

## Final Preliminary Documentation

### **Kumbarilla Renewable Energy Park (reference EPBC 2021/9018) Elecseed Pty Ltd and Korea Midland Power Co Ltd**

#### **Statement regarding public comment period on draft Preliminary Documentation:**

During the public comment period on the draft Preliminary Documentation, which commenced on 06 October 2023 and concluded on 03 November 2023, no public comments were received. As no public comments were received, no changes to the Draft Preliminary Documentation were required in order to finalise the Preliminary Documentation.

#### **Statement regarding version of final Preliminary Documentation:**

On 06 November 2023, the Draft Preliminary Documentation was finalised following the public comment period which concluded on 03 November 2023. This version of the preliminary documentation is considered final.



Elecseed Pty Ltd

# Kumbarilla Renewable Energy Park – EPBC Act Draft Preliminary Documentation

11 July 2023

## Executive Summary

Elecseed Pty Ltd (Elecseed) and Korea Midland Power Co., Ltd (Komipo) (together and herein described as the Proponent) is proposing to construct and operate the Kumbarilla Renewable Energy Park (K-REP) which is a photovoltaic (PV) Power Station and associated Access Corridor proposed 40 km west of Dalby, Queensland (the Action, herein referred to as the Project or K-REP).

The Project includes two components:

- PV Power Station – A 100-megawatt peak (MWp) PV Power Station wholly located within a 400-hectare (ha) property described as Lot 4 DY457 (Estate in fee Simple/freehold) including easements over Lot C SP107383 and Lot B SP10738. This component includes the onsite power generation and distribution; and
- Access Road (herein described as an Access Corridor) – The Access Corridor is located within a gazetted road (crown land) that is the named road, Forest Road, and an unnamed track leading to Lot 4 DY457, crossing to the north of Weranga State Forest. This also includes a small area for clearing associated with an emergency access route in the north-eastern area (refer to note below).

The construction workforce for the Project may vary; however, it has an estimated peak of 144 personnel and when operational, the Project will have an ongoing anticipated maximum workforce of 5 full time equivalent staff. The bulk of construction activities are proposed to be undertaken in daytime hours 7 days per week from 6.30 am to 6.30 pm during the construction period.

A desktop assessment and field assessments have been undertaken to establish the existing ecological values of the Project site and determine the level of likely impact upon them from the Project. Various ecological surveys have been completed across the Project area (and partly outside). The surveys were carried out by Paul Fox (Principal Environmental Scientist/ Project Manager – Fox & Co Environmental) and Dave Moore (Principal Botanist - Fox & Co Environmental), Bruce McLennan (Arcadian Ecology Pty Ltd) and Ben Nottidge (GreenLeaf Ecology):

- **Preliminary Survey** - A preliminary ecology survey of the PV power station was undertaken over a 3-day / 2-night period 6 – 8 May 2020 to ground-truth desktop information and identify any additional flora and fauna values not identified through the desktop study;
- **Targeted Survey** - A subsequent survey was undertaken 18 – 22 January 2021 and included a targeted protected plant survey, Koala (*Phascolarctos cinereus*) habitat survey, quaternary vegetation assessments and targeted Corben's long-eared bat (*Nyctophilus corbeni*) surveys;
- **BioCondition and Habitat Quality Assessment** - A BioCondition survey and habitat quality assessment was undertaken in the PV power station area 24 – 27 May 2021 to verify RE mapping for the PV power station footprint of the Project area, identify any conservation significant species under the Queensland *Nature Conservation Act 1992* (NC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and to identify and conduct BioCondition assessments as prescribed; and
- **Access Corridor Survey** - An additional ecological survey was undertaken between 24 – 27 May 2021 within the access corridor to ground-truth desktop information and identify any additional flora and fauna values.

In addition to the above listed ecological surveys, members of DCCEEW and the Project team visited the offset site on 31 January 2023 and the Project area on 1 February 2023.

The ecological values of the Project area and surrounds have been extensively surveyed recently in 2020 and 2021. No EPBC Act listed flora or fauna species, or communities were observed within the Project footprint itself during the field assessments other than residual evidence of the Koala. Evidence of Koala was identified in the Project Area during field surveys, through the discovery of Koala scats and two skulls. The condition of the Koala scats within the PV Power Station area suggest Koalas had been present several months prior to the surveys. The species is known to occur in the wider area. In respect to the significant impact assessment criteria for each of the reviewed species, this analysis concluded the following:



- **Yakka skink (*Egernia rugosa*)** – during the dedicated ecology surveys performed at the Project site and surrounds, and there have been no records within 10km buffer of Project Area. As per the assessment against the Significant Impact Criteria, the Project’s activities are considered unlikely to significantly impact the species;
- **Five-clawed worm-skink (*Anomalopus mackayi*)** – during the dedicated ecology surveys performed at the Project site and surrounds, and there have been no records within 10 km buffer of Project Area. As per the assessment against the Significant Impact Criteria, the Project’s activities are considered unlikely to significantly impact the species;
- **Squatter pigeon (southern) (*Geophaps scripta scripta*)** – While an ‘important population’ has been identified within the greater region, the Project Area possesses suitable foraging and breeding habitat and marginal dispersal habitat, with no evidence of the presence of squatter pigeon (southern) inhabitation found in the Project Area. The significance impact assessment and risk assessment concluded that there is not expected to be a significant residual impact on an ‘important population’ of this species;
- **Regent honeyeater (*Anthochaera phrygia*)** – during the dedicated ecology surveys performed at the Project site and surrounds, and there have been no records within 10 km buffer of Project Area. As per the assessment against the Significant Impact Criteria, the Project’s activities are considered unlikely to significantly impact the species;
- **Painted honeyeater (*Grantiella picta*)** – There were no species recorded in the Project area during the dedicated ecology surveys performed at the Project site and surrounds, and one record of this species has previously been recorded within a 10km buffer of the Project Area. As per the assessment against the Significant Impact Criteria, the Project’s activities are considered unlikely to significantly impact the species;
- **White throated needletail (*Hirundapus caudacutus*)** – There were no species recorded in the Project area during the dedicated ecology surveys performed at the Project site and surrounds, though two records of the species have previously been recorded within a 10km buffer of the Project Area. This is a wide-ranging aerial species that migrates from the northern hemisphere to eastern Australia. The significance impact assessment concluded that there will not be a significant impact on this species;
- **Greater glider (southern and central) (*Petauroides volans*)** – There were no species recorded in the Project area during the dedicated ecology surveys performed at the Project site and its surrounds, and only one record of this species has previously been recorded within a 10km buffer of the Project Area. The significance impact assessment concluded that there is not expected to be a significant impact on this species;
- **Koala (*Phascolarctos cinereus*)** – Habitat within the Project Area and surrounding the Project Area contains suitable habitat for the Koala to occur. As per the residual impacts likely to require referral stipulated in Section 8 of the Referral Guidelines for the Vulnerable Koala (that is relevant to this Project as the listing status of the species the controlled action decision), the Project has the potential to result in significant residual impacts to the Koala. The clearing of vegetation will result in the loss of potential habitat for koala. Notwithstanding the impact mitigation measures proposed to manage impacts to koala, the Project is likely to result in a significant residual impact and as such, environmental offsets for koala habitat are required; and
- **Brigalow woodland snail (*Adclarkia cameroni*)** – There were no species recorded in the Project area and there have been no records within 10 km buffer of Project Area. However, DCCEEW have confirmed a Brigalow woodland snail individual was recently recorded in proximity to the Project area; however, this point data cannot be obtained. As per the assessment against the Significant Impact Criteria, the Project’s activities are considered unlikely to significantly impact the species.

The design and mitigation measures proposed will minimise additional indirect impacts to terrestrial fauna and flora communities within and surrounding the Project area from construction and operational activities. These measures include minimising fauna interactions and weed spread during construction, and rehabilitation, all to be incorporated within the Construction Environmental Management Plan (CEMP). An Erosion and Sediment Control Plan (ESCP) will be developed to control indirect potential impacts such as dust and surface water contamination. With control measures in place indirect impacts to fauna and flora additional to those previously described are not expected to be significant.



An assessment of the socio-economic impacts of the Project indicates there will be positive impact on the regional economy due to the economic stimulus provided by the Project's construction and operation. This will also result in positive impacts to the regional supply chain and employment opportunities. Adverse impacts from the Project are minor and generally related to a loss of ecosystem services from clearing of remnant vegetation.

**PLEASE NOTE – Clearing to allow for an emergency access track has been included as part of the Preliminary Documentation that was not previously included in the Referral area. This is an approximate 600 m<sup>2</sup> square area at the north-eastern area. DAWE officers were notified of this minor inclusion on 09/10/2021 who advised of its inclusion in the Action area for this preliminary documentation.**

The following timeline explains the key events in the referral process to this point in time:

- On 30 August 2021, the Project was referred to the Commonwealth Government Department of Agriculture, Water and the Environment (DAWE);
- On 27 September 2021, and in accordance with section 75 and 87 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), DAWE deemed the proposed action a 'controlled action' to be assessed by preliminary documentation in accordance with Part 8, Division 4 of the Act. The controlling provisions are listed threatened species and communities (section 18 and 18A) under the Act (reference EPBC 2021/9018);
- On 2 December 2021 the draft preliminary documentation was submitted to DAWE and fees for Stage 2 were paid;
- On 16 December 2021 a meeting was held with the DAWE regarding initial feedback on the draft preliminary documentation. It was agreed during this meeting that a draft preliminary offset strategy could be prepared and submitted to DAWE prior to, or after receiving formal feedback on the draft preliminary documentation;
- On 18 January 2022 the draft preliminary offset strategy was prepared and then submitted to DAWE for feedback;
- On 02 February 2022 DAWE provided comments on the draft preliminary documentation;
- On 24 February 2022 DAWE provided comments on the draft preliminary offset strategy;
- On 22 April 2022 DAWE provided additional comments on the draft preliminary documentation including the draft preliminary offset strategy;
- On 27 May 2022, the Project team provided an updated revision of the draft preliminary documentation to DAWE;
- On 24 June 2022, a meeting was held with DAWE to discuss the feedback on the draft preliminary documentation provided on 27 May 2022. On 29 June 2022, meeting minutes were supplied, and DAWE responded with further comments on the minutes;
- On 1 July 2022, the Department of Climate Change, Energy, Environment and Water (DCCEEW) was established, superseding the water and environment functions from the Department of Agriculture, Water and the Environment and energy functions from the Department of Industry, Science, Energy and Resources;
- On 1 August 2022, a meeting was held with DCCEEW to discuss a proposed survey methodology for the proposed offset site. Following the meeting, on 5 August 2022, the DCCEEW issued another RFI;
- On 6 September 2022, the Project team provided to DCCEEW a response to the RFI items;
- On 23 September 2022, DCCEEW issued another RFI. On 5 October 2022, the Project team provide to the Department a response to the RFI;
- On 17 October 2022, the DCCEEW issued another RFI in relation to a letter provided to the DCCEEW in response to the previous RFI response;
- On 31 January and 1 February 2023, members of DCCEEW and the Project team undertook a site visit of the Project site and proposed offset site;
- On 3 March 2023 the Department of Climate Change, Energy, Environment and Water (DCCEEW) provided additional comments on the draft preliminary documentation including the draft offset strategy and assessment.

This revision of the draft preliminary documentation includes additional information following receipt of these comments;

- On 27 March 2023, a meeting was held in Canberra involving DCCEEW and the Project team to discuss the RFI issued on 3 March 2023; and
- On 18 May 2023, a meeting was held in Brisbane involving DCCEEW and the Project team to discuss the proposed response to the RFI issued on 3 March 2023.

For listing events that occur after the controlled action decision is made, section 158A of the EPBC Act provides that assessment processes under Parts 7 – 9 of the EPBC Act cannot be affected by the listing event. Therefore, the impact to such species cannot be considered as part of this assessment. At the time of the controlled action decision date, the following species were not listed under the EPBC Act and therefore were not considered in the original Preliminary Documentation submission or this submission:

- Yellow bellied glider (*Petaurus australis australis*) – listed as Vulnerable effective 2 March 2022;
- Grey snake (*Hemiaspis damelii*) – listed as Endangered effective 5 October 2022;
- Glossy black-cockatoo (south-eastern) (*Calyptorhynchus lathami lathami*) – listed as Vulnerable effective 10 August 2022;
- Southern whiteface (*Aphelocephala leucopsis*) – listed as Vulnerable effective 31 March 2023; and
- Diamond firetail (*Stagonopleura guttata*) – listed as Vulnerable effective 31 March 2023.

In addition to the above species, the Brigalow woodland snail has been added to the assessment as a precautionary approach as per DCCEEW's disclosure that a record of this species has occurred in proximity to the Project site.

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## Document history & status

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Note: CDM Smith has provided a final draft of this document to ERM for final review.

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# Section 1 Introduction

## 1.1 Background

Elecseed Pty Ltd (Elecseed) and Korea Midland Power Co., Ltd (Komipo) (together and herein described as the Proponent) is proposing to construct and operate the Kumbarilla Renewable Energy Park which is a photovoltaic (PV) Power Station and associated Access Corridor proposed 40 km west of Dalby, Queensland (the Action, herein referred to as the Project or K-REP).

The Project includes two components:

- PV Power Station – A 100-megawatt peak (MWp) PV Power Station wholly located within a 400-hectare (ha) property described as Lot 4 DY457 (Estate in fee Simple/freehold) including easements over Lot C SP107383 and Lot B SP10738. This component includes the onsite power generation and distribution; and
- Access Corridor – The Access Corridor is located within a gazetted road (crown land) that is the named road, Forest Road, and an unnamed track leading to Lot 4 DY457, crossing to the north of Weranga State Forest. This also includes a small area for clearing associated with an emergency access route in the north-eastern area (refer to note below).

The Project was referred to the Commonwealth Government Department of Agriculture, Water and the Environment (DAWE) on 30 August 2021. On 27 September 2020, and in accordance with section 75 and 87 of the EPBC Act, DAWE deemed the proposed action a ‘controlled action’ to be assessed by preliminary documentation in accordance with Part 8, Division 4 of the Act (refer to **Appendix A**). The controlling provisions are listed threatened species and communities (section 18 and 18A) under the Act (reference EPBC 2021/9018).

**PLEASE NOTE – Clearing to allow for an emergency access track has been included as part of the Preliminary Documentation that was not previously included in the Referral area. This is an approximate 600 m<sup>2</sup> square area at the north-eastern area. DAWE officers were notified of this minor inclusion on 09/10/2021 who advised of its inclusion in the Action area for this preliminary documentation.**

### 1.1.1 Timeline

The following timeline explains the key events in the referral process to this point in time:

- On 30 August 2021, the Project was referred to the Commonwealth Government Department of Agriculture, Water and the Environment (DAWE);
- On 27 September 2021, and in accordance with section 75 and 87 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), DAWE deemed the proposed action a ‘controlled action’ to be assessed by preliminary documentation in accordance with Part 8, Division 4 of the Act (refer to **Appendix A**). The controlling provisions are listed threatened species and communities (section 18 and 18A) under the Act (reference EPBC 2021/9018);
- On 2 December 2021 the draft preliminary documentation was submitted to DAWE and fees for Stage 2 were paid;
- On 16 December 2021 a meeting was held with the DAWE regarding initial feedback on the draft preliminary documentation. It was agreed during this meeting that a draft preliminary offset strategy could be prepared and submitted to DAWE prior to, or after receiving formal feedback on the draft preliminary documentation;
- On 18 January 2022 the draft preliminary offset strategy was prepared and then submitted to DAWE for feedback;
- On 02 February 2022 DAWE provided comments on the draft preliminary documentation;
- On 24 February 2022 DAWE provided comments on the draft preliminary offset strategy;

- On 22 April 2022 DAWE provided additional comments on the draft preliminary documentation including the draft preliminary offset strategy.
- On 27 May 2022, the Project team provided an updated revision of the draft preliminary documentation to DAWE;
- On 24 June 2022, a meeting was held with DAWE to discuss the feedback on the draft preliminary documentation provided on 27 May 2022. On 29 June 2022, meeting minutes were supplied, and DAWE responded with further comments on the minutes.
- On 1 July 2022, the Department of Climate Change, Energy, Environment and Water (DCCEEW) was established, superseding the water and environment functions from the Department of Agriculture, Water and the Environment and energy functions from the Department of Industry, Science, Energy and Resources;
- On 1 August 2022, a meeting was held with DCCEEW to discuss a proposed survey methodology for the proposed offset site. Following the meeting, on 5 August 2022, the DCCEEW issued another RFI;
- On 6 September 2022, the Project team provided to DCCEEW a response to the RFI items;
- On 23 September 2022, DCCEEW issued another RFI. On 5 October 2022, the Project team provide to the Department a response to the RFI;
- On 17 October 2022, the DCCEEW issued another RFI in relation to a letter provided to the DCCEEW in response to the previous RFI response;
- On 31 January and 1 February 2023, members of DCCEEW and the Project team undertook a site visit of the Project site and proposed offset site.;
- On 3 March 2023 the Department of Climate Change, Energy, Environment and Water (DCCEEW) provided additional comments on the draft preliminary documentation including the draft offset strategy and assessment. This revision of the draft preliminary documentation includes additional information following receipt of these comments;
- On 27 March 2023, a meeting was held in Canberra involving DCCEEW and the Project team to discuss the RFI issued on 3 March 2023; and
- On 18 May 2023, a meeting was held in Brisbane involving DCCEEW and the Project team to discuss the proposed response to the RFI issued on 3 March 2023.

### 1.2 Purpose and Scope

Following the original referral and decision described in Section 1.1, on 14 October 2021 DAWE submitted a request for further information (RFI) to the Proponent describing the technical and non-technical information required in the preliminary documentation and the general structure, style and format of the required response. Subsequent RFIs have reinforced the requirement to provide the PD as a summary of relevant information and supplementary information provided in response to RFIs. Detailed technical information, studies and investigations supporting this summary report are attached as appendices to the main document.

The Preliminary Documentation request by DAWE listed the following specific additional content:

1. General content, format and style;
2. Description of the action;
3. Description of the environment and Matters of National Environmental Significance;
4. Quantification of impacts;
5. Avoidance and mitigation;

6. Proposed offsets;
7. Economic and social matters; and
8. Ecologically sustainable development.

To address the specific additional information requested by DAWE and subsequently DCCEEW, this document provides a detailed compilation of existing information from the original Referral which is supplemented by additional information gathered in response to each RFI and DAWE/DCCEEW comments on matters provided during the consultation process with the Department.

Multiple RFIs have been issued and addressed for this Project and whilst the scope of this documentation is focused on providing the information necessary to address the RFIs, the Preliminary Documentation is also required to be 'stand-alone' and therefore a range of additional information has been included to provide the reader with a comprehensive document (e.g., location information, relevant legislation, environmental permits, and local development approvals process etc.). The first RFI was dated 14 October 2021 (refer to Section 1.4.1), the second RFI was issued as comments on the Preliminary Documentation and Draft Offset Strategy in February and April 2022 (refer to Section 1.4.2). The most recent RFI was provided on 3 March 2023 and is provided in Section 1.4.3.

### 1.3 Description of the Action

The proposed action requires the disturbance of 209.4 ha to improve the existing access road and emergency egress point and allow for the installation of PV modules and associated electricity infrastructure to develop the 100 MWp PV power station.

The Project's proposed system arrangement is to achieve a 100 MWp installation utilising a maximum Ground Cover Ratio (GCR) of 0.5 MW/ ha to fit within the physical site constraints and an approximate 200 ha negotiated lease arrangement. This shall include all ancillary systems and balance of plant. Due to the existing topography and undulating nature of the site, horizon shading must be avoided from natural formations as much as reasonably practicable.

Provision has been included for one permanent Project Operations Area. Refer to **Appendix B** for the Project Area and **Appendix C** for a detailed layout of the PV Power Station area. The includes provisions for the following permanent structures:

- Site 33 kV Switch room (2 x 12.2 m container);
- Low voltage, power plant controller and supervisory control and data acquisition control room (6x9m structure);
- Office and control centre (6 x 9 m structure);
- Amenities (6 x 9 m structure);
- Store 1 (6 x 9 m structure);
- Store 2 (6 x 9 m structure);
- Space for 20 car park bays (unsealed); and
- Through road, emergency egress track, truck parking bay and turnaround bay.

All structures shall largely be prefabricated off site, delivered and installed on raised structural posts. Surrounding staircases, ramps, pathways, verandas and similar shall be constructed on site to suit the final configuration. The compound shall be fenced and secured with appropriate physical and electronic security measures in place. The compound shall be lightning protected and generally treated as a critical services zone for ongoing operation.

Within the Project Operations Area will be the 33 kV site distribution switch room. This is planned around a prefabricated ABB 'Eco Flex' containerised system including all required self-contained services. A Powerlink-compliant 132kV to 33kV substation is required to be located on the Project site to provide the PV Power Stations 33 kV point of

connection and coupling. A spatial allowance of 150 x 100 m has been provisioned for this substation with a 5 m wide perimeter emergency egress and access road.

Within the Access Corridor, the Project includes a 5.7 km (approximately 22 ha) long access road (within a public road reserve known as Forest Road and referred to as the Access Corridor). Forest Road provides the final portion of the approved access road and is a rural access road constructed in a road reserve. Condition 61 of the Material Change of Use (MCU) approval requires the upgrading of Forest Road to provide an all-weather 7 m wide gravel pavement on an 8 m formation. There is no stipulation about upgrading Forest Road in its current formed location or in the dedicated road reserve. An approximate 2.5 km section of the public road reserve for Forest Road occurs adjacent to the Weranga State Forest (Lot 201 on FTY1243). As with many rural roads in Queensland, the actual formed location of the road deviates from the road reserve and enters the State Forest lot at two locations totalling approximately 420 m. Based on aerial imagery, these deviations are assumed to be associated with on ground constraints (e.g., drainage lines).

The following legislation below are relevant to identifying the impacts and constraints relevant to the site and provide guidance in the assessment of the ecological values of the site.

## 1.4 Compliance Table

### 1.4.1 Additional Information Request (14 October 2021)

Table 1-1 provides a cross-reference providing evidence of compliance with the DAWE additional information request (dated 14 October 2021) that has been included in this Preliminary Documentation. Table 1-1 is a cross-reference which includes extracts from the additional information request.

**Table 1-1 Preliminary Documentation – Request for Information (14 October 2021)**

Item	Request	Section and Response
<b>1. General content, format and style</b>		
-	The preliminary documentation must include: a) The information contained in your original referral b) All additional information submitted to the department in support of the referral c) The further information you provide on the impacts of the proposed action and the strategies you propose to avoid, mitigate, and/or offset those impacts (as described below), and d) Other relevant information on the matters protected by the EPBC Act.	N/A
-	Follow the structure of this information request.	This Preliminary Documentation follows the structure of the information request.
-	Include a reference table indicating where to find the information fulfilling this request.	Table 1-1
-	Contain sufficient information to enable interested stakeholders and the Minister (or delegate) to understand the environmental consequences of the proposed development on matters of national environmental significance (MNES).	This Preliminary Documentation addresses the requirements of the RFI and includes information from the Referral to provide a comprehensive account of the potential impacts to MNES and the proposed management measures to remove or minimise the potential for those impacts.
-	Specifically, it must contain sufficient information to allow the Minister (or delegate) to make an informed decision on whether or not to approve, under Part 9 of the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act), the undertaking of the action for the purposes of each controlling provision.	The potential impacts and mitigation, and offsetting proposal are contained within this PD to a level of detail that should afford the Minister or delegate to make an informed decision as to the action pursuant to the controlling provisions.



Item	Request	Section and Response
-	Please note that the department may require further information, in addition to the information required below, should new information come to light during the assessment stage (e.g. an additional species has been identified onsite).	N/A
-	<p>Ensure all work and conclusions:</p> <p>a) Are evidence based and the evidence is provided.</p> <p>b) Use scientifically robust methodologies appropriate to the purpose, detail why the methodology/s was selected, and are described and referenced.</p> <p>c) Consider and state any limitations in the chosen approach.</p> <p>d) Are supported by peer reviewed literature, with references provided, or expert opinion.</p> <p>e) Are presented clearly, unambiguously, succinctly and objectively.</p> <p>f) Are, where appropriate, supported by maps, plans, diagrams or other descriptive detail.</p> <p>g) Demonstrate consideration of relevant Approved Listing Advice(s), Approved Conservation Advice(s), Recovery Plan(s), Threat Abatement Plan(s) or comparable policy guidelines, and approved survey methods.</p>	The work and conclusions presented in this preliminary documentation are based on evidence gathered from field investigations and supported literature which has been correctly cited as necessary. Scientific methodologies applied are consistent with relevant survey guidelines and species profiles for the jurisdiction and bioregional profile of the relevant species. Limitations and assumptions are clearly articulated throughout the report, and efforts to ameliorate any limitations have been proposed. An objective assessment of the conditions as current at the time of surveys has been clearly portrayed, and the reporting has been supported by maps formulated in ESRI ArcGIS using a combination of publicly available spatial datasets which has been supplemented by ground-truthed data collected on GPS devices. Relevant conservation advice, recovery plans, threat abatement plans, species profiles, guidelines and policy papers have been considered in the definition of habitat descriptions, ecological profiles and impact mitigation and offsetting strategies for the Project.
-	Be able to read as a stand-alone document and must include summaries of all relevant information. Detailed technical information, studies or investigations necessary to support the main text should be attached as appendices to the main document	This Preliminary Documentation has been prepared as a stand-alone document. As such there is necessary repetition of materials previously presented in the Referral, supplemented by additional information provided to address the requirements of the subsequent RFI.
<b>2. Description of the Action</b>		
-	The preliminary documentation must include a description of the action.	The action is clearly described in Section 2 of this Preliminary Documentation Report.
2.1	<p>Including:</p> <p>a) The location, boundaries, and size (in hectares) of the disturbance footprint, and of adjoining areas and vegetation, which may be indirectly impacted by the proposal, including from material stockpiles, vehicle access and associated activities.</p>	<p>Refer to Section 2.2.</p> <p>This includes a description and calculations of the Project Area and expected disturbance footprints.</p>
	b) A description of all components of the proposed action, including the anticipated timing and duration, (including start and completion dates) of each component of the proposed action. This should include a detailed outline of the expected timing of any staged clearing over the construction period.	<p>Refer to Section 2</p> <p>This includes a description of Project infrastructure and timing.</p>

Item	Request	Section and Response
	c) A description of the construction and operation of the solar farm and associated works (i.e. activities that comprise its operation).	Section 2.9 This includes a breakdown of the proposed Project activities including construction and commissioning.
	d) An indicative layout plan for the proposed action area, including the location and type of land use, key infrastructure, and the number and location of dwellings, other buildings, open space, and conservation areas.	<b>Appendix C.</b> This is the layout plan and includes locations of infrastructure, buildings and access roads. This plan clearly shows the types of uses that are proposed to occur in the Project Area.
2.2	<p>The department notes that the proponent’s website (<a href="https://k-rep.com.au">https://k-rep.com.au</a>) and the referral describe the proposed action as part of a two stage development. Later stages proposed on the website include a further 100 MW photovoltaic power station and 80MW green hydrogen production facility.</p> <p>The department considers that the proposed action is likely to facilitate future impacts through these later stages. Provide a discussion on the relationship of the proposed action with these later stages. Information in the following document may help to describe the relationship.</p> <p>EPBC Act Policy Statement on Staged Developments-Split Referrals at: <a href="https://www.environment.gov.au/resource/epbc-act-policy-statement-staged-developments-split-referrals-section-74a-epbc-act">https://www.environment.gov.au/resource/epbc-act-policy-statement-staged-developments-split-referrals-section-74a-epbc-act</a>.</p> <p>The discussion should include:</p> <ul style="list-style-type: none"> <li>• The likely size and location of those later stages and any potential impacts on matters protected under the EPBC Act</li> <li>• The likely impacts may comprise of desktop and/or onsite surveys</li> <li>• Maps of the proposed sites for activities associated with the larger Kumbarilla Renewable Energy Project.</li> </ul>	Section 2.12. This includes a discussion on if the Project is considered a two-staged development. This approach was discussed with DAWE on 26 October 2021.
<b>3. Description of the environment and Matters of National Environmental Significance</b>		
-	<p><u>Listed threatened species and ecological communities and listed migratory species</u></p> <p>From the information provided to date, the department considers that the matters that may or are likely to be significantly impacted by the proposed action include, but are not limited to:</p> <ul style="list-style-type: none"> <li>• Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) (<i>Phascolarctos cinereus</i>) – vulnerable.</li> </ul>	The Preliminary Documentation includes a detailed assessment of the presence of Koala habitat in the Project Area and surrounds and any potential impacts the Project may have on the Koala population.

Item	Request	Section and Response
-	<p>The department also considers that there is a real chance or possibility that significant impacts may arise in relation to the following:</p> <ul style="list-style-type: none"> <li>• Squatter pigeon (southern) (<i>Geophaps scripta scripta</i>) – vulnerable</li> <li>• Yakka skink (<i>Egernia rugosa</i>) – vulnerable.</li> </ul>	<p>The Preliminary Documentation includes a detailed assessment of the presence of Koala habitat in the Project Area and surrounds, and any potential impacts the Project may have on the Yakka skink and Squatter pigeon (southern) and other species.</p>
-	<p><i>Note: this may not be a complete list and it is your responsibility, as the proponent, to ensure that any species or ecological communities listed under the EPBC Act at the time of the controlled action decision, which will or are likely to be significantly impacted by the proposed action, are assessed for the Minister’s consideration.</i></p> <p><i>Any matters protected by a listing events (i.e. new listing or up-listing of a species or ecological community, e.g. from vulnerable to endangered category) that occur after the controlled action decision cannot be considered in the decision to approve or not approve an action, as set out in s158A of the EPBC Act. However, for the purpose of offsets, where a species was listed at the time of the controlled action decision and has subsequently been up or down-listed, the department will use the current listing status to calculate offset requirements.</i></p> <p><i>Furthermore, it is also the responsibility of the proponent to maintain awareness of any changes to species distributions. Please ensure that a recent Protected Matters Search Tool report has been generated and used during the assessment stage before finalising the draft preliminary documentation.</i></p>	
-	<p><u>Habitat quality</u></p> <p>In accordance with the Koala habitat assessment tool in the EPBC Act referral Guidelines for the listed Koala, the referral notes that the site contains habitat critical to the survival of the Koala with a score of 8. The department disagrees with this score and considers that a score of 10 is more appropriate for the following reasons:</p>	<p>Refer to <b>Appendix I</b>.</p> <p>The methodology used in Appendix 1 has considered the scoring that was suggested by the DAWE and the scoring has been updated to reflect the DAWE’s comments.</p>
-	<p>a) Koala occurrence (+2) – Surveys conducted in May 2020 and January and May 2021 identified the presence of Koala scat, scratches and two Koala skulls within the proposed action area, therefore there is evidence of one or more Koalas within the last five years.</p>	<p>Refer to <b>Appendix I</b>.</p> <p>. After further review and consideration, the scoring has been updated to reflect the DAWE’s comments and the scoring that was suggested by the DAWE.</p>
-	<p>b) Vegetation composition (+2) – the site contains a ‘woodland’ or ‘open forest’ with two or more known Koala food tree species, including Narrow-leaved Ironbark (<i>Eucalyptus crebra</i>), Queensland Peppermint (<i>Eucalyptus exserta</i>), and Forest Red Gum (<i>Eucalyptus tereticornis</i>).</p>	<p>Refer to <b>Appendix I</b>.</p> <p>After further review and consideration, the scoring has been updated to reflect the DAWE’s comments and the scoring that was suggested by the DAWE.</p>

Item	Request	Section and Response
-	c) Habitat connectivity (+2) – the proposed site is part of a contiguous landscape of greater than 1000 ha.	Refer to <b>Appendix I</b> . After further review and consideration, the scoring has been updated to reflect the DAWE’s comments and the scoring that was suggested by the DAWE.
-	d) Key existing threats (+2) – the proponent states that the existing threat is medium because on juvenile Koala skull was found, one dingo was observed and the area is known to have a wild dog problem. The department does not consider this represents evidence of infrequent or irregular Koala mortality from vehicle strike or dog attack. The department considers there is little or no evidence of Koala mortality from vehicle strike or dog attack at present and therefore this criteria should be scored as +2.	Refer to <b>Appendix I</b> . After further review and consideration, the scoring has been updated to reflect the DAWE’s comments and the scoring that was suggested by the DAWE.
-	d) Recovery value (+2) – the department considers that, given the scale and location of the proposed action site, it is likely to be important for achieving the interim recovery objectives for the inland context and should be scored +2.	Refer to <b>Appendix I</b> . After further review and consideration, the scoring has been updated to reflect the DAWE’s comments and the scoring that was suggested by the DAWE.
-	The preliminary documentation must provide a description of the environment affected by and surrounding the proposed action area, over both the short and long term. Specific matters this section must address include, but are not limited to:	Refer to the below.
3.1	A description of any potential MNES (including but not limited to those listed in this request for information) that occur in the Project Area and adjacent areas.	Section 3.4
3.2	A description and map of the current land use/s, land topography, surface and ground water bodies, waterways and vegetation communities (habitat types as they relate to potentially impacted listed threatened species) on the proposed action site and adjoining areas.	Section 3.3 The Preliminary Documentation has provided an overall description on the matters mentioned. These are based on desktop and in some circumstances field surveys. Please see also Figure Figure 3-3 to Figure 3-12.
3.3	For listed threatened species and ecological communities that have the potential, or are likely, to be present at and in the vicinity of the project site, including but not limited to those listed in this request for further information, this section must provide the following: a) Information on the abundance, distribution, ecology and habitat preference of the species or communities.	Section 3.4 Key information on threatened to species with the potential to occur on or in the vicinity of the Project Area has been included. This includes a description of the species, occurrence in the region, occurrence in the Project Area and a habitat assessment.

Item	Request	Section and Response
	b) Quantification of the extent of habitat and (if known) the number of individuals present or historical patterns of use on and surrounding the proposed action site (including maps identifying known or potential habitat).	Section 3.4 Information on the extent of habitat within and surrounding the Project Area have been identified. Searches of publicly available information from government and other surrounding proponent's documentation has been used as part of the quantification.
	c) Assessment of the quality and importance of known or potential habitat for the species or communities within the proposed action site and surrounding areas.	Section 3.4 This includes information on occurrence in the region, occurrence in the Project Area and a habitat assessment for threatened species with the potential to occur. Section 4.1.1 includes a review of the connectivity of the Project Area with surrounds.
	d) Information detailing known populations or records within at least five kilometres of the development footprint and (if known) the size of these populations.	Section 3.4 This includes information on occurrence in the region, occurrence in the Project Area and a habitat assessment for threatened species with the potential to occur.
	e) Information on the survey methodology used, including a map/s of survey points or transects, how the survey points or transects were selected, when surveys were conducted (e.g. dates, time of day, season, etc.) and search effort (e.g. 20 hours over eight days).	Section 3.2. This section includes information on the field surveys and location of dedicated survey points and transects completed.
	f) An assessment of the adequacy of any surveys undertaken. In particular, the extent to which these surveys were appropriate for the species and undertaken in accordance with relevant survey guidelines.	Section 3.2 and Table 3-1. For threatened species with the potential to occur, a cross-reference assessment of field surveys to survey guidelines has been undertaken.
	g) Results of any surveys undertaken.	Section 3.3 and 3.4 Results of surveys has been included in these sections.
3.4	Information about the methods, data and scientific literature used to identify and assess the environmental values on the proposed action site and surrounding areas, including survey data and historical records. Survey data for the proposed action site must be provided for the above listed threatened species, should be as recent as possible, and must not have been collected more than five years before the date of this letter.	Section 3.2. Information regarding survey methods and literature used has been included. Surveys are considered recent having been undertaken in 2020 and 2021.
<b>4. Quantification of impacts</b>		

Item	Request	Section and Response
-	Based on the information provided in the referral, additional information provided in support of the referral, information provided in the Species Profile and Threats Database, and observation records provided in the Atlas of Living Australia, the department considers that:	Refer to below.
-	Due to the presence of Koala food trees across the proposed action area and as there are few barriers to movement, the proposed action is likely to result in the loss of 207 ha of habitat critical to the survival of the Koala. General guidance for determining Koala habitat in open/cleared areas is provided in Attachment C.	This guideline has been reviewed and was used as part of the assessment.
-	Further information regarding the presence of habitat and potential impacts are required to determine whether or not the proposed action is likely to have a significant impact on the Squatter Pigeon and the Yakka Skink. Squatter Pigeons are often sighted in opportunistic sightings rather than in targeted surveys. Opportunistic sightings of threatened species should be considered when determining presence of these species onsite.	For all species with potential to occur refer to Section 3.4. Additional information on Squatter pigeon (southern) and Yakka skink can be found in sections 3.4.2.1, 3.4.2.2, 4.3.1 and 4.3.3
-	The department notes that the action may also result in indirect impacts on MNES and habitat adjacent to the proposed action site. Indirect impacts may result from edge effects; mortality or injury to MNES from increased traffic; and/or predation from domestic dogs. Direct and indirect impacts on adjacent habitat areas may also render this habitat to be functionally lost.	Indirect impacts have been considered as part of the assessment and are found in Section 4.
-	To clarify the extent and nature of impact on listed threatened species and ecological communities as a result of the proposed action, the preliminary documentation must:	Refer to below.
4.1	Include current maps and coordinates/shapefile of the proposed impact area and areas of habitat for MNES proposed to be retained. Maps must clearly identify development footprints, buffer zones, and any conservation areas where impacts will be avoided, and areas of adjacent habitat that would be subject to indirect impacts, including areas that are to be retained within and adjacent to the site.	Section 3.4. Maps of potential and known habitat of threatened species have been prepared (Refer to Figures 1-10 in <b>Appendix L</b> ). As a conservative approach, the Project Area has been used to calculate impact areas. Conservation and buffer areas will be applied during detailed design of the Project.
4.2	Confirm the area of habitat that will be directly and indirectly impacted by the proposed action, including areas where:	Refer to Section 4.1.1. This includes a discussion on connectivity.
	a) Connectivity to surrounding habitat will be retained, removed or functionally lost.  b) Adjacent habitat will be subject to intensification of ongoing impacts (for example, through increased levels of dust or polluted runoff).	Refer to Section 3.4 for a discussion on potential habitat for species.
4.3	Confirm the quantity and quality of suitable habitat to be impacted within the proposed action area.	The quantity of habitat within the Project Area of threatened species has been calculated. Ground-truthed vegetation areas have also been calculated and are provided in Section 3.3.6.2.



Item	Request	Section and Response
4.4	Provide an assessment of the direct, indirect, consequential and cumulative impacts that may occur during construction and post-construction phases, including:	Section 4.4. This section includes a review of all impacts that may occur during all phases of the Project and their potential to have a significant impact on relevant threatened species.
	a) The nature and extent of impacts (including direct, indirect and facilitated impacts), including timing and whether the impact is temporary or permanent.	Section 4.4. This section includes a review of all impacts that may occur as a result of the Project and their potential to impact relevant threatened species.
	b) Details of any policy guidelines, relevant studies, surveys or consultations with species experts/field specialists, which were not included in the referral or additional information provided in support of the referral.	Section 4.4.
	c) A local and regional scale analysis of likely impacts, with reference to the project's potential contribution to cumulative impacts in the context of development patterns in the locality and region.	Section 4.1.1. This includes a discussion on potential cumulative impacts as a result of gas field development and future potential clearing in the region.
	d) A risk assessment of potential impacts from the action that are likely to be unpredictable, severe, or irreversible.	Section 4.4. This section identifies the risk assessment method chosen to identify potential impacts on relevant threatened species.
	<i>Note: Facilitated impacts may include (but are not limited to) the risk of injury or mortality to MNES as a result of the introduction of domestic dogs, vehicle strike as a result of increased traffic use and/or the development of domestic pools.</i>	Section 4.4. This section includes a risk assessment on these impacts.
4.5	Provide a description of environment management activities that will be undertaken as part of the development of the proposed action including management activities intended to avoid and mitigate impacts on listed threatened species. You should include an assessment on the management activities intended benefit, likelihood of success, corrective actions should the intended benefit not occur and details of who will be responsible for each activity if third party providers are intended to be used.	Section 5. Information on management measures is included in this section. This includes an assessment of each management actions expected effectiveness.
<b>5. Avoidance and Mitigation</b>		
5.1	Provide a consolidated description of all proposed measures to avoid and mitigate impacts, including those provided in the referral and any additional to those described in the referral. This should include:	Section 5.2 <b>Appendix M</b> – Consolidated management measures.
	a) Discussion of consideration and assessment of alternative strategies, plans and measures to avoid and mitigate impacts (e.g. alternative plans, retention of habitat/movement corridors/buffers, and fauna-friendly development and road design).	Section 5.2 Information on alternative strategies and plans to avoid impacts are included within the management measures proposed,

Item	Request	Section and Response
	b) Details about pre-clearance and clearance procedures to ensure that species are detected and managed to minimise mortality, stress, injury, or introduction of disease.	Section 5.3. Pre-clearance and clearance procedures are included in this section.
	c) A description (including maps and imagery) of the location, boundaries and size of buffer areas or proposed exclusion zones, and details on how these areas will be enhanced, protected and maintained. Also include a description of any fences or barriers which may be installed around areas where impacts will be avoided.	Section 5.2 Details regarding fences and barriers have been included in this Section.
	d) Details of any rehabilitation measures to be implemented for disturbed areas, including rehabilitation objectives, target species, timing of rehabilitation stages, methodology, maintenance measures, schedules, and monitoring.	Section 5.4. Proposed rehabilitation measures have been included in this section. Additional information will be included in a Rehabilitation Management Plan as required.
	e) Details of any ongoing mitigation and management measures during the operation of the facility.	Section 5.2. Ongoing management measures have been identified.
5.2	For each measure proposed, indicate the:	N/A
	a) Responsible party	Tables in Section 5.2. A column has been added to the management measures table in this section.
	b) Environmental outcomes to be achieved	Tables in Section 5.2 A column has been added to the management measures table in this section.
	c) Millstones / performance / completion criteria	Tables in Section 5.2 A column has been added to the management measures table in this section.
	d) Proposed monitoring and evaluation program.	Tables in Section 5.2 A column has been added to the management measures table in this section.
5.3	Provide an assessment of the predicted effectiveness of each proposed avoidance or mitigation measure, noting that the effectiveness of a particular measure is a reflection of confidence in the ability of the measure to reduce the risk of a threat. The assessment of effectiveness should be evidence based and include examples of demonstrated success of a particular measure to achieve the desired avoidance/mitigation outcome.	Tables in Section 5.2. A column has been added to the management measures table in this section.

Item	Request	Section and Response
5.4	Please provide a table showing where in the preliminary documentation how relevant Guidance documents (i.e. Recovery Plans, Threat Abatement Plans and Conservation Advices) have been considered. That is, having regard to and providing a discussion on the objectives of the documents.	Section 3.4 and 5.1 This has been included and referenced where possible in these sections.

Item	Request	Section and Response
<b>6. Proposed Offsets</b>		
-	Based on the referral information, the department considers that the proposed action is likely to have a residual significant impact on the Koala and may have a residual impact on Squatter Pigeon and Yakka Skink.	This has been confirmed as part of this Preliminary Documentation preparation.
-	Where residual significant impacts remain after consideration of avoidance and mitigation measures, an environmental offset will be required to compensate for the impacts in accordance with the <i>Environment Protection and Biodiversity Conservation Act 1999</i> Environmental Offsets Policy (EPBC Offsets Policy). Offsets must be specific to the species or ecological community being impacted and must improve or maintain the viability of the species.	This has been confirmed as part of this Preliminary Documentation preparation. Section 6 includes information on potential offsets including potential offset sites.
-	<u>Habitat quality assessment methodology</u> The following must be adhered to when assessing habitat quality for a listed species.	Refer to Sections 3.2.2.3, 3.2.2.4, 6.5.2.
-	<ul style="list-style-type: none"> <li>The methodology chosen to assess habitat quality must be evidence-based, quantitative, robust and repeatable.</li> </ul>	Refer to Sections 3.2.2.3, 3.2.2.4, 6.5.2. This includes the methodology used.
-	<ul style="list-style-type: none"> <li>The same methodology to assess habitat quality must be used at both impact and offset sites for input into the EPBC Act Offsets Assessment Guide.</li> </ul> <p><i>Note: The department currently uses an adaptation of the DEHP guide, the Modified Habitat Quality Assessment (MHQA) Version 1.2 April 2017.</i></p>	Refer to Sections 3.2.2.3, 3.2.2.4 and 6.5.2. This includes the methodology used for an offset site.
-	<ul style="list-style-type: none"> <li>The quality score for an area of habitat must relate directly to habitat requirements of the species (e.g. number of Koala feed trees).</li> </ul> <p><i>Note: This may inform outcome-based conditions if the Minister decides to approve the proposed action.</i></p>	<b>Appendix N.</b> Details regarding scoring method have been included.
-	<ul style="list-style-type: none"> <li>Risk of loss scores with and without offset must be substantiated by strong evidence where the risk of loss exceeds a score of 0.</li> </ul> <p><i>Note: Risk of Loss is the chance that values for the protected matter on the proposed offset site will be permanently lost due to development reducing the extent and viability of that protected matter. Land zoning, stochastic events, land degradation, speculation that a landowner may sell or clear their land or actions that would necessitate approval under the EPBC Act do not constitute a risk of loss.</i></p>	<b>Appendix N.</b> Details regarding risk of loss have been provided.
-	<ul style="list-style-type: none"> <li>There are three components that need to be considered when calculating habitat quality which should be weighted as follows: site condition (30%), site context (30%), and species stocking rates (40%). The MHQA provides some guidance on what may be considered for each habitat quality component.</li> </ul>	Refer to Sections 3.2.2.3, 3.2.2.4, 6.5.2. Details regarding these three components have been provided.

Item	Request	Section and Response
-	<ul style="list-style-type: none"> <li>When calculating offsets, please refer to the department's published guidance: How to use the Offsets Assessment Guide.</li> </ul>	<p><b>Appendix N.</b> This guide was utilised when calculating offsets as detailed in this section and the appendix.</p>
-	In the past, the Koala habitat assessment tool at Table 4 (p. 27) of the EPBC Act referral guidelines for the listed koala has been used by proponents to assess habitat quality for that species at proposed offset sites, however the department notes that this methodology may not accurately account for potential habitat quality improvements as a result of management measures over time.	<p>Refer to Sections 3.2.2.3, 3.2.2.4, 6.5.2. The MHQA has been used to calculate habitat quality as directed to by the department.</p>
-	The department encourages all proponents to initially consult the department on appropriate methodology to calculate a habitat quality score, before conducting their assessment.	<p>Refer to Sections 3.2.2.3, 3.2.2.4, 6.5.2. A meeting was held with DAWE on 9/11/2021 to confirm the method.</p>
-	For further details regarding offset requirements, see Attachment B.	Refer to Sections 3.2.2.3, 3.2.2.4, 6.5.2.
-	If a residual significant impact is identified, the preliminary documentation must include an offset proposal, which must:	A residual significant impact was identified for the Koala. As such, the Preliminary Documentation has included an offset proposal for this species.
6.1	Demonstrate how the offset proposal:	-
	a) Meets the principles outlined in the EPBC Offsets Policy.	<p>Section 6.2 and <b>Appendix N.</b> An assessment of the EPBC Offsets Policy has been undertaken and tabulated.</p>
	b) Addresses the considerations and requirements outlined in the EPBC Offsets Policy, including but not limited to sections 6 and 7 of the EPBC Offsets Policy.	<p>Section 6.3 and <b>Appendix N.</b> This has been undertaken in these sections. An offset site has not yet been confirmed but will be finalised before the action commences. Details regarding potential offset sites have been included.</p>
	c) Directly contributes to the ongoing viability of the EPBC listed species or ecological community and will deliver an overall conservation outcome that improves and or maintains the viability of the protected matter, as compared to what is likely to have occurred under the status quo, i.e. if neither the action nor the offset had taken place.	<p><b>Appendix N.</b> An offset site has not yet been confirmed but will be finalised before the action commences. Details regarding potential offset sites have been included in <b>Appendix N</b>, including information on preliminary site investigations for two of these potential sites. One of the potential offset sites has had a habitat quality assessment completed on the property.</p>

Item	Request	Section and Response
	d) Compensates for the impact over the entire duration of the impact (i.e. should impacts be in perpetuity, the offsets must also be delivered in perpetuity).	<b>Appendix N.</b> An offset site has not yet been confirmed but will be finalised before the action commences. Details regarding potential offset sites has been included. Details regarding mechanisms to secure offset areas has been included.
	Note: while the offsets do not need to be secured before the decision on whether to approve the proposed action, should the proposed action be approved, conditions of an approval are likely to require that offsets are secured, and management measures are in place, before commencement of the proposed action.	<b>Appendix N.</b> As communicated with DAWE on 9/11/2021, an offset site has not yet been confirmed but will be done so before the action commences. Details regarding potential offset sites has been included in <b>Appendix N</b> , including information on preliminary site investigations for two of these potential sites. One of the potential offset sites has had a habitat quality assessment completed on the property.
<b>7. Economic and social matters</b>		
-	The preliminary documentation must:	
7.1	Provide details on the social and economic costs and/or benefits of undertaking the proposed action, including the basis for any estimations of costs and/or benefits. Where possible, please include the total economic capital investment and economic ongoing value of the project.	Section 7.1 and 7.2 Details of social, economic benefits and employment opportunities has been included.
7.2	Identify if economic benefits and employment opportunities are in addition to what would have been expected if the action were not to take place.	Section 7.1 and 7.2 Details of economic benefits and employment opportunities has been included.
7.3	Provide details of any public stakeholder consultation activities, including the outcomes of those consultations.	Section 7.3 This section discusses consultation with Indigenous stakeholders completed thus far.
7.4	Provide details of any consultation with Indigenous stakeholders.	Section 7.4 This section discusses consultation with Indigenous stakeholders completed thus far.
<b>8. Ecologically sustainable development</b>		
-	The preliminary documentation must:	



Item	Request	Section and Response
8.1	Provide a description of how the proposed action meets the principles of ecologically sustainable development, as defined in section 3A of the EPBC Act.	Section 8 This section includes a tabulated assessment against the principles of ecologically sustainable development.

### 1.4.2 Comments on Draft Preliminary Documentation and Draft Supplementary Offset Strategy (02/02/2022, 24/02/2022 and 22/04/2022)

Table 1-2 provides a cross-reference providing evidence of compliance with the DAWE comments on draft preliminary documentation (dated 02 February 2022). Table 1-3 provides a cross-reference of providing evidence of compliance with the DAWE comments on the draft supplementary offset strategy.

Additional comments received from DAWE on some of the following items were received on 22 April 2022. A response to these is provided in relevant tables Table 1-2, Table 1-3 and Table 1-4.

**Table 1-2 Comments on Draft Preliminary Documentation (02/02/2022)**

Item	Information Requested	Draft Preliminary Documentation Section or Page (previous revision)	Department's Comment (02/02/2022)	Additional Department Comments (22/04/2022)	Section and Response
1.	Quantification of Impacts	Section 2 and Figure 2-1; Section 3.3.6.4.	The department notes that a patch of land within the project site will not be cleared to protect a population of Kogan Wax Flower and that this patch is also likely to constitute habitat for the Koala.	Met.	Please refer to Sections Section 4 and 0. The area not to be cleared to protect the population of Kogan Waxflower has been considered as part of the overall 'disturbance' to the Koala which is used as part of offsetting calculations. As identified in Section 4.1.1, a conservative approach has been applied and therefore the 207.6 ha of 'known important habitat' and 'suitable habitat' based on the Project Area has been used. The significant impact assessment concludes there is potential for significant residual impacts through direct clearing of 'known habitat' for Koala.

Item	Information Requested	Draft Preliminary Documentation Section or Page (previous revision)	Department's Comment (02/02/2022)	Additional Department Comments (22/04/2022)	Section and Response
2.	Management Plans	-	<p>We note your request to finalise offsets, including provision of an Offset Management Plan, after the delegate has made a decision on the approval of the action.</p> <ul style="list-style-type: none"> <li>▪ Please complete the attached “Election to have an Action Management Plan Approved” form. This form is to for you to assert your preference and to also acknowledge that there are cost recovery arrangements in place for an action management plan (e.g. an Offset Management Plan), after a decision to approve a project is made.</li> <li>▪ If the project is approved, any Action Management Plans will likely require approval prior to commencement of the action. All management plans must be consistent with the department’s <a href="#">Environmental Management Plan Guidelines</a>, including monitoring and reporting requirements.</li> </ul>	<p>In order for the assessment to progress to the next stage, this form must be completed and provided. Can you please clarify when this completed form will be provided.</p> <p>Please note: Any offset management plan(s) would need to specify that the legal mechanism of protection (e.g. VDec) is in place for the duration of the approval, so as to be legally enforceable.</p>	<p>The proponent currently intends to sign and complete the “Election to have an Action Management Plan Approved” form.</p>

Item	Information Requested	Draft Preliminary Documentation Section or Page (previous revision)	Department's Comment (02/02/2022)	Additional Department Comments (22/04/2022)	Section and Response
3.	Offsets - overview	-	<p>On 16 December 2021, the department met representatives of the proposed Kumbarilla Renewable Energy Park. In that meeting, we clarified that an Offset Strategy is required to be provided prior to the delegate's consideration of approval of the proposed action. Minutes from the meeting were provided to CDM Smith on 17 December 2021 which included the information required to be provided in an Offset Strategy.</p> <p>In summary, the Offset Strategy must demonstrate that there are viable offset options available to the person proposing to take the action that will compensate for the impacts to the Koala from the proposal.</p> <p>In summary, the offset strategy should include:</p> <ul style="list-style-type: none"> <li>▪ The size of the project and offset site/s.</li> <li>▪ The quality of the project and offset site/s.</li> <li>▪ Biological characteristics and quality of habitat for the koala based on desktop research.</li> <li>▪ What management actions would likely be applied to the offset site to support improvements for koalas and the likely improvements that would be delivered.</li> <li>▪ A completed offset calculator based on the assessment of the above characteristics.</li> </ul> <p>The strategy should also clarify whether some preliminary engagement with the relevant landholder has occurred, and that the landholder is receptive to the idea of providing the property for offsetting purposes.</p>	<p>Offset Strategy Provided – Two offset sites proposed as Option 1 and 2. OMP to be provided post-approval.</p> <p>There is a lack of information as to if and how the offsets proposed would compensate for the impacts for the full duration of the impact in terms of delivering a conservation gain (in accordance with the Offsets Policy). E.g. how will they be protected into the future from grazing and other pressures? Who will be the responsible party?</p> <p>E.g. Any offset management plan(s) would need to specify that the legal mechanism of protection (e.g. VDec) is in place for the duration of the approval, so as to be legally enforceable.</p> <p>Mgt actions -Lack of detail in general for what management actions would be undertaken. -Lack of detail as to the likely improvements that would be delivered.</p>	<p>Please refer to <b>Appendix N</b>.</p> <p>This document was prepared following a meeting with DAWE on 16 December 2021 and as formally requested. The items requested have been included in <b>Appendix N</b>.</p> <p>Details on the legal mechanism to secure protection is discussed in Section 3.13 of <b>Appendix N</b>.</p> <p>Additional details on management actions for offset site(s) is provided in Section 2.4.1.5 and 2.4.2.8 of <b>Appendix N</b>.</p>
4.	Offset calculations	Section 6 Table 6-4	The department notes that the figures provided in table 6-4 are preliminary figures. In general, we recommend a conservative approach at this stage to ensure that offset	As per comments above - DAWE comments included within attached spreadsheet.	Please refer to Table 1-3 and <b>Appendix N</b> .

Item	Information Requested	Draft Preliminary Documentation Section or Page (previous revision)	Department's Comment (02/02/2022)	Additional Department Comments (22/04/2022)	Section and Response
			<p>requirements are not underestimated. Please note the following advice:</p> <p><b>Time until ecological benefit</b></p> <p>Generally, the department requests that offsets be based on improving habitat for the relevant species. The time until ecological benefit will need to take into consideration what outcomes the proposed offset is intended to achieve. The department considers that a 20 year time to ecological benefit is more appropriate and achievable, particularly with the planting of trees.</p> <p><b>Risk of loss</b></p> <p>The department notes that Risk of Loss without Offset is proposed to be 15% which will be confirmed once detailed site investigations have been undertaken. We recommend that you use a more conservation approach (0% Risk of Loss with and without offset) in identifying an appropriate site for the following reasons.</p> <p>Risk of loss is based on the likelihood that the land will be cleared with no values for the protected matter remaining, such as clearing a woodland to make build a carpark. Risk of loss is based on anthropogenic causes, such as, loss from wildfire, cyclones etc are not considered. A gradual decline of habitat because of grazing or weed incursion should be considered in the habitat quality with and without offsets fields. Land zoning is also not considered a reliable alternative indicator or risk of loss because, land zoning only clarifies what may occur, not what is likely to occur.</p> <p>Evidence to support your proposed risk of loss may include referencing a published background rate of loss figure or providing studies which provide the background</p>		<p>This comment corresponds to the offset assessment calculator provided in the draft preliminary documentation.</p> <p>Refer to update text in the draft supplementary offset strategy including the offset assessment calculator in sections 2.4.1.6 and 2.2.10 of <b>Appendix N</b>.</p> <p>See similar comments the offset calculator input in Table 1-3.</p> <p>Regarding Government funding, refer to Section 1.5. The Proponent has not received any Australian Government grants for the Project.</p>

Item	Information Requested	Draft Preliminary Documentation Section or Page (previous revision)	Department's Comment (02/02/2022)	Additional Department Comments (22/04/2022)	Section and Response
			<p>rate of loss for the area in which the offset is proposed. For clarity, if risk of loss is a prediction of what could happen, background rate of loss is evidence of what has already happened.</p> <p>The department would require the studies to be current, based on a sufficient representative area (such as a local government area) and be assessed over time. The background rate of loss must also be based on clearing of large areas of trees and not thinning of trees. A Risk of Loss figure based on an alternative approach may be assigned a lower confidence in result score within the Offsets Assessment Guide (calculator).</p> <p>If referencing published background rate of loss figures:  <a href="https://www.nespthreatenedspecies.edu.au/publications-and-tools/guidance-for-deriving-risk-of-loss-estimates-when-evaluating-biodiversity-offset-proposals-under-the-epbc-act">https://www.nespthreatenedspecies.edu.au/publications-and-tools/guidance-for-deriving-risk-of-loss-estimates-when-evaluating-biodiversity-offset-proposals-under-the-epbc-act</a>.</p> <p><b>Future quality with and without offset</b></p> <p>To demonstrate a decline in habitat quality you will need to provide evidence that degradation has been occurring on the offset site over time and will continue to occur without protection.</p> <p>There is an increasing amount of evidence demonstrating that it is difficult to achieve a significant increase in habitat quality over the course of the life of an approved action. The department's view is that it is unlikely that a proponent could achieve a habitat gain of more than three points. Beyond this, there is an increasing risk the proposed outcome will not be achieved, and the 'degree of confidence' scores should reflect this</p>		



Item	Information Requested	Draft Preliminary Documentation Section or Page (previous revision)	Department's Comment (02/02/2022)	Additional Department Comments (22/04/2022)	Section and Response
			<p>As discussed on 16 December 2021, management of feral animal species is unlikely to provide an environmental gain. This is because feral animal management is routinely undertaken by landholders and also because feral animal management is unlikely to be effective when not undertaken on a regional scale. Weed management can only provide an environmental gain for a species where the weeds on the site are causing detriment to the protected species. For example, removal of lantana where it currently impedes koala movement. Removal of any weeds where control is required by law also cannot be considered as an offset.</p> <p>Please also clarify whether any government funding is being sought or has been received for the proposed offset actions by the person proposing to undertake those actions.</p>		

Item	Information Requested	Draft Preliminary Documentation Section or Page (previous revision)	Department's Comment (02/02/2022)	Additional Department Comments (22/04/2022)	Section and Response
5.	Offset site options	Section 6.4 Table 6-5	<p>Given the proposed impact site has evidence of the presence of koalas, any proposed offset site would be expected to have evidence of current use by koalas.</p> <p>If an offset is proposed within or adjacent to a State-wide biodiversity corridor buffer area, please provide a link to publicly available information about the relevant biodiversity corridor.</p>	<p>The PD information currently does not appear to adequately reference Commonwealth statutory documents in both the assessment of impacts nor the assessment of the value of the potential offset sites proposed. See further comments in summary section.</p>	<p>Please refer to <b>Appendix N</b> for information on potential offset sites. This includes landholder evidence of current use by Koalas. For additional information regarding evidence, see Table 1-3.</p> <p>Refer to Sections 2.4.1.4 and 2.4.2.4 of <b>Appendix N</b> for information related to publicly available information on biodiversity corridors associated with potential offset sites.</p> <p>Additional information referencing Commonwealth statutory documents is included in <b>Appendix K</b> and referenced as required in the following sections:</p> <ul style="list-style-type: none"> <li>▪ Sections 3.4.2, 4.3.1, 4.3.2, 4.3.4, 4.3.6, 4.3.7, 0 and 4.4.4;</li> <li>▪ <b>Appendix N</b> Section 2.4.1.3 and 2.4.2.3.</li> </ul>

**Table 1-3 Comments on Draft Supplementary Offset Strategy (24/02/2022)**

Item	Information Requested	Draft Preliminary Documentation Section or Page (previous revision)	Department's comment (24/02/2022)	Additional Department Comments (22/04/2022)	Section and Response
1.	Management Plan	-	<p>As per Item 2 of our comments on the draft PD, we note your request to finalise offsets, including provision of an Offset Management Plan, after the delegate has made a decision on the approval of the action.</p> <ul style="list-style-type: none"> <li>▪ Please complete the attached "Election to have an Action Management Plan Approved" form. This form is to for you to assert your preference and to also acknowledge that there are cost recovery arrangements in place for an action management plan (e.g. an Offset Management Plan), after a decision to approve a project is made.</li> <li>▪ If the project is approved, any Action Management Plans will likely require approval prior to commencement of the action. All management plans must be consistent with the department's Environmental Management Plan Guidelines, including monitoring and reporting requirements.</li> </ul>	<p>In order for the assessment to progress to the next stage, this form must be completed and provided. Can you please clarify when this completed form will be provided.</p>	<p>The proponent currently intends to sign and complete the "Election to have an Action Management Plan Approved" form.</p>

Item	Information Requested	Draft Preliminary Documentation Section or Page (previous revision)	Department's comment (24/02/2022)	Additional Department Comments (22/04/2022)	Section and Response
2.	Overview of discussions with landowner	2.2.1.6	Offset principle 6 of the EPBC Offsets Policy states that suitable offsets must be additional to what would occur in the absence of the offset. Therefore, while it is fine for the landholder at Option 1 to manage an area for carbon storage incentives, those activities must occur on a different part of the property than the area of the property proposed as an offset.	Evidence will need to be provided when submitting any future offset management plan, which clearly shows locations of carbon farming areas versus offset areas (such as maps and mapping coordinates).	Please refer to Section 2.4.1 of <b>Appendix N</b> for information on potential offset property option 1.  The DAWE's comment has been considered and noted. Additional text provided in Section 2.4.1.7 of <b>Appendix N</b> .  A future offset management plan will include the information as requested by DAWE, if relevant.
3.	Overview of discussions with landowner	2.2.2.6	Timber harvesting on Option 2 would need to be assessed to ensure that harvesting adjacent to the offset does not impact the values of the offset.	Nil	Refer to Section 2.4.2 of <b>Appendix N</b> for information on potential offset property option 2.  Information relating to timber harvesting associated with the potential offset property option 2 is provided in Section 2.4.2.11 of <b>Appendix N</b> . There is no timber harvesting occurring on offset property option 2.
4.	Overview discussions with landholder	2.2.1.6	A requirement under the EPBC Act Offsets Policy is that offsets be additional to what would occur without the offset in place. Therefore, sites that are already being improved as part of a carbon farming incentive program are not acceptable as offsets.	Nil	As noted in response to Item 2 above, and as per additional text provided in Section 2.4.1.11 of <b>Appendix N</b> , it is noted that an area for carbon farming incentives must occur on a different part of the property than the area of a property proposed as an offset.
5.	Offsets Calculations	-	The EPBC Offsets Policy states that the offset site location should be as close to the impact site as possible. However, if it can be shown that a greater conservation benefit for the impacted protected matter can be achieved by providing an offset further away, then the	-Some of the figures provided in the proponent's excel calculation spreadsheet, will need to be revised. Further information is required for the basis of some figures. (DAWE	Noted  This comment corresponds to the offset assessment calculator. Site specific information on two potential offset sites has been included in the draft supplementary offset strategy (refer to <b>Appendix N</b> ). The two potential offset sites

Item	Information Requested	Draft Preliminary Documentation Section or Page (previous revision)	Department's comment (24/02/2022)	Additional Department Comments (22/04/2022)	Section and Response
			<p>proposed offset will be considered. The department notes that the distance of the two offset sites from the proposed action is quite different (approximately 25 and 75 km from the project site). Distance from the proposed action should be included as a consideration when selecting a preferred offset site.</p> <p><b>Time until ecological benefit</b></p> <p>As per Item 4 of our comments on the draft PD, we note that the time until ecological benefit provided in both offset sites is 7 years. We consider it is likely to take 20 years to ecological benefit where tree planting is included within the final offset management plan.</p> <p><b>Risk of Loss</b></p> <p>Also, as per Item 4 of our comments on the draft PD, the department notes that Risk of Loss without Offset is proposed to be 15%. We consider a more conservative approach is appropriate (generally 0% risk of loss with and without offset) in identifying an appropriate site. Given the location of the properties proposed, it is very unlikely that the offset sites will be developed to the extent that all habitat values for the koala will be lost.</p> <p><b>Future quality with and without offset</b></p> <p>As stated in Item 4 above, in order to demonstrate a decline in habitat quality, you will need to provide evidence that degradation has been occurring on the offset site over time and will continue to occur without protection.</p>	<p>comments included within attached spreadsheet)</p> <p>E.g., in spreadsheet,</p> <ul style="list-style-type: none"> <li>- Role of site location to species overall population in the state is scored as 4 – it should be 5 (the site contains habitat critical).</li> <li>- Currently Ecological corridors are scored as 0, however a check on Queensland Globe shows this needs to be a 6 (Within (whole or part)) of two state listed significant corridors.</li> </ul> <p><b>Time until ecological benefit</b></p> <p>Please clarify what corrective measures are proposed for if the ecological benefit is not realised at 20-year mark. And in that event, please identify the responsible party?</p>	<p>have been split into different types of units to inform representative calculations of the potential offset sites.</p> <p>Offset calculator has been updated.</p> <p><b>Time until ecological benefit</b></p> <p>The offset calculator for the two potential offset site options has been amended from a 7-year time frame to a 20-year time frame.</p> <p>Additional information added to <b>Appendix N</b>, Section 3.1.3 and 3.1.5 to discuss what corrective measures are proposed if the ecological benefit is not realised at the 20-year mark and the responsible party.</p> <p><b>Risk of loss</b></p> <p>The risk of loss scores have been updated and are based on the unit types found on each site. As a general rule for the degraded units risk of loss score without offset are now derived from the Guidance for Deriving 'Risk of Loss' Estimates When Evaluating Biodiversity Offset Proposals Under the EPBC Act: Report to the National Environmental Science Programme (Commonwealth of Australia 2017). The risk of loss scores adopted are:</p> <ul style="list-style-type: none"> <li>■ Potential offset site option 1 – 0.32% for the South Burnett Regional Council.</li> <li>■ Potential offset site option 2 – 0.24% for the Western Downs Regional Council.</li> </ul>

Item	Information Requested	Draft Preliminary Documentation Section or Page (previous revision)	Department's comment (24/02/2022)	Additional Department Comments (22/04/2022)	Section and Response
			<p>Table 2-2 states that without the offset the future quality of the site will fall 1-2 points due to restocking of cattle and pest species occurrence at the site.</p> <p>The decline in quality needs to be based on what is currently occurring in the environment and based on a demonstrated decline in habitat. A proposal to reintroduce stock is an example of what might happen and therefore should not be included in the future habitat quality without offset calculations.</p>		<p>For units with remnant or regrowth vegetation, other risk of loss scores have been used. These are described in <b>Appendix N</b>.</p> <p>For the 'risk of loss <b>with</b> offset', as per guidance advice, the offset calculator has adopted 0%. This was applied to all units.</p> <p><b>Future quality without offset</b></p> <p>Refer to additional information included in <b>Appendix N</b>. Additional information includes assessment of degradation occurring onsite and influence on encroaching agricultural uses. Additional information looks at changes overtime and trend in habitat quality.</p> <p><b>Future quality with offset.</b></p> <p>Refer to Sections 2.4.1.5 and 2.4.2.8 of <b>Appendix N</b> for additional information regarding proposed management measures which may be implemented to obtain an acceptable future quality of the potential offset sites.</p> <p><b>Spreadsheet updates post DAWE comments on 22/04/2022.</b></p> <p>Within the 'impact site' tab of the MHQA spreadsheet, the role of site location to species overall population in the state has been changed.</p> <p>The change to the ecological corridors score has not been updated from 0 to 6 as the corridor is not directly within the Project area and</p>

Item	Information Requested	Draft Preliminary Documentation Section or Page (previous revision)	Department's comment (24/02/2022)	Additional Department Comments (22/04/2022)	Section and Response
					<p>therefore according to wording a score of 6 cannot be given.</p> <p>Other updates have been made to the spreadsheet per comments from DAWE.</p>
6.	Offset site options	-	The Supplementary Offsets Strategy states that both potential offset sites have historical Koala use on the properties, sighted by landholders, but not reported in the Atlas of Living Australia. The presence of koalas will need to be verified by suitably qualified experts and based on the outcomes of surveys of the site.	Nil	<p>Section 6 of the RFI (dated 14 October 2021) (refer to Table 1-1) (Proposed Offsets) note that an offset will be required to compensate for the [significant residual] impacts in accordance with the EPBC Offsets Policy and describes the method of quantifying and qualifying these impacts by the application of a Habitat Quality Assessment Methodology which, among other things:</p> <ul style="list-style-type: none"> <li>▪ uses an adaptation of the DEHP guide, called the <i>Modified Habitat Quality Assessment (MHQA) Version 1.2 April 2017</i>.</li> <li>▪ that the same methodology to assess habitat quality must be used at both impact and offset sites for input into the EPBC Act Offsets Assessment Guide</li> </ul> <p>The MHQA methodology is largely dedicated to the assessment of habitat quality and does not include specific presence/absence surveys of koala. It does, however, consider traces of koala presence in the form of scats and tracks which are detected opportunistically during habitat condition assessment. As such suitable qualified personnel shall undertake an assessment of the presence of koalas in the context of applying the same methodology to</p>

Item	Information Requested	Draft Preliminary Documentation Section or Page (previous revision)	Department's comment (24/02/2022)	Additional Department Comments (22/04/2022)	Section and Response
					<p>the impact and offset site in accordance with the requirements of the policy and incidental sighting during that activity shall be recorded to supplement the habitat assessments. These activities shall occur during the period of the offset site for confirmation that the property is an appropriate offset site.</p> <p>The DAWE have requested that the presence of Koala on potential offset sites be documented with evidence by a verified suitable qualified expert to confirm the viability of the potential offset site(s). It is however noted that as per <b>Appendix N</b>, landholders have confirmed the presence of Koalas on the potential offset sites. It is requested that the landholder evidence be used and further supported by additional habitat assessments on the chose offset site.</p>



**Table 1-4 Additional Comments on Draft Preliminary Documentation (22/04/2022)**

Item	Item	Proponent's Previous Response	Department Comments (22/04/2022)	Section and Response
RFI Item (22/04/22)	Offset Strategy	Nil	The offset site does not demonstrate consideration of the conservation values and habitat characteristics for maintaining or improving the viability of the matter protected.	At the time of preparing a response to this RFI, a detailed ecological survey had been completed at one of the proposed offset sites (Offset Site Option 2 (Site 7). If required, additional survey will be completed as for Offset Site Option 1 (Site 5).  For additional information on the Offset Site Option 2, refer to Section 2.4.2 of <b>Appendix N</b> which has been updated following the DAWE comments on 22/04/2022.
RFI Item (22/04/22)	Offset Strategy	Nil	Please ensure that the offsets strategy addresses how the offsets proposed will meet the requirements of the EPBC Offsets policy. In particular, the preliminary documentation (PD) needs to demonstrate 3 things in relation to proposed offsets:  1. That the impact is suitable to be offset.  2. That an environmental offset capable of counterbalancing the impacts on MNES – this needs to take into consideration the features of the impact site being lost (like-for-like) and the values provided to the MNES.  3. That suitable offsets are available to procure, manage and effectively counterbalance impacts for the duration of the impact, and to maintain or improve the viability of the species.	As per response to the previous RFI item, Section 2.4.2 of <b>Appendix N</b> has been updated with additional information.  Additional information has been added to Section 3.1.2 of <b>Appendix N</b> . This includes a review and response to the EPBC Environmental Offsets Policy principles. This is updated based on the recent habitat quality assessment survey completed for one of the potential offset site options.

Item	Item	Proponent's Previous Response	Department Comments (22/04/2022)	Section and Response
RFI Item (22/04/22)	Offset Site	Nil	In line with this, the draft PD needs to demonstrate that a proposed offset site contains, or is capable of containing, high quality habitat critical to the survival of the matter protected – or must demonstrate that such suitable sites are available within the area.	As per response to item above, Section 2.4.2 and 2.4.2.7 of <b>Appendix N</b> has been updated with additional information. It is noted that one of the potential offset sites is capable of containing high quality habitat critical to the survival of the Koala.
RFI Item (22/04/22)	Commonwealth statutory documents	Nil	Currently, the draft PD does not adequately reference Commonwealth statutory documents within species SPRAT profiles (such as approved conservation advice, recovery plans, survey guidelines etc). We request that these statutory documents be (i) drawn on for such matters such as species specific habitat requirements, threats and conservation priorities and, (ii) review the impacts / offset sites through this lens, particularly in the absence of detailed field survey information and analysis. The PD information currently does not demonstrate that these documents have been taken into consideration for the assessment of impacts and the assessment of the value of the potential offset sites proposed.	<p>Additional information referencing Commonwealth statutory documents included in:</p> <ul style="list-style-type: none"> <li>▪ Section 4.4.4;</li> <li>▪ <b>Appendix N</b> Section 2.4.1.3 and 2.4.2.3</li> <li>▪ <b>Appendix N</b> Section 2.5.</li> </ul> <p>This information has been derived from the species conservation advice and SPRAT profiles (refer to <b>Appendix K</b>).</p>

Item	Item	Proponent's Previous Response	Department Comments (22/04/2022)	Section and Response
RFI Item (22/04/22)	Offset Site Suitability	Nil	<p>Please review each potential offset site in terms of its suitability as an offset (for the impact site specifically) and its capacity to deliver a conservation gain for the species – describing how each offset site provides all the things the species needs to be viable into the future. There is currently a lack of detail as to the likely improvements that would be delivered that would adequately compensate for the loss of high quality habitat within a large contiguous patch of habitat.</p> <p>For instance, we note that the PD refers to the site as 'it's closely connected to a corridor'. The department requires further information to provide evidence that it contributes to the conservation for the Koala. This could include: the viability of an offset may be demonstrated to have connectivity with the corridor by measuring the length of the connection, providing evidence that it is being used by koalas, and including an evaluation of whether it is under threat by wild dogs / domestic animals etc.</p>	<p>As per response to item above, Section 2.4.2 of <b>Appendix N</b> has been updated with additional information.</p> <p>Additional information regarding biodiversity corridor and proximity to the offset site options is included in <b>Appendix N</b> Section 2.5.</p>

Item	Item	Proponent's Previous Response	Department Comments (22/04/2022)	Section and Response
RFI Item (22/04/22)	MHQA Calculations	Nil	<p>Please ensure that:</p> <p>a) there is a comprehensive description of how you have come to score every attribute (apart from the BioCondition Assessment Manual inputs).</p> <p>b) we note that should the proposal be approved, any approval decision is likely to include conditions with objectives to aid the offset site returning to a habitat condition that is viable Koala habitat. This means we would be expecting environmental outcomes, evidence based management measures and interim milestones that support the claimed offset site target habitat quality.</p>	<p>A description of how scores for attributes were derived is provided in:</p> <ul style="list-style-type: none"> <li>▪ Section 6.3 of this report</li> <li>▪ Section 2.4.2.6, 2.4.2.7, 2.4.2.9 and 2.4.2.10 of <b>Appendix N.</b></li> </ul>
RFI Item (22/04/22)	<p>Additional matters to be addressed:</p> <ul style="list-style-type: none"> <li>• Project alternatives</li> </ul>	Nil	<p>Section 5.1 a) of the draft PD guidelines requires a consideration and assessment of alternative strategies, plans and measures to avoid and mitigate impacts. It is unclear whether project alternatives have been considered, and why the ~200 ha proposed action is best located within an area of contiguous high-quality habitat (as opposed to existing cleared/disturbed sites).</p>	<p>Additional information on the chosen impact site is provided in Section 2.13 of this report.</p>

Item	Item	Proponent's Previous Response	Department Comments (22/04/2022)	Section and Response
RFI Item (22/04/22)	Impact footprint	Nil	<p>Please clarify the amount of hectares that will be impacted. For example on page 118 of the Draft report (dated 10 March 2022), identifies a total of 204.1 ha of Koala habitat as being in the disturbance area. On page 33 of the report it references 209.4 ha.</p> <p>– In addition, I note that item 4 of the department's request for further information of October 2021, the department identified that 'due to the presence of Koala food trees across the proposed action area and as there are few barriers to movement, the proposed action is likely to result in the loss of 213 ha of habitat critical to the survival of the Koala'. Should Koala habitat impact footprint differ from 213 ha, please provide a rationale for why.</p> <p>– Please clarify whether the fire protection buffer lies within or outside the development footprint (i.e., whether it has been included in the quantification of MNES habitat that will be impacted and potentially offset for).</p>	<p><b>Koala habitat clearing amount</b></p> <p>Refer to Section 6.3 for information. The Project Area is predicted to potentially impact a maximum 207.6 ha of 'known important habitat' and 'suitable habitat', this is based on the <b>Project area boundary</b>. The estimated impact based on the <b>disturbance footprint</b> is 204.1 ha of 'known important habitat' and 'suitable habitat'. A conservative approach has been used and therefore the 207.6 ha based on the Project area boundary has been used for offset calculations. It is noted that it will be less based on final design refinements.</p> <p><b>Item 4 of DAWE October 2021 RFI</b></p> <p>An additional row has been added to the table in Section 4.3 (Table 4-5). This reiterates the area of the project extent / disturbance area. The change between project extent and koala habitat is within the 'access corridor' where because the existing access road is already cleared this area is not included in the Koala habitat calculation. Further to this, the disturbance and Koala impact footprint will be further refined post approval as part of the OMP.</p> <p><b>Fire Protection Buffer</b></p> <p>Fire protection buffer lies with the footprint. Refer to Section 2.2 for clarification.</p>

Item	Item	Proponent's Previous Response	Department Comments (22/04/2022)	Section and Response
RFI Item (22/04/22)	Squatter pigeon (southern)	Nil	<p>Squatter pigeon (southern)</p> <p>– We note that results of targeted surveys undertaken for this project have not found the species to be present on site. However, given that the proposal site contains suitable breeding habitat for the species, that the remaining patches of only small, isolated and sparsely distributed sub-populations of the subspecies occur in this part of its range, and that all populations within the area would be considered important populations, please provide additional information regarding proposed measures in the event that the Squatter pigeon (southern) is encountered either during pre-clearance surveys or during the construction and operation phases. Measures may include a consideration for how potential offset sites would address residual impacts to the Squatter pigeon (southern).</p>	<p>Additional management measures have been provided in Section 5.3 and 5.4.</p> <p>While this species has not been identified as a species requiring a specific offset, preclearance field surveys will quantify any unavoidable impacts. Offsets already planned for the Project are likely to contain suitable habitat for this species and provide any offsets which may be required given the similarity of habitat and the fact that the proposed offset site is within the natural distribution of the Squatter pigeon (southern) in Queensland.</p>

Item	Item	Proponent's Previous Response	Department Comments (22/04/2022)	Section and Response
RFI Item (22/04/22)	Indirect impacts:	Nil	<ul style="list-style-type: none"> <li>• Indirect impacts:                             <ul style="list-style-type: none"> <li>o Re: edge effects from solar panels ('Heat Island Effect')</li> </ul> </li> </ul> <p>Section 4.1 of the draft PD states in regard to potential 'heat island effect': The surrounding land uses are not considered 'sensitive land uses'; however, a 30 m setback to neighbouring properties will be implanted wherever possible subject to detailed design constraints. As the areas that comprise solar panels will be cleared impacts to fauna are not expected to occur as a result of the heat island effects.</p> <p>Please clarify whether or not a buffer will be observed to protect the Koala and Koala habitat (e.g., from increased fire risk from heat island effect) against potential indirect impact from heat island effect adjacent to impact site, and a rationale for why how a buffer of 30m may be effective in mitigating the indirect impacts.</p>	The studies described in Section 4.1.9 are contradictory and the actual impact from heat island effects is not clear. The Victorian Planning Panel Report (Panel Report 2018) accepted that solar arrays will affect air and soil temperatures within the solar array perimeter, and that in relation to outside of the solar array perimeter a heat island effect is unlikely to occur. It identified that any temperature increase within the solar array will be marginal and recommended a 30 m setback from any neighbouring property boundary. In accordance with standards a 10 m bushfire setback will be established from the Project boundary. This is expected to be sufficient to alleviate any heat island impacts.
Email from J. Keast 10/12/21	Offset site: It is unlikely that the delegate will approve the project without the offsite site and offset proposal being identified.	Nil	Two sites identified but not secured.	Noted.

Item	Item	Proponent's Previous Response	Department Comments (22/04/2022)	Section and Response
Email from J. Keast 10/12/21	<p>1. What level and type of information will be requested by the department on the offset site? Will the department require the offset site BioCondition and habitat assessment?</p> <p>DAWE: Yes. You will need to assess the values of the project and offset site and describe what you intend to improve on the offset site and how you intend to achieve the improvements. The level of detail will have been provided in the Request for Information.</p>	<p>Re the 'what' and 'how'...</p> <p>These are deferred to future OEMP that will be written to align with offsets policy.</p> <p>The main management consideration will be the reduction of cattle, the control of weeds and control of feral pest animals and dogs and the regeneration of Koala habitat.</p> <p>Re stock...</p> <p>Minimising loss and fragmentation of habitat by reduction of stock (i.e. cattle);</p>	<p>Mgt measures proposed to be in place for 20 years. As duration of impact is likely to be permanent, there ought to be evaluation and contingency measures proposed for at the 20 year mark in event that habitat cover and quality is not equal to or greater than impact site pre-clearing state.</p>	<p>Draft offset management objectives, performance criteria, adaptive management triggers and corrective actions for a potential offset site are identified in <b>Appendix N</b>.</p>
10/12/21	<p>a. As discussed, an impact site EMP and offset management plan are likely to be required post approval. You should provide a proposal for both in the final PD including the actions that will be undertaken and how you will do them. Not in the detail of a management plan but we should have a good sense of what you are proposing to do.</p>	<p>Nil</p>	<p>Lack of detail provided as to adaptive management measures proposed for enhancing the offset sites to equal or better than impact site.</p> <p>Coupled with this is a lack of detail in identifying/describing/characterising the features of the offset sites – items that are being deferred to a later assessment by the proponent in any post-approval phase. These would no doubt inform the adaptive management measures that are currently absent.</p>	<p>Draft offset management objectives, performance criteria, adaptive management triggers and corrective actions for a potential offset site are identified in <b>Appendix N</b>.</p>
Email from J. Keast	<p>We are happy to consider the action management plans as part of the approval or in post approvals. However, conditions will likely require that the action management plans be approved prior to commencing the action.</p>	<p>Nil</p>	<p>Proponent proposes submitting detailed management plans in a post-approval phase.</p>	<p>No action required.</p>



Item	Item	Proponent's Previous Response	Department Comments (22/04/2022)	Section and Response
5.2 RFI	<p>For each measure proposed, indicate the:</p> <ul style="list-style-type: none"> <li>• Responsible party</li> <li>• Environmental outcomes to be achieved</li> <li>• Millstones / performance / completion criteria</li> <li>• Proposed monitoring and evaluation program.</li> </ul>	Nil	Mgt measures proposed to be in place for 20 years. As duration of impact is permanent, there ought to be evaluation and contingency measures proposed for at the 20 year mark in event that habitat cover and quality is not equal or greater than impact site pre-clearing.	Draft offset management objectives, performance criteria, adaptive management triggers and corrective actions for a potential offset site are identified in <b>Appendix N</b> .
6 RFI	Based on the referral information, the department considers that the proposed action is likely to have a residual significant impact on the Koala and may have a residual impact on Squatter pigeon and Yakka Skink.	Ni	Given breeding habitat present on site for Squatter pigeon, and that any populations in area are considered important populations, it is reasonable that measures be proposed for the species in the event that the species is found on site during pre-clearance surveys or construction/operation phases.	<p>Additional management measures have been provided in Section 5.3 and 5.4.</p> <p>While this species has not been identified as a species requiring a specific offset, preclearance field surveys will quantify any unavoidable impacts. Offsets already planned for the Project are likely to contain suitable habitat for this species and provide any offsets which may be required given the similarity of habitat and the fact that the proposed offset site is within the natural distribution of the Squatter pigeon (southern) in Queensland.</p>

Item	Item	Proponent's Previous Response	Department Comments (22/04/2022)	Section and Response
6.1 RFI	<p>If a residual significant impact is identified, the preliminary documentation must include an offset proposal, which must:</p> <p>Demonstrate how the offset proposal:</p> <ul style="list-style-type: none"> <li>• Meets the principles outlined in the EPBC Offsets Policy.</li> <li>• Addresses the considerations and requirements outlined in the EPBC Offsets Policy, including but not limited to sections 6 and 7 of the EPBC Offsets Policy.</li> <li>• Directly contributes to the ongoing viability of the EPBC listed species or ecological community and will deliver an overall conservation outcome that improves and/or maintains the viability of the protected matter, as compared to what is likely to have occurred under the status quo, i.e. if neither the action nor the offset had taken place.</li> <li>• Compensates for the impact over the entire duration of the impact (i.e. should impacts be in perpetuity, the offsets must also be delivered in perpetuity).</li> </ul>	Nil	<p>As yet unclear as to how proposed offsets sites would be protected in perpetuity, what would trigger adaptive management strategies, nor responsible party post 20 years.</p> <p>Potential residual impacts for squatter pigeon not identified (see comment above).</p> <p>Lack of detail in general as to how offset sites would directly contribute to ongoing viability of the Koala as compared to the action not proceeding.</p>	<p>Additional information added to <b>Appendix N</b>.</p> <p>Additional management measures have been provided in Section 5.3.</p> <p>While this species has not been identified as a species requiring a specific offset, preclearance field surveys will quantify any unavoidable impacts. Offsets already planned for the Project are likely to contain suitable habitat for this species and provide any offsets which may be required given the similarity of habitat and the fact that the proposed offset site is within the natural distribution of the Squatter pigeon (southern) in Queensland.</p> <p>Additional information added to <b>Appendix N</b>.</p>

### 1.4.3 Additional Information Request (3 March 2023)

Table 1-5 is a cross-reference which includes extracts from the additional information request.

**Table 1-5 Preliminary Documentation – Request for Information (3 March 2023)**

Item	Request	Section and Response
<b>1. General content, format and style</b>		
-	<p>Ensure that all supplementary documentation and information provided to date is collated within the PD in a way that enables interested stakeholders and the Minister (or delegate) to find and understand the information easily, and ensure that any conclusions reached can be independently assessed.</p> <p>The PD should be able to be read as a stand-alone document (with attachments) and must include summaries of all relevant information and supplementary information provided to date. Detailed technical information, studies or investigations necessary to support the main text should be attached as appendices to the main document.</p>	The PD report has been revised to include an executive summary, with each matter within the preliminary documentation report summarised under its relevant section. These summaries reference detailed technical documentation included as appendices. Any conclusions reached within relevant sections has been appropriately referenced for the purposes of supporting conclusions, and references are provided to allow for independent review of these conclusions.
<b>2. Description of the action (site selection and alternative sites)</b>		
-	a) Ensure the PD includes all supplementary information relating to site selection provided to date and includes a summary of this information within the main document.	Refer to Section 2.2.
-	b) Ensure the PD demonstrates the process of avoidance of impacts to matters of national environmental significance (MNES) and associated habitats. This includes a detailed explanation involving site selection during the feasibility study, including the assessment of cleared land/already disturbed land	Refer to Section 2.2.
-	c) Provide further information (such as future development plans) relating to the lease (PL) 273 and evidence to support the proponent's statement that 'the 1,000 ha or at least substantial portions thereof will ultimately be exploited for coal seam gas extraction'.	Refer to Section 4.1.1.
-	d) Include figures where applicable.	Refer to Figure 2-2.
<b>3. Description of the environment (habitat quality)</b>		
-	a) Ensure that the draft PD includes a detailed description of the habitat values present at the impact site. If there is information that demonstrates that the site is of less value, please provide this in the draft PD and ensure there is detailed analysis against relevant statutory documentation.	Refer to Section 2.1.4 regarding the Forest Road access road conditions and clearing of the road. Refer to Section 4.1.1.
-	b) Review the Offset Assessment Guide attachment and update the impact and offset assessment according to the department's assessment. If further information is available (such as including technical studies, independent expert analysis, research papers etc) to support the original proponent's assessment, please include this in the PD.	Refer to <b>Appendix N</b> .

Item	Request	Section and Response
<b>Description of MNES that may occur within study area and quantification of impacts</b>		
-	a) Complete a revised habitat suitability assessment of the proposed impact site, considering specific habitat requirements of each species in accordance with relevant listing advices, conservation advices, recovery plans, Significant Impact Guidelines 1.1 and publicly available information.	<p>Revised habitat suitability assessments and habitat mapping have been conducted and are provided in the relevant profiles for each threatened species and TEC and within Appendix L. The following list of species does not reflect the species detected during dedicated ecology surveys of the impact site. Ground truthing survey failed to detect the presence of any species apart from Koala. Nonetheless, the list is as follows:</p> <ul style="list-style-type: none"> <li>• Poplar box grassy woodlands on alluvial plains – Section 3.4.1.1</li> <li>• Yakka skink – Section 3.4.2.1; <b>Appendix L</b></li> <li>• Five-clawed worm-skink – Section 3.4.2.2; <b>Appendix L</b></li> <li>• Squatter pigeon (southern) – Section 3.4.2.3; <b>Appendix L</b></li> <li>• Regent honeyeater – Section 3.4.2.4</li> <li>• Painted honeyeater – Section 3.4.2.5; <b>Appendix L</b></li> <li>• White-throated needletail – Section 3.4.2.6; <b>Appendix L</b></li> <li>• Koala – Section 3.4.2.7; <b>Appendix L</b></li> <li>• Greater glider (southern and central) – Section 3.4.2.8</li> <li>• Brigalow woodland snail – Section 3.4.2.9; <b>Appendix L</b></li> </ul> <p>Additional information has also been provided in response to other specific concerns outlined in the RFI, particularly regarding the Koala, Greater glider (southern and central), and poplar box grassy woodland on alluvial plains TEC. This additional information is in the corresponding sections listed above.</p>
-	b) Provide revised or expanded mapping showing the extent of suitable habitat for each species (in particular for yakka skink) and community in relation to the impact footprint (including asset protection zones that are subject to fire management measures), and any proposed buffer zones.	
-	<p>c) Provide information that demonstrates an assessment of potential direct and indirect impacts, including but not limited to those outlined in Item 3, taking into account:</p> <ul style="list-style-type: none"> <li>i) The predicted rise in incidence of drought in the Brigalow Belt South bioregion</li> <li>ii) The range of potential edge effects, such as increased hotter drier conditions along forest edges that become exposed, and</li> <li>iii) The increased pressure on remaining habitat (carrying capacity) and population numbers from displaced individuals and a reduced area of occupancy.</li> </ul>	Refer to Section 4.1.2.

Item	Request	Section and Response
-	<p>d) provide information on measures proposed for avoiding, mitigating and compensating for the range of potential impacts, including but not limited to:</p> <ul style="list-style-type: none"> <li>a. avoidance (such as footprint re-designs, observance of avoidance buffers along edges, scheduling of works to avoid breeding).</li> <li>b. species specific mitigation measures (further discussed under item 7) - which may include but not be limited to: <ul style="list-style-type: none"> <li>i. Measures for addressing potential barriers to movement and dispersal, such as widening road corridor in areas adjacent to vegetation habitat</li> <li>ii. Salvaging of hollows (supported by region-specific best practice methods/expert advice)</li> <li>iii. Tracking and monitoring of individuals encountered during pre-clearance surveys</li> </ul> </li> </ul>	<p>Mitigation and management measures, including those specific to each MNES, are detailed in the CEMP, OEMP, MNES MP, and Section 5 of this document.</p>
-	e) Adjust the risk rating equivalent to extreme for relevant species in the PD	See Table 4-19 in Section 4.4.4
-	f) Demonstrate surveys for each species have been completed in accordance with relevant Commonwealth, State or local council guidelines (or best available peer reviewed information). For example, please ensure the Squatter Pigeon surveys have been completed in accordance with the Survey Guidelines for Australia's Threatened Birds (2010), including area searches or transect surveys and flushing surveys, scaled up for the size of the proposed site area.	Table 3-1 in Section 3.2.2.1 assesses the adequacy of field surveys for detecting MNES that are likely or have the potential to be present against relevant guidelines.
-	<p>g) For the ecological community, conduct a review of the revised regional ecosystem mapping and vegetation data presented in the PD for the proposed impact site. Compare this data to conservation advices, and the Queensland Department of Environment and Science broad vegetation group descriptions <a href="https://www.des.qld.gov.au/__data/assets/pdf_file/0029/81929/descriptions-of-broad-vegetation-groups.pdf">https://www.des.qld.gov.au/__data/assets/pdf_file/0029/81929/descriptions-of-broad-vegetation-groups.pdf</a>.</p> <ul style="list-style-type: none"> <li>a. Note that a combined patch size of one hectare or greater would be applicable if the TEC is assessed as being present and Category A1 quality.</li> <li>b. Please substantiate the likelihood assessment, referring to site vegetation data and mapping information available. Use soils data from sampling completed on site and available mapping where appropriate.</li> </ul>	<p>Refer to Section 3.4.1.1.</p> <p>The vegetation data collected by BioCondition and quaternary surveys in the Project Area have been assessed against the key diagnostic characteristics for poplar box grassy woodland on alluvial plains, as outlined in the conservation advice for all survey sites where poplar box (<i>Eucalyptus populnea</i>) was present (see Table 3-12). For all survey sites where the presence on the TEC was assessed as present or possibly present, further assessment against the condition thresholds for national legal protection was conducted (see Table 3-13).</p>
<b>5. Presence of dieback at the impact and offset sites</b>		
-	Provide a restoration plan for any areas affected by dieback as part of an offset management plan, where applicable (refer item 9 below).	Refer to <b>Appendix N</b> .
<b>6. Connectivity, fragmentation and cumulative impacts</b>		

Item	Request	Section and Response
-	Provide further detail of whether the areas previously mapped as RE11.7.4/11.7.5 high value regrowth (HVR) which have been remapped as remnant RE 11.7.5 vegetation within the proposed action area were included in the calculations.	Refer to Section 4.1.1
-	Provide further detail of whether areas previously mapped as Category X (then HVR 11.5.1), then remapped as RE 11.5.1 AU 3 were included in the calculations.	Refer to Section 4.1.1
-	Provide further detail of whether equivalent ratings of Category X or regrowth vegetation (that the department may consider habitat for MNES) of the surrounding areas were included in the connectivity and fragmentation assessment.	Refer to Section 4.1.1
-	Undertake a review of potential cumulative impacts, as far as practical, addressing potential impacts to MNES detailed in Item 4. Include a review of potential cumulative impacts resulting from habitat loss, increased edge effects from the proposed action and surrounding land uses, barriers to wildlife movement, and reduction in access to watering points within the broader habitat. Please present this assessment in a table.	See Table 4-3 in Section 4.1.10
<b>7. Mitigation Measures</b>		
-	<b>Planning and consultation</b> a) Provide information on stakeholder, community and first nations consultations that have been undertaken and any existing or anticipated arrangements.	Refer to Section 7.3 and Section 7.4.
-	b) Provide the existing approvals underway or completed for the proposed action from local and state government, including approval numbers.	<p>The Project has been approved by WDRC under Development Approval 030.2020.120.001 on 1 October 2020.</p> <p>The Queensland Department of Environment and Science granted a permit (WA0038967) to clear Kogan waxflower (<i>Philothea sporadica</i>) across an area of 213 ha.</p> <p>The Queensland Department of Environment and Science has also approved Species Management Programs (SMP954) for tampering with animal breeding places (high and low risk of impacts).</p> <p>Elecseed and the Barunggam People have agreed the terms of the Cultural Heritage Management Plan for the Project.</p> <p>Other proponents hold existing approvals for the development of the land upon which the Project is proposed. Refer to Section 2.14.</p>
-	c) Include consultation measures for other potential impacts to environmental quality and management (more than only air quality in the planning).	Refer to Table 5-1, which includes ongoing consultation measures during project construction.

Item	Request	Section and Response
-	<p><b>Pre-clearance ecological surveys &amp; early works</b></p> <p>Please detail:</p> <p>a) Pre-clearance ecological surveys and plans, including, but not limited to the identification and marking of hollow-bearing trees, listed MNES, weed species and microhabitats including fallen logs, cracking soils where relevant.</p>	Refer to Table 5-2, particularly management measures HC5, HC13 and HC15.
-	<p>b) Early works - habitat feature removal, salvage storage and relocation plan. For example, where tree hollows are present, please specify removal techniques, storage, transport and translocation plans including receiving locations. Specify actions for applicable MNES listed in Item 4.</p>	Refer to Table 5-2, particularly management measures HC15 and HC16.
-	<p>c) Weed pre-treatment.</p>	Refer to Table 5-2, particularly management measure HC20.
-	<p><b>Habitat clearance and site preparation</b></p> <p>Please provide additional measures in Table 5-1 (or equivalent), including but not limited to:</p> <ul style="list-style-type: none"> <li>• Specifications for, at minimum, two-stage habitat clearance and preparation procedures including pre-clearance habitat inspection, feature preparation such as tree hollow preparations, knocking habitat trees with clearance machinery to allow animals time to escape,</li> <li>• Staged clearing including vegetation strata selective removal</li> <li>• Timing of clearance of habitat trees</li> <li>• Wildlife “safe passage” plans (please expand on HC11).</li> </ul>	<p>Refer to Refer to Table 5-2, particularly management measure HC17.</p> <ul style="list-style-type: none"> <li>• Specifications for, at minimum, two-stage habitat clearance and preparation procedures including pre-clearance habitat inspection, feature preparation such as tree hollow preparations, knocking habitat trees with clearance machinery to allow animals time to escape – refer to HC10, HC11, HC12 and HC13.</li> <li>• Staged clearing including vegetation strata selective removal – refer to K3.</li> <li>• Timing of clearance of habitat trees – refer to K3.</li> <li>• Wildlife “safe passage” plans – refer to HC6.</li> </ul> <p>Note: multiple HC management measures have been removed or changed during this RFI, in particular, wildlife “safe passage” plans (previously HC11) is now HC6.</p>
-	<p><b>Construction</b></p> <p>Please specify mitigation measures that minimise environmental harm to habitats and MNES in the following construction phases for the proposed action area (inclusive of the access road):</p> <ul style="list-style-type: none"> <li>• Site establishment</li> <li>• Site preparation</li> <li>• Materials delivery</li> <li>• Construction (including laydown area and washdown area management – expand HC12)</li> <li>• Transmission infrastructure (where applicable)</li> <li>• Grid connection and commissioning</li> </ul>	<p>Refer to all tables in Section 5.2. An additional column has been added to each management measure to specify the applicable phase of the management measure.</p> <p>Note: multiple HC management measures have been removed or changed during this RFI, in particular, laydown area and washdown area management (previously HC12) is now HC7.</p>

Item	Request	Section and Response
-	<p><b>Operation</b></p> <p>Please detail:</p> <ul style="list-style-type: none"> <li>• The minimum requirements that may be stipulated in a construction environment management plan (CEMP) and subsequent operational works plan (or equivalent)</li> <li>• Add a column in the tables in Section 5 (where practical) detailing triggers for remedial actions</li> </ul>	Refer to all tables in Section 5.2. An additional column has been added to each table to specify the triggers for remedial actions for each management measures, where applicable.
<b>8. Management Plans</b>		
-	Please provide an updated offset strategy that details habitat quality characteristics for the proposed impact site, and a proposed offset site and strategies to achieve included gains. Ensure habitat and associated services for all matters listed in Item 4 are included.	An Offset Management Plan has been prepared, refer to <b>Appendix N</b> .
<b>9. Adequacy of offset proposal</b>		
-	<p>Please provide an offset strategy that includes detailed description of how the proposed offset (or alternative offset site) will meet the principles of the EPBC Offsets Policy for all protected matters that are likely to be impacted by the action.</p> <p><i>Note: offset proposals must address the conservation needs of each species and must meet the principles under the EPBC Offsets Policy. For example, the department considers a suitable offset for the Greater Glider should at minimum:</i></p> <ul style="list-style-type: none"> <li><i>o Contain suitable denning and foraging habitat for the Greater Glider and may also contain mixed vegetation types suitable for restoring or revegetating Greater Glider habitat at set intervals.</i></li> <li><i>o Have a demonstrated presence of Greater Gliders within, or within close proximity to, the site (i.e., within 10 km), provided the vegetation habitat is contiguous with that in which the Greater Gliders are recorded.</i></li> </ul>	An Offset Management Plan has been prepared, refer to <b>Appendix N</b> .
-	Current impact and offset site descriptions lack contextual information related to MNES and the presence of Koala populations. The descriptions of both Offset sites should be consistent with types and level of detail provided for the impact site and examine MNES habitat use and connectivity with areas adjacent to each offset site.	Refer to <b>Appendix N</b>
-	Proposed measures to achieve the vegetation conservation gains are not substantiated with evidence, and the Department considers that more information is needed to demonstrate that the conservation gains can be achieved at the offset sites given the proposed management measures (which are generally 'passive' in nature).	Refer to <b>Appendix N</b>



Item	Request	Section and Response
-	<p>Further evidence needs to support claims that the management of risks and threats, and proposed changes in the land use will see an improvement in Koala habitat quality and stocking rates. Alternatively, the proponent should adopt specific completion criteria for vegetation and weed management, and provide evidence based-achievement timeframes.</p> <ul style="list-style-type: none"> <li>o For example, the Offset management strategy 2.4.2.8 states permanent removal of grazing pressure may improve dieback recovery. However, there is no grazing occurring within the proposed offset site.</li> <li>o Evidence is to be provided to demonstrate value of this notation, otherwise please remove.</li> </ul>	Refer to <b>Appendix N</b>
-	<p>The department also considers that the description of the management measures at the proposed offset site should include:</p> <ul style="list-style-type: none"> <li>o performance and completion criteria for evaluating the success of the management measures and criteria for triggering remedial action (if necessary),</li> <li>o timelines to monitor and report on the effectiveness of the management measures, and progress against the performance and completion criteria,</li> <li>o Adaptive management strategies, where applicable.</li> </ul>	Refer to <b>Appendix N</b> .
-	<p>Please include potential risks to the successful implementation of the management measures and a description of the contingency measures that would be implemented to mitigate against these risks and residual risk ratings.</p>	Refer to <b>Appendix N</b> .
-	<p><b>State and council requirements</b></p> <p>Please specify the offset requirements that have been stipulated by:</p> <ul style="list-style-type: none"> <li>• The Queensland Government, including relating to approval 2007-18034 SRA (Material Change of Use) and other relevant policy requirements or conditions; and</li> <li>• Western Downs Regional Council approval requirements.</li> </ul>	Refer to <b>Appendix N</b> .
<b>10. Decommissioning and restoration</b>		

Item	Request	Section and Response
-	<p>Please include a section in the PD that specifies a decommissioning plan (including mitigation measures) of the proposed solar farm. Stages to include in this plan are, at minimum:</p> <ul style="list-style-type: none"> <li>• Removal of infrastructure from site</li> <li>• Recycling or re-use of the PV modules and other associated infrastructure</li> <li>• Disposal of components</li> <li>• Stabilisation of land and soil remediation</li> <li>• Revegetation works (revise revegetation minimum standards)</li> <li>• Returning site to previous use</li> </ul>	<p>Refer to Section 5.5 for details regarding decommissioning and restoration activities.</p>

### 1.5 Environment Policy and Record of the Proponent

Elecseed is the Project proponent in a joint venture with KOMIPO (South Korean government organisation who has completed renewable projects throughout the world). As Elecseed is a new company operating in Australia, it does not have an environmental policy or document in place for environmental management to be recorded. However, Elecseed is in the process of developing an environmental policy. KOMIPO has maintained ISO 14001 Environmental Management Systems certification. KOMIPO operates a Sustainability Management Committee which oversees making rational and efficient major decisions on sustainability management. KOMIPO has established environmental guidelines and plans for long term environmental management. KOMIPO conducts an environmental audit every year that assesses the efficient operation of its environmental management system and suitability of its environmental management plan to minimise potential environmental risks.

Elecseed and KOMIPO will undertake the Australian operations in a manner which meets our legal obligations, recognises the importance of working closely with our internal and external stakeholders, and strives to prevent environmental harm and improve our environmental performance.

The Proponent has not received any Australian Government grants for the Project.

### 1.6 Project Area and Locality

The Project footprint is comprised of an approximately 191 ha area allocated to the PV Power Station and the associated 22 ha Access Corridor approximately 40 km west of Dalby, Queensland and located within the Western Downs Regional Council (WDRC) Local Government Area (LGA). The PV Power Station is to be wholly located within a 400 ha property described as Lot 4 DY457 (Estate in fee Simple/freehold) including easements over Lot C SP107383 and Lot B SP107382. The Access Corridor is to be located within a gazetted road (crown land) that is the named road, Forest Road, and an unnamed track leading to Lot 4 DY457, crossing to the north of Weranga State Forest (refer to Figure 1-1 and Figure 1-2). Refer to **Appendix B** for an action area map and coordinates.

The PV Power Station area is currently vacant and contains mapped remnant and regrowth woody vegetation covering most of the site with the exception of access roads / vehicle tracks and a small non-referrable dam located slightly north-west along the northern boundary of the Lot.

QGC has an existing 132 kilovolt (kV) Substation fed by the Powerlink Kumbarilla Park 275/132 kV Substation located adjacent the proposed Project. The high voltage transmission line supplies QGC's Gas Compression Facility, at the Ruby site at Kumbarilla Park, West of Dalby. The Powerlink Kumbarilla Park 275/132 kV Substation is the proposed point of connection for Project.



**Legend**

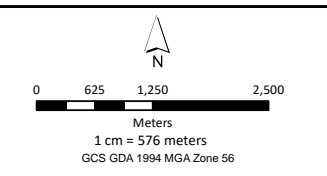
- PV Power Station
- Access Corridor
- Lot Boundary
- Localities
- Rail network
- Roads and Tracks

R	Details	Date
2	Revision	23/11/21
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

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DESIGNED	MM	CHECKED	JM
DRAWN	MM	CHECKED	JM
APPROVED	SM	DATE	23/11/21

Notes:



**DISCLAIMER**  
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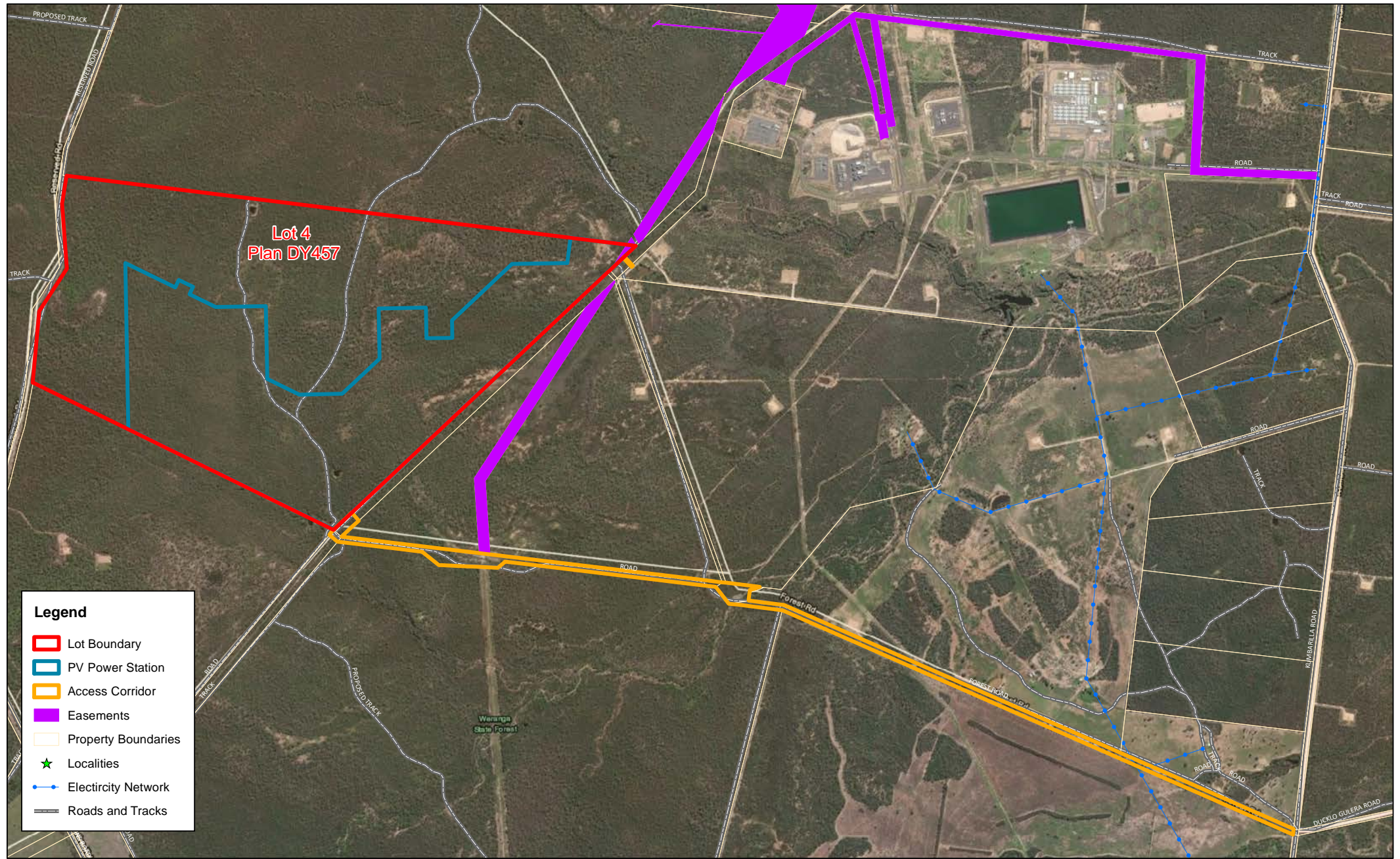


FIGURE 1-1

**Regional Area**

DRG Ref: Figure 1-1 Regional Location\_22112021





**Legend**

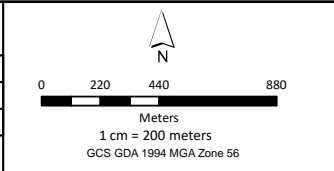
- Lot Boundary
- PV Power Station
- Access Corridor
- Easements
- Property Boundaries
- ★ Localities
- Electricity Network
- Roads and Tracks

R	Details	Date
2	Revision	22/11/21
-	-	-
-	-	-
-	-	-
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DESIGNED	SB	CHECKED	SM
DRAWN	MM	CHECKED	SM
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Notes:



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DATA SOURCE  
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FIGURE 1-2

Project Area

DRG Ref: Figure 1-2 Project Area\_22112021

## 1.7 Statutory Considerations

### 1.7.1 Commonwealth Legislation

#### 1.7.1.1 Environment Protection and Biodiversity Conservation Act 1999

The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) provides a legal framework to protect and manage MNES including nationally and internationally important flora, fauna, ecological communities, heritage places and water resources. The EPBC Act implements obligations under international conventions and treaties, such as protection of migratory species (Migratory Bird Agreements and the Bonn Convention 1979) and World Heritage Area values (World Heritage Convention 1972). The EPBC Act is administered by the Commonwealth DAWE.

The EPBC Act establishes a process for assessment and approval of proposed actions that have, or are likely to have, a significant impact on MNES. There are nine MNES listed under the EPBC Act, being:

- World heritage properties;
- National heritage places;
- Wetlands of international importance (Ramsar wetlands);
- Nationally threatened species and ecological communities;
- Migratory species;
- Commonwealth marine areas;
- Great Barrier Reef Marine Park;
- Nuclear actions; and
- A water resource in relation to coal seam gas and large coal mining development (the ‘water trigger’).

Proponents may refer projects to the Australian Government Minister for the Environment (the Minister) for a determination on whether their project is a controlled action or not a controlled action. If the referral is deemed to be a controlled action, then it is likely to have the potential for a significant impact on MNES and the necessary assessment and approvals process must be undertaken in accordance with the decision from the Minister. Where significant impacts to MNES are deemed to likely occur and are unavoidable, a project proponent may be required to compensate through the acquiring of environmental offsets as set out in the EPBC Act Environmental Offsets Policy (DSEWPac 2012a).

In accordance with Section 95A(3) of the EPBC Act, following receipt of the information sought in the Preliminary Documentation Additional Information Request, the Minister must give the proponent a written direction to publish for a period of not less than 10 business days and in accordance with the regulations. Section 95B of the EPBC Act sets out the requirements for a post-publication Submissions Report which must include: (1) *“any changes or additions needed to take account of the comments”*; and (2) *“a summary of the comments received and how those comments have been addressed”*.

#### Change to Species Listings

On 12 February 2022 the conservation status of Koala under the EPBC Act was revised from vulnerable to endangered. As per correspondence with the DAWE on Monday 21 February 2022, the provisions of Section 158A of the EPBC Act, specifically subsections 3 and 4(a) and Section 2 of the Policy Statement for listing events under the EPBC Act, listing events do not need to be considered for projects under assessment and as part of offsetting requirements after a Section 75 decision is made. As such the assessment process and offsetting requirements will continue as per the Koala’s previous listing as vulnerable.

For listing events that occur after the controlled action decision is made, section 158A of the EPBC Act provides that assessment processes under Parts 7 – 9 of the EPBC Act cannot be affected by the listing event. Therefore, the impact to such species cannot be considered as part of this assessment. At the time of the controlled action decision date, the



following species were not listed under the EPBC Act and therefore were not considered in the original Preliminary Documentation submission or this submission:

- Yellow bellied glider (*Petaurus australis australis*) – listed as Vulnerable effective 2 March 2022;
- Grey snake (*Hemiaspis damelii*) – listed as Endangered effective 5 October 2022;
- Glossy black-cockatoo (south-eastern) (*Calyptorhynchus lathami lathami*) – listed as Vulnerable effective 10 August 2022;
- Southern whiteface (*Aphelocephala leucopsis*) – listed as Vulnerable effective 31 March 2023; and
- Diamond firetail (*Stagonopleura guttata*) – listed as Vulnerable effective 31 March 2023.

In the addition to the above species, the Brigalow woodland snail has been added to the assessment as a precautionary approach as per DCCEEW’s disclosure that distribution mapping has been revised and updated for the species.

### 1.7.1.2 Aboriginal and Torres Strait Island Heritage Protection Act 1984

The *Aboriginal and Torres Strait Island Heritage Protection Act 1984* preserves and protects areas and objects of particular significance to Aboriginals in accordance with Aboriginal tradition. Cultural heritage may also be protected under the EPBC Act as a MNES or under the *Native Title Act 1993* (NT Act) where a native title claim exists. The Proponent is currently undergoing discussion with the relevant cultural heritage party for the region, the Barunggam people.

Should the Proponent discover anything that has “reasonable grounds to suspect to be Aboriginal remains “[s20(1)] during construction of the Project, the proponent will report the discovery to the Commonwealth Minister in accordance with Part 2, Division 3 of the Act. Negotiations are required if triggered.

### 1.7.1.3 Native Title Act 1993

The Commonwealth *Native Title Act 1993* (NT Act) recognises the rights and interests of Indigenous peoples in respect of land on which they historically resided and regulates the conduct of ‘future acts’, including development. The Commonwealth NT Act includes requirements for native title party notification and consultation, where a proponent seeks to undertake a ‘future act’.

## 1.7.2 State and Local Approvals

The Project is located within the WDRC local government area. A MCU approval (030.2020.120.001) was given for a Renewable Energy Facility (PV Power Station) from WDRC. Refer to a copy of the MCU approval in **Appendix D**.

The State regulatory framework that applies to the Project, and additional information regarding these is identified in the following sections:

- *Aboriginal Cultural Heritage Act 2003*;
- *Biosecurity Act 2014*;
- *Building Act 1975*;
- *Environmental Offsets Act 2014*;
- *Environmental Protection Act 1994*;
- *Land Act 1994*;
- *Nature Conservation Act 1992*;
- *Planning Act 2016*, including the following local instrument:
  - Western Downs Planning Scheme
- *Transport Infrastructure Act 1994*; and

- *Vegetation Management Act 1999.*

### 1.7.2.1 Planning Act 2016

The *Planning Act 2016* (Planning Act) is Queensland's principal planning legislation and comprises three main elements: plan making, development assessment and dispute resolution. The aim of the Planning Act is to provide a planning system that enables responsible development and delivers prosperity, sustainability and liveability.

The State Planning Policy (SPP) is a statutory instrument prepared under the Planning Act that relates to matters of Queensland interest. The SPP applies to a range of circumstances under the Planning Act, including for development assessment and when proposed new planning schemes are made or amended. The SPP is applicable to assessable development within Queensland. The provisions of the SPP may also be considered under the standard criteria of the *Environmental Protection Act 1994* (EP Act) which includes ecological MSES including: Biodiversity - MSES - Regulated vegetation and Regulated vegetation (intersecting a watercourse) and waterway barriers.

The Western Downs Planning Scheme (planning scheme) was prepared in accordance with the Planning Act as a framework for managing development in a way that advances the purpose of the Planning Act. The planning scheme identifies particular ecological interest areas in mapping overlays targeting biodiversity areas (MSES), wetlands and waterway corridors.

### 1.7.2.2 Nature Conservation Act 1992

The objective of the *Nature Conservation Act 1992* (NC Act) is the conservation of nature while allowing for the involvement of indigenous people in the management of protected areas in which they have an interest under Aboriginal tradition or Island custom.

In the context of the Project the NC Act provides for the protection and management of native wildlife and habitat that supports native species with particular regard to:

- Administering the clearing of plants protected under the NC Act;
- Managing activities that may cause disturbance (that is tamper, damage, destroy, mark, move or dig up) to animal breeding places; and
- Managing the taking of native flora and fauna.

Subordinate legislation lists protected species and areas to which the regulatory provisions of the NC Act apply, namely the Nature Conservation (Animals) Regulation 2020: this regulation lists terrestrial and aquatic plant and animal species presumed extinct, endangered, vulnerable, near threatened, least concern, international or prohibited. It recommends management objectives for the protection and maintenance of these species in Queensland, as appropriate.

The Proponent has an approved Species Management Program (SMP) for the project, dated 8 October 2021. The SMP is required where an animal breeding place has been identified and activities are proposed that would tamper with the breeding place. The Project is now registered with the DES as an approved SMP. This approval remains in effect until midnight on 15 December 2024. Refer to **Appendix D** for a copy of the letter from Department of Environment and Science (DES).

### 1.7.2.3 Environmental Protection Act 1994

The EP Act provides the key legislative framework for environmental management and protection in Queensland. The objective of the EP Act is to: 'Protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains ecological processes on which life depends' (s 3). Under the EP Act, every person must comply with the general environmental duty that stipulates: "A person must not carry out any activity that causes, or is likely to cause, environmental harm unless the person takes all reasonable and practicable measures to prevent or minimise the harm (the general environmental duty)" (s 319). The Act also obliges the duty of persons to notify the administering authority where they suspect an event has happened that causes or threatens serious or material environmental harm.



### 1.7.2.4 Environmental Offsets Act 2014

The *Environmental Offsets Act 2014* (EO Act) (Qld), Environmental Offsets Regulation 2014 and the Queensland Government Environmental Offsets Policy 2014 provides a streamlined framework for environmental offset requirements. Offsets are required where there is an unavoidable impact on significant Environmental Values (EVs). In addition, an environmental offset can only be required if impacts from a prescribed activity constitute a significant residual impact as identified through the following guidelines:

- The State guideline that provides guidance on what constitutes a significant residual impact for Matters of State Environmental Significance (MSES);
- The Commonwealth Significant Impact Guidelines for what constitutes a significant residual impact on MNES; and
- Any relevant local government significant impact guideline for Matters of Local Environmental Significance (MLES).

To avoid duplication with offsets required under the Commonwealth's EPBC Act Environmental Offsets Policy 2012, the policy provides that the administering agency must consider other relevant offset conditions which apply for the same, or substantially the same prescribed impact. If duplicate conditions are imposed, it allows the proponent to remove the duplication.

### 1.7.2.5 Aboriginal Cultural Heritage Act 2003

The *Aboriginal Cultural Heritage Act 2003* (ACHA) is the primary piece of legislation governing Aboriginal Cultural Heritage in Queensland. The ACHA requires developers to identify reasonable and practicable measures for ensuring the activities are managed to avoid or minimise harm to Aboriginal cultural heritage in a way that meets the duty of care requirements under Section 23 of the ACHA.

The Cultural Heritage Duty of Care Guidelines (the Guidelines) provides guidance in determining whether a person or activity complies with the cultural heritage duty of care. The Guidelines recognise that it is unlikely that Aboriginal cultural heritage will be harmed where:

- The current or proposed activity in an area is in an area previously subjected to significant ground disturbance and the activity will impact only on the area subject to the previous ground disturbance; or
- The impact of the current or proposed activity is unlikely to cause any additional harm to Aboriginal cultural heritage than that has already occurred.

The Project is located within the Barunggam People's native title claim (QC1999/005). The Barunggam People's application (QUD6005/1999) was filed on 27/1/1999 and has been dismissed by the Federal Court. However, the Barunggam People remain the 'native title party' for the Project Area and comprise the 'Aboriginal party' for the purpose of consultation as defined by section 35 of the ACHA. Under the legislation, the Barunggam People are the owners and caretakers of any items of Aboriginal cultural heritage within the Project Area.

The Proponent is currently in discussion with the Barunggam people. Necessary agreements will occur and if required a Cultural Heritage Management Plan (CHMP) or Other Agreement will be prepared and developed in collaboration with the Barunggam people. Additional information is included in **Section 7.4**.

## Section 2 Description of Action

### 2.1 Project Infrastructure

#### 2.1.1 Solar Arrays

Solar PV modules are devices that can convert the sunlight into electricity. Tier One solar PV panels will be used. Modules will utilise monocrystalline bifacial technology with a power class likely between 550Wp to 650Wp. The panels will be elevated off the ground on support columns which include solar trackers to maximise yield and protect the assets from extreme weather events. Refer to **Appendix C** for the location of the solar PV modules.

String combiners take the wires from several different solar panels and combine them into one main feed. A string combiner will be used to combine the output of multiple strings of solar PV modules and will be connected to the substation.

#### 2.1.2 Substation

The substation area is located at the north-eastern section of the site (refer to **Appendix C**). The substation will contain the Powerlink compliant 132 kV to 33 kV substation transformer and be the point of electrical connection. Earthworks and hardstand will be undertaken to provide a flat site above the Q200 (0.5% AEP) flood event.

#### 2.1.3 Site-Operation Compound

The site operation compound will contain an open area with shed facilities to store equipment and provide a workspace to complete maintenance works. Car parking will be provided as required.

#### 2.1.4 Access Road

The access road to the site is from existing Forest Road, which is currently an unsealed formed rural road. The majority of this forestry road is cleared and will be improved through resurfacing methods to reduce the potential for erosion and dust dispersion. The majority of the previous disturbance will be utilised with only some minor clearing to occur for the purpose of safety in design and improvements to the alignment to be consistent with the real cadastral boundaries of the site (i.e., to specifically avoid impacting on the State Forest). The existing track will be regraded and enlarged to a 7 m wide gravel placement on an 8 m formation.

The crossing of the creek intersecting the access road will be designed as part of 'detailed design' and impact will be minimised during design, and construction. It is expected that significant works will be avoided at this location and design will attempt to be in accordance with 'Accepted development requirements for operational works that is construction or raising waterway barrier works' (DAF, 2018).

Internal access roads will allow vehicular access between solar PV panel blocks. Internal roads will fall into two categories:

- Main roads – consisting of a 6 m wide gravel formation with a 3 m wide bitumen surface designed to accommodate large trucks. Passing bays may be required subject to detailed design; and
- Minor roads – these will be a graded dirt tracks to enable a maintenance vehicle to access solar panels.

A secondary emergency access track has been considered and will be utilised in the extreme occurrences if required, such as bushfire events. The secondary emergency access track will utilise a neighbouring landholder's access track. Relevant agreements with landholders will be obtained prior to construction

### 2.1.5 Drainage

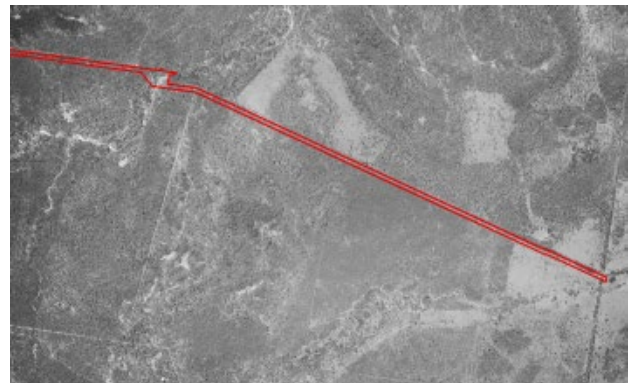
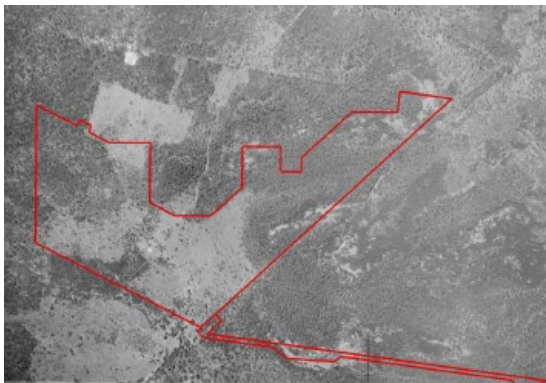
Forest Road will be constructed to a rural standard with table drains and crossroad culverts as necessary.

Existing internal roads and site areas will be disturbed by clearing and earthworks. The site will be designed with table drains, diversion bunds and stormwater pit and pipe necessary to direct water into multiple basins onsite for treatment.

### 2.2 Site Selection and MNES Avoidance

Elecseed, Calibre Group and Hills International College assessed several land parcels in proximity to existing electricity and gas infrastructure, and as a consequence, each other, for the suitability of the Project (refer to **Appendix E** for the site selection report). The land parcels proximal to the existing Kumbarilla Park substation, Shell QGC Ruby Jo Central Gas Processing Facility (which includes a field compression station and workforce camp) were investigated.

Proximity to suitable electrical infrastructure is a key pre-requisite for renewable assets and to avoid further environmental impacts from transmission corridor development that would be necessitated by assets further way from the existing electricity network. All prospective proximal sites are vegetated though several have existing coal seam gas wells, pads and gas gathering pipelines and associated infrastructure throughout them. To the southwest is the Weranga State Forest, and to the west and northwest is the Braemar State Forest, which are unavailable to development. State Forests in Queensland aim to balance the conservation of natural resources, sustainable timber production, recreation, research, and ecological services. Selective logging practices may be employed to extract timber resources while attempting to balance the long-term viability of the forest ecosystem. The Project site has been subject to selective logging and clearing over its history, whereby the oldest and largest trees have been taken for timber resources. To the south over the Project lies completely cleared land which is dedicated to agricultural production. QImagery analysis displayed mapping of the Project area dating back to 1959 where vegetation clearance was already prominent with 60% of the Project area including cleared (refer to Plate 2-1, Extent Heritage, 2021). Within this time, Forest Road and multiple dams were also already constructed within the Project area. This information suggests that logging practices were undertaken prior to 1959 and any hollows suitable in size for the Greater glider (southern and central) forms in trees at least 100+ years old (DCCEE, 2022a), therefore if these were ever present, they would have been eradicated from selective logging. To the south over the Project lies completely cleared land which is dedicated to agricultural production.



**Plate 2-1 Qimagery of the Project area in 1959 (source: Extent Heritage, 2021)**

The avoidance of MNES, given the proximity of complementary infrastructure and the absence of completely cleared land not already dedicated to CSG extraction, State Forests, or agricultural production, led to an acceptance that significant residual impacts to MNES may not be avoidable, and that appropriate environmental offsetting would be necessary to gain Project approval from the Federal government. It was considered that, including physical offsetting proposals that the carbon abatement of the Project lends to an overall positive environmental outcome of the Project.

Being near the Kumbarilla Park substation is also key. The Kumbarilla Park substation was initially designed and developed for a 600 MW gas-fired power station for Shell QGC. This project did not proceed, having been cancelled by Shell QGC. The sub-station is therefore particularly large with substantial spare capacity and access bays, ideal for renewable assets to be connected. This influenced the decision of the substation selected.

The land suitability was assessed against the following six criteria:

1. Project Economics;

2. Technology;
3. Environmental and Geographical;
4. Potential renewable energy zones;
5. Gas line infrastructure; and
6. Land commercial availability.

### 2.2.1 Chosen Project Site

Following the site selection process, the proposed Project area was determined to be located on Lot 4 on DY457. This lot is located within 0.85 km of the Kumbarilla Park substation and has an existing High Voltage (HV) Braemar to Bulli Creek 330 kV line running overhead. The chosen Project area is located within existing gas fields and three existing petroleum leases owned by Shell QGC, being PL 273, PL 275, and PL 466. Proximity to existing gas fields and petroleum leases allows for the labour availability for construction, maintenance and operation works. It is also located conveniently in the event of potential future technological advancements in hydrogen transmission via existing methane pipeline infrastructure which may able to be repurposed.

At the time of the assessment, the vegetation within the chosen Project area is considered of least concern or regrowth vegetation by the Queensland government. Development approval has been granted by the WDRC and clearing permits have been issued by the DES.

The chosen Project area is located within one of the highest solar irradiance regions of the world, generating approximately 4.2 – 4.6 kWh per KWp, in-turn allowing the Project to generate an attractive carbon abatement of 162,790 tonnes of CO<sub>2-e</sub> per year (Elecseed, 2023). The Project area is situated within the Southern Queensland Renewable Energy Zone (QREZ), an area set out to encourage the development of renewable projects due to existing electrical infrastructure and land availability.

### 2.2.2 Alternative Sites

Several additional sites were evaluated against the suitability criteria as potential land for the Project, refer to Table 2-1. Each landlord at the time of assessment received a letter outlining the purpose and background of the Project. Of the six letters, two received a reply; one communicated the desire to sell his land at an elevated cost, and another from a landowner which subsequently led to meetings and mutual interest.

**Table 2-1 Additional Land Evaluated**

Land Parcel	Land Area	Landlord at the time of assessment	Date contacted
SP271223	512 hectares	Landholder 1	Q3 / 2019
Lot 4 on DY457	396 hectares	Landholder 2	Q3 / 2019
Lot 30 on DY457	270 hectares	Landholder 3	Q3 / 2019
Lot 16 on SP215354	417 hectares	Landholder 4	Q3 / 2019
Lot 8 on RP194938	311 hectares	Landholder 5	Q3 / 2019
Lot 30 on DY129	270 hectares	Landholder 6	Q3 / 2019

### 2.3 Disturbance Footprints

The disturbance footprint of the Project has been refined and reduced following the submission of the Referral. The expected disturbance footprint of the Project has been calculated as Table 2-2 with these areas shown on Figure 2-1. The disturbance footprint is the maximum expected clearing extent. Figures shown throughout this document will continue to show the Project extent, with calculations provided throughout for both the Project extent and disturbance footprint. This disturbance footprint is the boundary of project development within which clearing is proposed but does not account for the relatively minor areas devoid of woody vegetation.

The Access Corridor disturbance area is based on a 30 m corridor; however, the clearing extent is expected to be far less as the road only requires regrading and to be enlarged to a 7 m wide gravel pavement on an 8 m formation. It is expected clearing will be limited to only what is necessary in the Access Corridor. The bushfire setback buffer lies with the Project disturbance extent.

**Table 2-2 Project Extent and Disturbance Footprint**

Type of Area	Area (ha)		
	PV Power Station	Access Corridor	Total Area
Project extent	191.5 ha	22.0 ha	213.5 ha
Disturbance footprint	190.4 ha	19.0 ha	209.4 ha

### 2.4 Communications and Power

Telecommunications are currently not provided to the site. Telecommunications will be installed, either through the existing established networks in the region, or through remote networking. During construction, portable diesel generators will be utilised to provide power for construction works, while operational power will be sourced directly from the solar farm's substation. As such, no connection to the localised low voltage transmission network is proposed.

### 2.5 Transport

Details on the number of vehicles for the construction phase is currently unconfirmed. Once construction is complete the number of maintenance vehicles entering the site will be very low.

### 2.6 Water

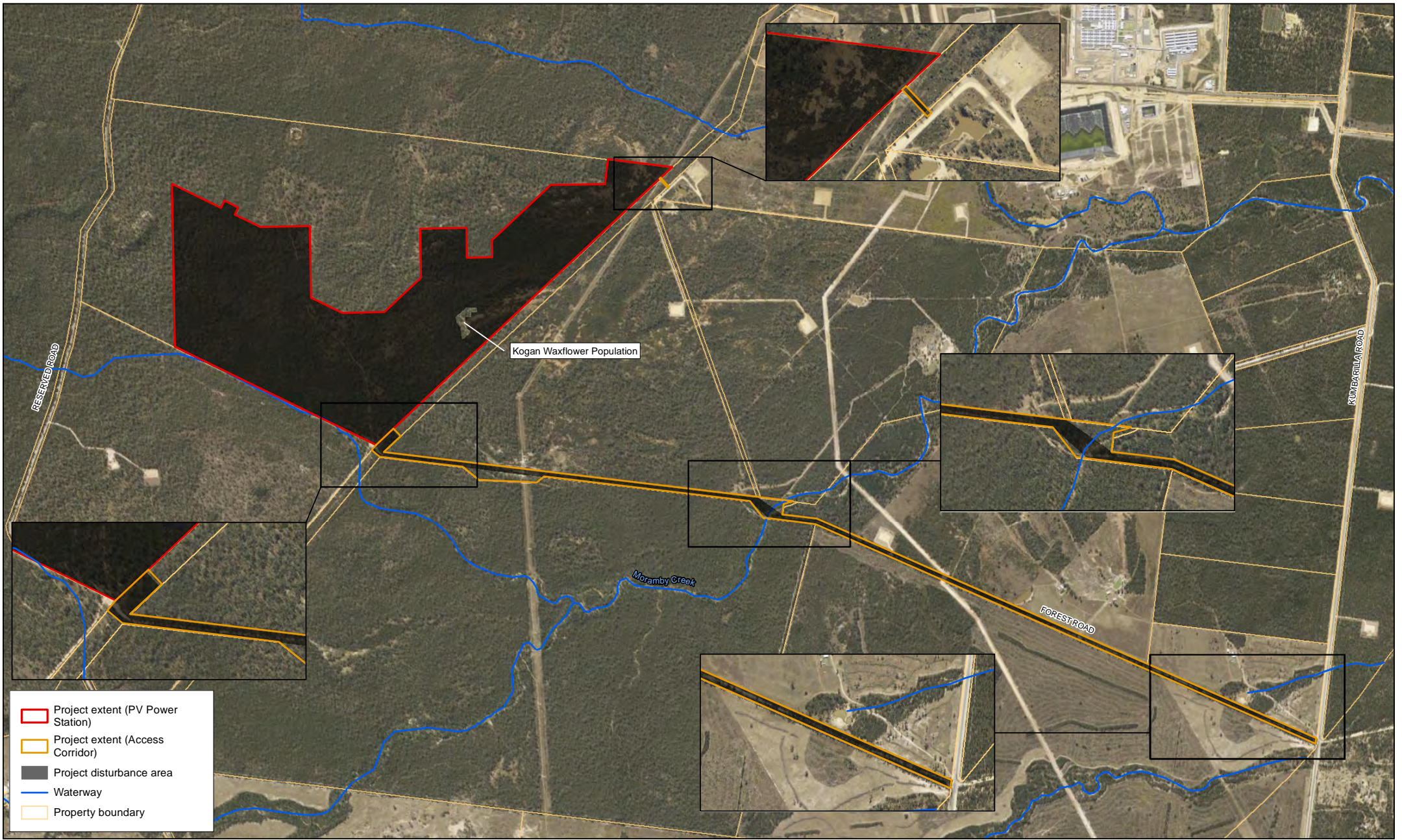
The Bushfire Management Plan prepared by Blackash Bushfire Consulting has recommended that a 50,000 litre on-site dedicated water supply be provided. This is expected to be provided in above ground water tanks connected to shed roofs. During the construction period, it is expected that water will be trucked to site. This water will be used for construction and potable uses. Water will be required for construction dust suppression, wheel washing and workforce facilities.

During operation, water will be required for worker facilities; however, with minimal employees, water requirements will be minimal and primarily for functioning of the ablutions block, potable purposes and bushfire fighting purposes. It is expected that water will be trucked to and stored on-site throughout the Project's lifetime. Should it be determined that trucking is incapable of supplying the required amounts or is too costly, a range of supplementary water supply options may be considered, including:

- Connection to mains water under a licence agreement;
- Construction of bores;
- Rainwater capture and storage; and

- Runoff water capture and storage.

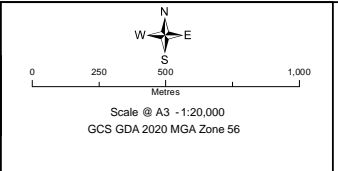




- Project extent (PV Power Station)
- Project extent (Access Corridor)
- Project disturbance area
- Waterway
- Property boundary

R	Details	Date
1	Final	18/11/21
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
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DESIGNED	DB	CHECKED	SM		
DRAWN	DB	CHECKED	SM		
APPROVED	SM	DATE	18/11/21		
Notes:					



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**DATA SOURCE**  
QLD Government Open Source Data  
CDM Smith Modelling Data

DESIGNER

CLIENT

FIGURE 2-1

**Disturbance Areas and Project Area**

DRG Ref: FIG X-XX Project Areas



## 2.7 Wastewater and Solid Waste

No onsite effluent treatment is proposed. During construction wastewater will be captured and removed from site using a licensed waste contractor. Solid waste will be handled by onsite bins for disposal off site to an approved facility.

A small operational sewage treatment plant will be designed and constructed to manage the minimal operational staff. The design peak capacity of the sewage treatment plan will cater for visitors expected at the site.

## 2.8 Waste

There is not expected to be significant waste output from the Project. Much of the waste is expected to be recyclable, including the pallets that transport the solar panel modules. Waste is expected to be managed locally, where several waste treatment and disposal centres are available. A dedicated waste storage and handling section will be provided in the laydown area.

Any waste will be disposed of safely in accordance with Queensland regulations and spill kits will be provided in hazardous material storage areas. Unused or excess chemicals and material will be removed and disposed of correctly, in accordance with safety data sheets (SDS) and waste disposal guidelines.

Material moving to and from site, will be tracked using dockets and receipts. Licensed transporters will be used to collect and dispose of the waste.

## 2.9 Project Timing

The Project life cycle consists of clearing and establishment works, construction, initial rehabilitation, commissioning, operation, decommissioning and final rehabilitation. Initial rehabilitation of works of a temporary nature will occur as sections are completed while final rehabilitation will occur once operations are complete at the end of mine life (refer to Section 5.4 for rehabilitation summary).

The operations and maintenance of the Project components begins immediately after commissioning and testing. The operation and maintenance period will be ongoing for the life of the infrastructure.

The Project timeframes related to the initial stages of the Project are represented in Table 2-3. The operations period for the Project is for a proposed 40 years, after this decommissioning and final rehabilitation will occur.

**Table 2-3 Project Timing**

Phase	Indicative Start	Indicative End
<b>Access Corridor</b>		
Clearing of Access Corridor	July 2024	September 2024
External roadworks	August 2024	December 2024
External drainage (pipes and culvert crossing)	September 2024	October 2024
Finishing works	March 2024	April 2025
<b>PV Power Station</b>		
Clearing of PV Power Station	July 2024	September 2024
Construction fencing, compound and services	July 2024	August 2024
Formation of sediment basins and erosion and sediment controls	August 2024	September 2024
Internal roadworks	September 2024	December 2024
Internal drainage (including detention basins)	August 2024	October 2024
Hardstand areas	September 2024	September 2024

Phase	Indicative Start	Indicative End
Buildings	September 2024	February 2025
Fencing	September 2024	November 2024
Finishing works	December 2024	January 2025
Solar panel installation	August 2024	July 2025
Sub-station construction	March 2025	July 2025
Commissioning	July 2025	September 2025

## 2.10 Project Construction

### 2.10.1 Workforce and Hours

The construction workforce for the Project may vary; however, it has an estimated peak of 144 personnel. Most construction positions will be short-term and temporary, and it is expected the bulk of the construction workforce will be provided by contractors. The workforce is likely to be sourced locally, wherever possible. The workers who do not reside locally will be housed within local accommodation facilities in Dalby or surrounding localities. It is likely that a proportion of the workforce will be indigenous and pursuant to the terms of a Cultural Heritage Management Plan, will also be involved in the protection of Aboriginal Cultural Heritage on the Project site.

The bulk of construction activities are proposed to be undertaken in daytime hours 7 days per week from 6.30 am to 6.30 pm; however, some critical path work may be undertaken at night from time to time. It is recognised that some construction and commissioning activities may need to be undertaken at times when there are minimal personnel on-site to progress time critical activities

### 2.10.2 Plant and Equipment

The Project will require a number of specialist plant and equipment, which will be mobilised to site, these include:

- Generators;
- Excavators;
- Grader;
- Cranes;
- Trenching machine;
- Wheeled crane; and
- Trailer mounted fuel pod.

### 2.10.3 Construction Methodology

#### *Site Preparation*

The Project site will be surveyed and marked out. The Project site will then be predominately cleared in compliance with environmental and cultural heritage management plans where required for the erection of solar panel arrays and other associated infrastructure.

Site grading and minimal earthworks will occur for the construction of access tracks, solar module areas, temporary facilities, the substation, trenches for electrical cabling and site drainage features. The expected earthworks are described as follows:

- Main – earthworks associated with the construction of road formation, stormwater basins and building pads; and
- Minor – clearing and grade over the surface to remove surface rills, mounds and vegetation for minor roads and solar panels.

Topsoil that is left over will remain on-site and will be used for restoration following the construction activities. Erosion and sediment control measures will be installed as required. The site road network will be developed with internal access tracks and a perimeter road.

Clearing will progress along internal roads to locations of sediment basins and pad areas to enable basins to be formed before the balance of the site is cleared.

#### *Mechanical, Structure and Electrical Works*

Mechanical, structural, and electrical works will involve the installation of solar panels and substation.

The Project will require the excavation and removal of in-situ material and placement of material and grounding to allow the construction of electrical equipment and the substation. To secure the solar panel arrays, piles will be driven or screwed into the ground using an excavator or piling rig. Solar panel piles will be driven or screwed to a depth of approximately 1.5 m to 2 m depending on the undulation of the land.

Electrical cabling from the modules to the substation will generally be trenched (using a trenching machine) but may be routed over ground in cable trays or conduit. Once the piles and structural support system for the solar panels are in place, the solar panels will be fitted to the support structure. Trenches will be to depths will be between 0.9 m to 1.2 m.

#### *Commissioning*

Following completion of site works all construction equipment will be demobilised. The solar panels and systems will undergo a commissioning process. Solar panel commissioning ensures that systems are safe, high performing and in accordance with expectations. Predicted and actual energy performance of the Project will be examined and compared. Solar panel arrays will be tested. The Project will be connected to the grid sequentially.

## 2.11 Operation and Maintenance

Once the roadworks and construction of all elements that comprise of the PV Power Station are completed the operation will consist of generating electricity from the solar panels and exporting it to the power grid via the substation. The facility will be remotely monitored, and maintenance operations will consist of periodic ground keeping works and replacement of solar components as necessary of the lifetime of the facility. When operational, the Project will have an ongoing anticipated maximum workforce of 5 full time equivalent staff.

The operational activities will be solar panel maintenance and ground maintenance. An onsite storage facility will contain components for maintenance of the solar panels. Maintenance to the solar panels will be carried out using light vehicles and labour to replace the panels. When problems arise, most faults will be electrical in nature and will require specialist technical personnel and equipment to resolve.

The landscape under the PV array trackers will be grassed and following the contour of the natural landscape.

The panels tilt and will always be at least 0.5m from the ground in a fully tilted position, and 1.5m above the ground during the middle of the day when tracking the sun.

The operational solar farm will continue to provide some habitat values to species that can utilise periodically maintained grasslands.

### 2.12 Staged Action Discussion

The K-REP website describes the Project as a two-stage development of PV Power Station and green hydrogen production facility (note that this hydrogen production facility is a future development aspiration which is not part of current planning. Allowance was made for a clearing pad for a possible future hydrogen plant within the MCU approval area, with later plans for an additional 100 MWp PV Power Station and 80 MW hydrogen plant. The EPBC Act policy regarding staged development or split referrals has been reviewed, regarding the Project. As per the policy, when deciding whether a project constitutes a split referral, the following questions are considered:

1. **What is the larger action?** The K-REP website states the potential for an additional 100 MWp PV Power Station and 80 MW hydrogen plant, however there are no plans provided or details of spatial extent to this development. There is insufficient information in the public domain, nor even in our domain, to sufficiently understand what any larger action would involve, nor any business decision by the proponent to undertake this development. The expansion of the current proposal is a theoretical aspiration, rather than a considered prospect.
2. **Can the referred action stand alone?** Yes - the Project does not rely on any other actions. It includes the Access Corridor, power generation and distribution (substation). The current action could operate separately to any expansion.
3. **Are the referred action and related actions co-dependent?** Possible – however, the location of the second stage is unknown and the ability of the hydrolyser plant to operate just on the power supplied by a theoretical later stage is unknown. It is also not necessary for any future hydrolyser to be physically collocated with this project nor considered part of it due to the nature of the reticulated electricity grid affording locational flexibility of any such infrastructure should it ever be developed.
4. **What is the timeframe between the referred action and the related action?** Unknown – and a presumption of a lengthy or indefinite timeframe between the actions and the possibility of a later action supports the assertion that the referred action and a theoretical later action are distinct.
5. **What is the geographic relationship between the referred action and the related action?** Unknown. It is assumed to be proximal because of a reduction in potential transmission losses notwithstanding the implied flexibility of any connection to a broader electricity network.
6. **Is there an overall plan or vision for the larger action and does that plan encompass the referred action?** The policy refers to existence of a masterplan or other planning documentation. There is no overall plan or vision of a larger action beyond what is purported to be aspirational and technically plausible on the K-REP website.
7. **Are the actions authorised by a single local government or State/Territory permit, licence or other authorisation?** A separate local government permit and state permits would be required for a separate action. A development approval for the solar farm which is consistent with the action proposed in this Preliminary Documentation has been obtained, refer to Section 1.7.2.
8. **Will the action be financed from a single funding source?** At this point in the Project development, the final details of capital expenditure for the development have not been finalised as they are likely contingent on securing all necessary approvals to reach a final investment decision.

Based on the policy questions, the Project is not considered part of a staged development or larger project for the purposes of consideration under the EPBC Act. Justification for this is as follows:

- There are no designs or layouts produced by the proponent for any larger action than is being referred;
- Technical studies have been limited to the extents of the action provided in the referral;

## Section 2 Description of Action

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- The MCU application to WDRC and subsequent conditional approval only account for the action included in the current referral;
- It is possible that any expansion of the Project (should it occur in the future) may be undertaken by a separate proponent and through a separate funding source; and
- Should the proponent or separate proponent wish to expand the action in the future, consideration of the obligations under the EPBC Act will be undertaken at such time and with consideration of the action details which are currently not available.

### 2.13 Project Alternatives

#### 2.13.1 No Development Alternative

The Project provides a secure and reliable supply of renewable energy. The Project has secured a MCU approval from WDRC to construct (030.2020.120.001). The Project considered several arrangements and components in order to establish a solar farm. The consequences of not proceeding outweigh the consequences of proceeding, including both economic, social and infrastructure benefits for the region and State. The Project is considered economically significant at a local, regional and State level. The Project will create new and sustainable opportunities for small and medium-sized businesses in the local and regional economy, especially those providing services to the mining industry. The Project is endorsed by Trade and Investment Queensland as this Project aligns with many of the Queensland Government's objectives (source: letter dated 20 April 2020 from Trade and Investment Queensland). The Project also has the support of the WDRC (source: WDRC Website dated 26 October 2020) as energy is recognised as one of the four economic pillars of the region.

The Project both supports and is supported by a number of initiatives which include:

- Investigating the opportunity for renewable energy power plants in regional centres;
- Decarbonising Government's electricity supply;
- Facilitating the market penetration of renewable energy; and
- Attracting international investment.

The Project proponents have understood the requirement to provide environmental offsets either at a State and Commonwealth level and recognised the financial and long-term nature of this obligation.

#### 2.13.2 Feasibility and Alternative Option Studies

Two detailed studies have been completed prior to the lodgement of the EPBC Act Referral.

- The first was a Pre-Feasibility Study which reviewed several potential sites for the location of the Project.
- A subsequent Feasibility Study was prepared which confirmed the Project's subject site as being the most suitable for the proposed development.

The following works were undertaken prior to preparation of the Feasibility Study and to assist in selection of the subject site:

- Drainage review;
- Environmental review;
- Discussions with Powerlink;
- Discussions with solar panel providers;
- Discussions with balance of system providers;
- Discussions with WDRC;
- Discussions with the State Assessment and Referral Agency (SARA);
- Discussions with Pricewaterhouse Coopers;
- Discussions with Commonwealth Government Department of the Environment and Energy (now DAWE);
- Discussions with Engineering Procurement and Construction Providers; and
- Discussions with Power Purchasing Agreement Providers.

The Feasibility Study reviewed the subject site in terms of the following and found the site to be the most suitable due to the following core aspects being assessed, including:

- Site works including:
  - Topography;
  - Geological profile;
  - Soil classification;
  - Acid sulphate soils; and
  - Controls.
- Environmental matters including:
  - Remnant regional ecosystems;
  - Essential habitat species;
  - Statutory review of requirements;
  - Environmental offsets; and
  - Approvals.
- Stormwater management;
- Roadworks and earthworks;
- Wastewater and water supply;
- Solar farm electrical configuration including:
  - Panels;
  - Inverters;
  - Array structure and trackers;
  - Schematics and single line diagrams;
  - General arrangement layouts;
  - Temporary works and site layout area layouts; and
  - Substation location.
- Ancillary calculated data and metrics for construction and operations phase including:
  - Yield calculations;
  - Basis of design;
  - Optimised life of plant;
  - Implementation planning; and
  - Operation and Maintenance.

In total, three alternative parcels of land were reviewed, and discussions were had by Calibre and Elecseed with the owners of the lands. An initial site comprised two blocks of land across the entire area of two on Kumbarilla Lane, Dalby, Queensland, both 50.54 hectares in area and therefore totalling 101.08 hectares. These lots were located 8.3 km from the nearest power substation and would therefore require transmission lines to be considered alongside the solar farm proposal potentially over public and private land to connect to the solar farm to the power network.

Calibre's pre-feasibility report noted that the location of the power line and associated infrastructure should ideally be positioned within 1,000 m of the Kumbarilla Park substation and alternative site locations were investigated. QGC has an existing 13 2kV Substation fed by the Powerlink Kumbarilla Park 275/132 kV Substation located adjacent the proposed K-REP site. The high voltage transmission line supplies QGC's Gas Compression Facility, at the Ruby site at

Kumbarilla Park, West of Dalby. The Powerlink Kumbarilla Park 275/132 kV Substation is the proposed point of connection for K-REP and met the above requirements.

### 2.14 Existing Approvals and Agreements

The Project has been approved by WDRC under Development Approval 030.2020.120.001 on 1 October 2020.

The Queensland DES granted a permit (WA0038967) to clear Kogan waxflower (*Philothea sporadica*) across an area of 213 ha.

The Queensland DES has also approved Species Management Programs (SMP954) for tampering with animal breeding places (high and low risk of impacts).

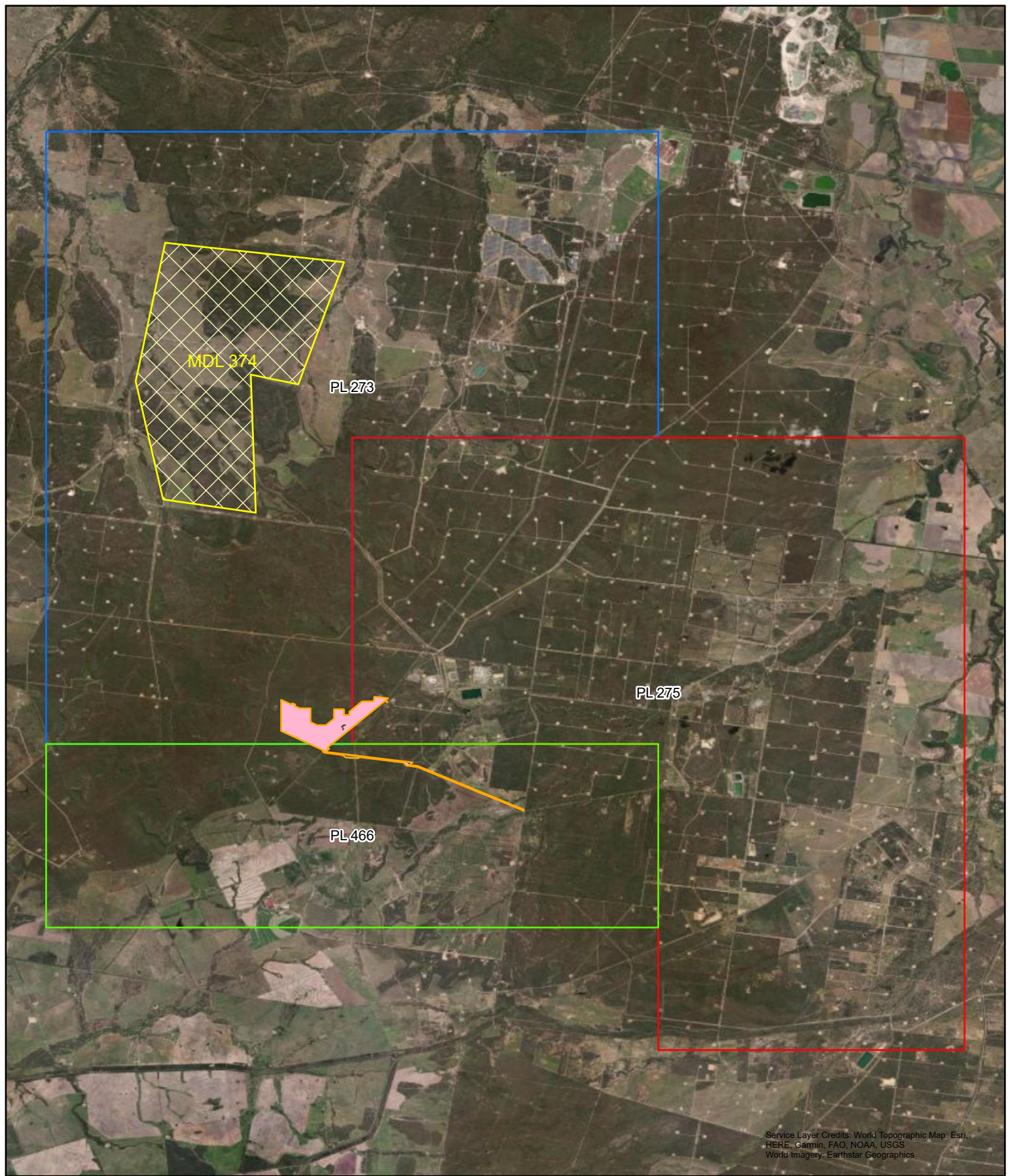
Elecseed and the Barunggam People have agreed the terms of the Cultural Heritage Management Plan for the Project.

As per a desktop analysis of Queensland Government mapping (i.e., QGlobe and GeoRes Globe) and the Western Downs Regional Council interactive mapping, the entire Project area and surrounds are covered by three petroleum leases, including PL 273, PL 275 and PL 466 by QGC Pty Limited, granted in September and December of 2011) (refer to Figure 2-2) (DNRM, 2019). Should the K-REP project not proceed, these areas are likely to be developed for coal seam gas extraction by QGC Pty Limited.

Within the vicinity of the Project area, Braemar State Forest, located approximately 4.2 km north of the Project area, is covered by an authority to prospect, part of which is also a mineral development licence (MDL 374) (DNRM, 2019) (refer to Figure 2-2).

State Forests can be utilised for sustainable timber harvesting. Commercial logging operations are conducted in designated areas to provide a renewable supply of timber, supporting the forest products industry in Queensland. Rather than clear-cutting entire forests, sustainable logging practices typically involve selective harvesting. This means carefully choosing specific trees for removal while leaving others to continue growing and regenerating. Selective harvesting helps maintain forest structure, biodiversity, and ecosystem functions, though may bias older trees which can play an important role in the habitat for species, particularly hollow-denning species.

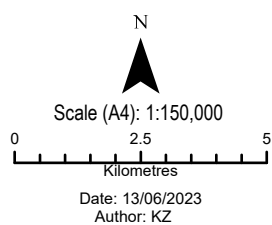




Service Layer Credits: World Topographic Map: Esri, HERE, Garmin, FAO, NOAA, USGS  
World Imagery: Earthstar Geographics

**Figure 2-2 Petroleum leases within and surrounding the Project area**

- Legend**
- Project Extent
  - Disturbance Extent
- Petroleum Leases**
- PL 273
  - PL 275
  - PL 466
- Mineral Development Licence**
- MDL 374



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### Section 3 Description of the Environment and MNES

#### 3.1 Nomenclature

Botanical nomenclature within this report follows taxonomy accepted by the Queensland Herbarium and Queensland Museum. Zoological nomenclature follows the Birdlife Australia Rarities Committee checklist (for birds) and the Queensland DES Wildlife Online database taxonomy (for all other fauna), unless otherwise noted. All species in this report will be referred to initially by both their common and scientific names and then only by the common name.

#### 3.2 Methodology

The methodology for the ecology assessment includes a combination of desktop and field-based assessment methods:

- A desktop review of relevant Commonwealth, State and local databases, vegetation mapping, published ecological studies and any other relevant literature. The desktop review was used to identify vegetation communities predicted to occur within the Project Area, and individual flora and fauna species known, or which have the possibility to occur within the Project Area;
- Field survey to ground-truth the presence of listed species and / or suitable habitat, and vegetation communities identified during the desktop review;
- Follow-up field surveys to identify details of flora and fauna; and
- Review of field vegetation site data and recent aerial imagery to refine existing mapping at the property scale.

In addition to the ecological assessments several other surveys and evaluations were undertaken to assess if the Project's activities would have the potential to cause environmental impacts. The following studies have been completed for the Project:

- Soil survey and associated reporting;
- Stormwater and drainage reporting;
- Traffic and transport impact assessment and reporting; and
- Bushfire risk assessment and reporting.

##### 3.2.1 Desktop Review

Desktop studies were undertaken prior to field assessments. The desktop review was used to obtain background information relating to the potential presence and distribution of species and ecological communities (including connectivity across the regional landscape), particularly those listed under the VM Act, NC Act and EPBC Act (Cth). Desktop studies involved database searches and review of:

- Commonwealth EPBC Act Protected Matters Search Tool (PMST) (DAWE) (to confirm current legislative status of listed species) (refer to **Appendix E**);
- Current publicly available RE mapping – V12 (Queensland Herbarium 2021);
- DES WildNet (Wildlife Online) database search results (refer to **Appendix G**);



## Section 3 Description of the Environment and MNES

- Atlas of Living Australia (ALA) species database; and
- Mapping for the Protected Plants Trigger Survey Map and MSES.

Database searches were undertaken over a 25 km radius (10 km for the ALA species database) of the Project Area. The EPBC Act PMST, whilst based on some species records, primarily relies on modelling of suitable habitats (with mapped boundary constraints accounted for) and is largely a predictive tool with associated caveats.

Wildlife Online database records are based on records of species from a wide variety of observers and although the records are generally accurate in terms of spatial location, not all records have been verified. The ALA records are largely verified and include specimen records from museum collections across Australia.

Reviews of Shell QGC pre-clearance survey reports for the Ruby Jo, Isabella, Jen, David, Poppy, and Sean sites were also conducted to gain additional knowledge of the surrounding environment and any species or communities of concern in the area.

### 3.2.2 Field Surveys

Various ecological surveys have been completed across the PV Power Station component of the Project Area (and partly outside). The surveys were carried out by Paul Fox (Principal Environmental Scientist/ Project Manager – Fox & Co Environmental), Dave Moore (Principal Botanist - Fox & Co Environmental), Bruce McLennan (Arcadian Ecology Pty Ltd) and Ben Nottidge (GreenLeaf Ecology):

- **Preliminary Survey** - A preliminary ecology survey of the PV Power Station was undertaken over a 3-day / 2-night period between 6 – 8 May 2020 (herein referred to as the **preliminary survey**). This was undertaken to ground-truth desktop information and identify any additional flora and fauna values not identified through the desktop study. Following this preliminary survey, a population of Kogan waxflower (*Philotheca sporadica*), a near threatened (NT) flora species listed under the NC Act and not Listed (delisted recently in December 2020) under the EPBC Act was identified in the south-eastern portion of the site. Refer to additional information below.

The site was fully accessible at the time of the surveys. The ecology survey was conducted over approximately 200 ha. The PV Power Station was traversed by vehicle and on foot.

- **Targeted Survey** - A subsequent survey was undertaken between 18 – 22 January 2021 (herein referred to as the **targeted survey**). This included a targeted protected plant survey, Koala (*Phascolarctos cinereus*) habitat survey, quaternary vegetation assessments<sup>1</sup> and targeted Corben's long-eared bat (*Nyctophilus corbeni*) surveys.

Fox & Co Environmental Pty Ltd (Fox & Co) partnered with the specialist Koala Detection Team (KDT) from the University of the Sunshine Coast (USC) to assist with Koala surveys for the Project Area. The KDT have provided a stand-alone report outlining the results of the Koala field assessment which includes mapping of presence/absence and the survey coverage area (Detection Dogs for Conservation, 2021). Fox & Co have subsequently prepared an assessment of the Koala habitat using the Koala Habitat Assessment Tool in accordance with the Matters of National Environmental Significance, Significant Impact Guidelines (1.1), Department of Environment (DoE), 2013 and the EPBC Act Referral Guidelines for the Vulnerable Koala, DoE, 2014 (Department of the Environment, 2013; Department of the Environment, 2014).

<sup>1</sup> Neldner, V.J., Wilson, B.A., Dillewaard, H.A., Ryan, T.S., Butler, D.W., McDonald, W.J.F, Addicott, E.P. and Appelman, C.N. (2020) Methodology for survey and mapping of regional ecosystems and vegetation communities in Queensland. Version 5.1. Updated March 2020. Queensland Herbarium, Queensland Department of Environment and Science, Brisbane.

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The site was fully accessible at the time of the surveys. The ecology surveys were conducted over approximately 200 ha. The PV Power Station was traversed by vehicle and on foot.

- **BioCondition and Habitat Quality Assessment** - A BioCondition survey and habitat quality assessment was undertaken in the PV Power Station area between 24 – 27 May 2021 by Bruce McLennan (Principal Ecologist - Arcadian Ecology) (herein referred to as the **BioCondition survey**). This assessment was to verify RE mapping for the PV Power Station footprint of the Project Area, identify any conservation significant species under the Queensland NC Act and Commonwealth EPBC Act and to identify and conduct BioCondition assessments as prescribed. Ecological values present within the study area were measured through the BioCondition assessment method. The data scores derived provide the baseline for deriving Terrestrial Habitat Quality through the *Guide to determining terrestrial habitat quality – Methods for assessing habitat quality under the Queensland Environmental Offsets Policy* (DES 2020) as well as forming the basis for any offset calculator scoring of MNES offsets required under the EPBC Act;
- **Access Corridor Survey** - An additional ecological survey was undertaken between 24-27 May 2021 within the Access Corridor (herein referred to as the **Access Corridor survey**). The survey was conducted by Bruce McLennan (Principal Ecologist - Arcadian Ecology) and Ben Nottidge (Ecologist - Greenleaf Ecology). This was undertaken to ground-truth desktop information and identify any additional flora and fauna values.

The Access Corridor (approximately 22 ha) was fully accessible at the time of the surveys and was traversed by vehicle and by foot.

Data was collected using general site notes, photo points with waypoint references. The waypoints correlate to Quaternary Vegetation Assessment, RE assessments, Song Meter™, camera locations and general environmental points. Refer to Figure 3-1 for quaternary site locations and flora and fauna assessment locations. Survey methods included:

- **Quaternary Assessments** - Quaternary assessments at 11 sites across the Project Area were completed. Vegetation community assessment were undertaken using the quaternary level of assessment as described within the Methodology for survey and mapping of REs and vegetation communities in Queensland (Neldner, et al., 2020);
- **BioCondition Assessments** - Field surveys were undertaken to confirm the identity of REs and correct the mapping, collect BioCondition data and to conduct targeted searches for endangered, vulnerable and near threatened (EVNT) flora species across the proposed impact area. RE boundaries were assessed using the State RE mapping (Version 11, Department of Resources 2021), historical imagery from QImagery and the latest available aerial imagery for the area (Queensland Globe 2021) and field assessment results.

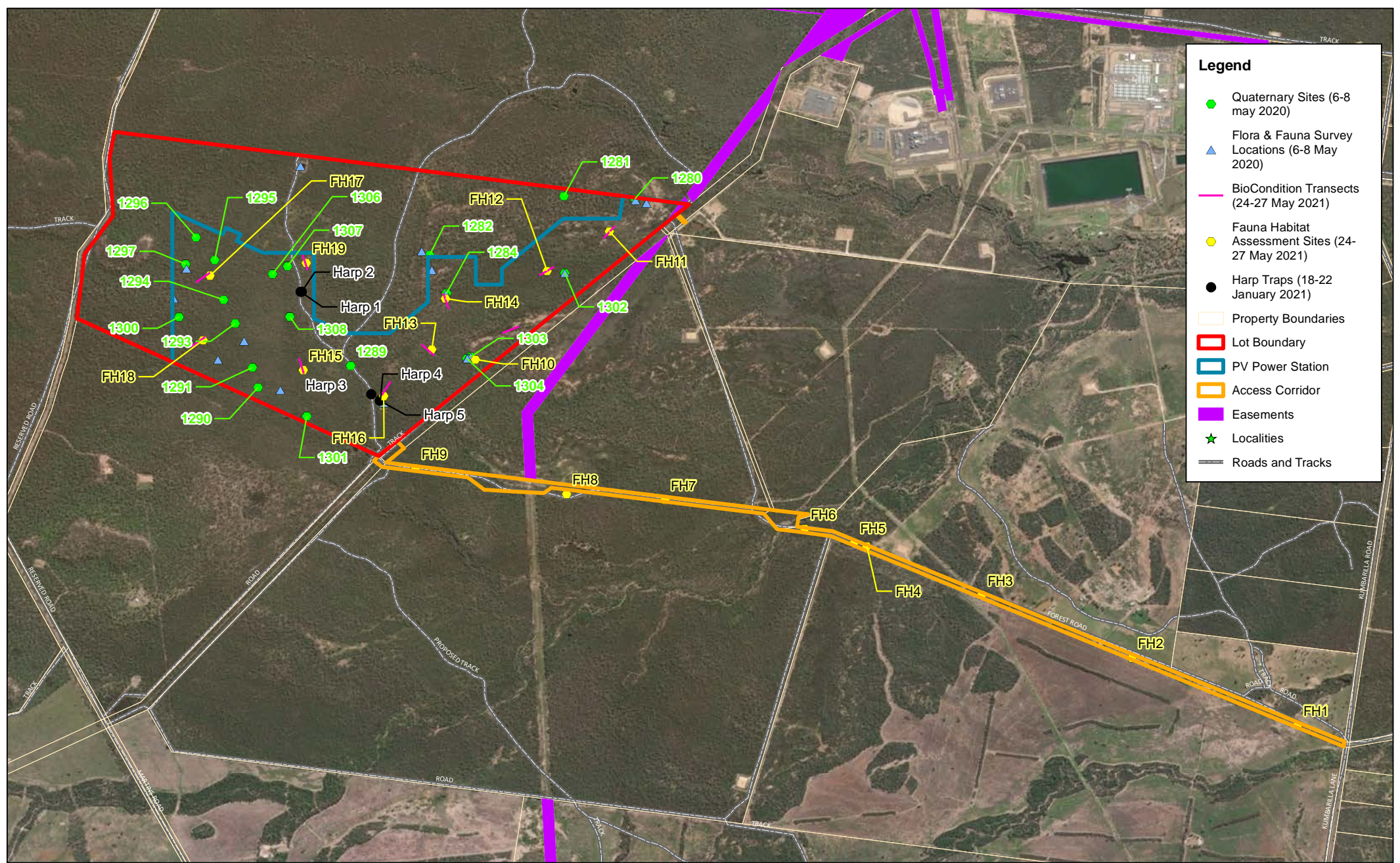
Vegetation communities within 5 assigned assessment units were assessed at a total of 10 sites. A BioCondition and fauna habitat survey was conducted at each site. Further information on method is explained below in Section 3.2.2.3.

- **Fauna Habitat Assessments** - Fauna surveys were undertaken at 12 locations within the PV Power Station area as part of the BioCondition survey and 9 within the Access Corridor as part of the Access Corridor survey. Comprehensive survey sites were 100 m x 50 m. Survey methods were consistent with those recommended in the 'Terrestrial Vertebrate Fauna Survey Guidelines for Queensland' (Eyre et al. 2018).
- **Opportunistic Fauna Observations** - Opportunistic fauna observations were recorded during all surveys;
- **Nocturnal surveys** - Completed during the preliminary survey 2 night with 2 people for approximately 12 hrs in total for nocturnal assessment);
- **Targeted Species Searches** - Targeted searches were undertaken for:

## Section 3 Description of the Environment and MNES

- Golden-tailed geckos (*Strophurus taenicauda*) and reptiles through nocturnal surveys during the preliminary survey (2 nights/2 people - approximately 12 hrs in total for nocturnal assessments) and turning logs and debris in areas within the mapped Essential Habitat (EH) and also outside of these areas.
- The presence of the NT listed Kogan wax flower which was discovered during the preliminary survey which triggered the targeted survey conducted on 21 February 2021 to assess the extent of the species. The flora surveys were prepared in accordance with the Flora Survey Guidelines – Protected Plants v2.01 (Department of Environment and Science, 2020). The survey was undertaken by Fox and Co's principal botanist, David Moore. The targeted survey for Kogan wax flower involved mapping the extent of the population onsite, including:
  - The GPS location of the population – collected using a handheld GPS unit with an accuracy between 4 – 8 m. Locations were recorded using a Universal Transverse Mercator (UTM) coordinate system with a GDA94 datum.
  - The number of individuals;
  - Observations of age structure, reproductive state and health of each individual;
  - A description of the vegetation structure including the RE;
  - The identities and locational data for all individual *P. sporadica*;
  - The landscape attributes including the landform type, soil type, geology, slope, aspect and altitude; and
  - Specific habitat or micro-habitat features associated with *P. sporadica*.
- Koala surveys were conducted during the targeted survey with the assistance of Koala detection dogs to find evidence of Koala populations within the Project Area. The methodology within this survey included:
  - Off leash detection dogs were fitted with a GPS collar to record survey tracks and search area (surveying approximately 18.9 km); and
  - Age of Koala scats were determined using the characteristics of scat appearance and smell.
- Bat surveys was undertaken over a five-night period during the targeted survey (18-22 January 2021) using the following methodology:
  - Undertaken in accordance with the guidelines for threatened bat species (Survey Guidelines for Australia's threated bats, DEWHA, 2019); and
  - A series of trapping, involving harp traps, was utilised and involved a survey effort of 20 trap nights over a five-night period.
- As part of the Access Corridor survey, rigorous field searches were undertaken within suitable habitat for evidence of Koala, Greater glider (southern and central), Yakka skink and Golden-tailed gecko.
- **Bird Surveys** – Twenty-minute bird census surveys were undertaken over the entire survey period during the preliminary survey including around the onsite water bodies;
- **Remote Cameras** - three remote cameras were established over a two-night period during the preliminary survey; and
- **Song-meters** - three song-meters were deployed over a two-night period for microbats during the preliminary survey.





### Legend

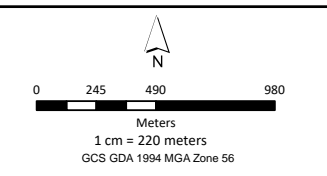
- Quaternary Sites (6-8 May 2020)
- ▲ Flora & Fauna Survey Locations (6-8 May 2020)
- BioCondition Transects (24-27 May 2021)
- Fauna Habitat Assessment Sites (24-27 May 2021)
- Harp Traps (18-22 January 2021)
- Property Boundaries
- Lot Boundary
- PV Power Station
- Access Corridor
- Easements
- ★ Localities
- Roads and Tracks

R	Details	Date
2	Revision	22/11/21
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DESIGNED	SB	CHECKED	SM
DRAWN	MM	CHECKED	SM
APPROVED	SM	DATE	22/11/21

Notes:



**DISCLAIMER**  
CDM Smith has endeavoured to ensure accuracy and completeness of the data. CDM Smith assumes no legal liability or responsibility for any decisions or actions resulting from the information contained within this map.

DATA SOURCE  
QLD Government Open Source Data

DESIGNER

CLIENT

FIGURE 3-1

## Flora and Fauna Survey Locations

DRG Ref: Figure 2 Flora and Fauna Survey Locations\_22112021

### 3.2.2.1 MNES Assessment

Targeted surveys were designed based on desktop literature review, preliminary threatened and migratory species likelihood assessments and the results of previous surveys. Species identified during this with the possibility to occur include:

- Yakka skink (*Egernia rugosa*);
- Squatter pigeon (southern) (*Geophaps scripta scripta*);
- Grey falcon (*Falco hypoleucos*);
- Painted honeyeater (*Grantiella picta*);
- White throated needletail (*Hirundapus caudacutus*);
- Corben's long-eared bat (*Nyctophilus corbeni*);
- Greater glider (southern and central) (*Petauroides volans*); and
- Koala (*Phascolarctos cinereus*).
- Brigalow woodland snail (*Adclarkia cameroni*)

Refer to Table 3-1 for survey effort associated with these species and other MNES species that may occur, as directed by DCCEEW. Refer to **Appendix J** for field notes associated with these surveys.



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**Table 3-1 Fauna – Survey Efforts**

Species	Recommended Survey Methods	Project Component	Survey Type(s)	Effort	Justification	
<p>Yakka skink</p> <p>Survey guidelines for Australia’s threatened reptiles Guidelines for detecting reptiles listed as threatened under the <i>Environment Protection and Biodiversity Conservation Act 1999</i></p> <p>Draft referral guidelines for the nationally listed Brigalow Belt reptiles</p> <p>Targeted species survey guidelines for the Yakka skink</p> <p>AND SPRAT profile</p>	<p>Guideline</p> <ul style="list-style-type: none"> <li>• Searching for burrow systems and communal defecation sites is the most reliable method of detection.</li> <li>• The species can be confirmed by Elliott trapping around the burrows, by distant observation with binoculars or by shining a torch down the burrows at night. Burrows seem to often be located in situations where excavation of the burrow system to locate the lizards is impractical.</li> </ul> <p>SPRAT</p> <ul style="list-style-type: none"> <li>• Targeted surveys to confirm the presence/absence of the Yakka skink are done by actively searching suitable open-forest, woodland and scrub habitats for potential colony sites and <b>deploying well-shaded Elliott-style traps close to burrow entrances</b> (Brigalow Belt Reptiles Workshop 2010).</li> <li>• Sufficient time is required to thoroughly search the area by day and to spotlight by night. The minimum survey effort required includes (Brigalow Belt Reptiles Workshop 2010):                             <ul style="list-style-type: none"> <li>○ a minimum of three survey days and nights</li> <li>○ at least one replicate survey employing all of the recommended techniques, if the</li> </ul> </li> </ul>	PV Power Station	<p>1<sup>st</sup> Preliminary Ecological Survey (6 – 8 May 2020)</p> <ul style="list-style-type: none"> <li>• 3 remote cameras were established over a 2-night period.</li> <li>• Nocturnal survey</li> <li>• Opportunistic survey</li> </ul>	Nocturnal surveys (2 nights/2 people - approximately 12 hrs in total for nocturnal assessments)	<p>Assessments completed in morning, day, afternoon and evening. Burrow searches and nocturnal surveys were completed as recommended.</p> <p>Elliott trapping not completed as no associated burrows identified.</p> <p>Camera trapping was completed as recommended during cooler months; however, camera stations should have been completed over a 4-night period as per ‘<i>Targeted species survey guidelines for the Yakka skink</i>’.</p> <p>Given the absence of burrows and lack of detection during all other surveys, the methods used were adequate for this species.</p>	
			2 <sup>nd</sup> Targeted Ecological Survey (18 – 22 Jan 2021)	<ul style="list-style-type: none"> <li>• Opportunistic survey</li> </ul>		Five-day opportunistic survey of site.
			3 <sup>rd</sup> BioCondition Survey	<ul style="list-style-type: none"> <li>• Opportunistic survey</li> <li>• Habitat assessment</li> </ul>		Two-day opportunistic survey of site and habitat assessment.
			Access Corridor	<p>3<sup>rd</sup> Access Corridor Survey (24 – 27 May 2021)</p> <ul style="list-style-type: none"> <li>• Opportunistic survey</li> <li>• Habitat assessment</li> </ul>		Two-day opportunistic survey of site and habitat assessment.



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Species	Recommended Survey Methods	Project Component	Survey Type(s)	Effort	Justification
	species has not already been detected.				
<p>Five-clawed worm-skink (or long-legged worm skink)</p> <p>Survey guidelines for Australia’s threatened reptiles Guidelines for detecting reptiles listed as threatened under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> Draft referral guidelines for the nationally listed Brigalow Belt reptiles</p>	<p>Guideline:</p> <ul style="list-style-type: none"> <li>• Crepuscular burrowing species are usually recorded by turning objects under which they shelter, or in pitfall traps. On several occasions in recent times it has successfully been located by turning rocks or fallen timber on the ground and raking the surface layer of soil.</li> <li>• Appropriate survey methodology for detecting the presence of the long-legged worm skink is searching for sheltering sites in combination with pitfall trapping at a time of year when the species is most likely to be active. If the survey is a targeted search for this species, a series of pitfall trap lines each comprising six 10 litre buckets spread along a 15-metre fence could be employed, however the species is more likely to burrow between the soil and the bucket. A successful technique has been to deploy artificial structures, such as bales of hay of different thicknesses, over a long period (over 6 months) and periodically check underneath.</li> </ul> <p>SPRAT</p>	-	<p>1st Preliminary Ecological Survey (6 – 8 May 2020)</p> <ul style="list-style-type: none"> <li>• 3 remote cameras were established over a 2-night period.</li> <li>• Nocturnal survey (active searches during targeted surveys for golden-tailed geckos)</li> <li>• Opportunistic survey</li> </ul>	<ul style="list-style-type: none"> <li>• Three-day opportunistic diurnal survey of site</li> <li>• Turning logs and debris</li> </ul>	<p>Assessments completed in morning, day, afternoon, and evening. Artificial shelter sites (hay bale plots) were not conducted due to the original assessment of the likelihood of the species occurrence being unlikely, due to limited availability of suitable microhabitat (cracking soils).</p> <p>Pitfall trapping not completed as recommended (survey guidelines for Australia’s threatened reptiles), however the method is not considered effective as they are likely to burrow into soils beside pitfall buckets (Brigalow Belt Reptiles Workshop 2010).</p> <p>Given the lack of cracking clay soils present within the project area, the</p>
			<p>2nd Targeted Ecological Survey (18 – 22 Jan 2021)</p> <ul style="list-style-type: none"> <li>• Opportunistic survey</li> </ul>	<ul style="list-style-type: none"> <li>• Five-day opportunistic survey of site.</li> </ul>	
			<p>3rd BioCondition Survey</p> <ul style="list-style-type: none"> <li>• Opportunistic survey</li> <li>• Habitat assessment</li> </ul>	<ul style="list-style-type: none"> <li>• Two-day opportunistic survey of site and habitat assessment</li> </ul>	

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Species	Recommended Survey Methods	Project Component	Survey Type(s)	Effort	Justification
	<ul style="list-style-type: none"> <li>Pitfall trapping may be used to survey, where practicable, on the friable basalt derived soils of the lower slopes. However, this method is not considered an effective method for capturing burrowing species, such as the Five-clawed worm-skink, as they are likely to burrow into soils beside pitfall buckets (Brigalow Belt Reptiles Workshop 2010).</li> </ul>		3rd Access Corridor Survey (24 – 27 May 2021) <ul style="list-style-type: none"> <li>Opportunistic survey</li> <li>Habitat assessment</li> </ul>	<ul style="list-style-type: none"> <li>Two-day opportunistic survey of site and habitat assessment.</li> </ul>	ecological surveys conducted were adequate to detect this species.
Squatter pigeon (southern), Grey falcon, Painted honeyeater, Regent honeyeater and White throated needletail  Survey guidelines for Australia’s threatened birds Guidelines for detecting birds listed as threatened under the <i>Environment Protection and Biodiversity Conservation Act 1999</i>	<p><b><u>Squatter pigeon (southern) – Guideline</u></b></p> <ul style="list-style-type: none"> <li>Area searches or transect surveys in suitable habitat. Flushing surveys also likely to be useful.</li> <li>Area searches or transect surveys (areas less than 50 ha)               <ul style="list-style-type: none"> <li>15 hours</li> <li>3 days</li> </ul> </li> <li>Flushing surveys               <ul style="list-style-type: none"> <li>10 hours</li> <li>3 days</li> </ul> </li> </ul> <p><b><u>Grey falcon</u></b></p> <ul style="list-style-type: none"> <li>No survey guidelines and no guidelines in SPRAT</li> <li><u>Conservation advice</u></li> <li>Locating active Grey Falcon nests is aided by:               <ul style="list-style-type: none"> <li>Visiting nests used in previous years;</li> <li>Actively searching for new nests in suitable habitat; and</li> </ul> </li> </ul>	PV Power Station	1 <sup>st</sup> Preliminary Ecological Survey (6 – 8 May 2020) <ul style="list-style-type: none"> <li>Opportunistic survey</li> <li>Bird Census Surveys</li> </ul>	<ul style="list-style-type: none"> <li>Three-day opportunistic diurnal survey of site.</li> <li>20-min bird census surveys were undertaken over the 3-day period including around the onsite water bodies;</li> <li>3 remote cameras were established over a 2-night period</li> </ul>	Squatter pigeon (southern) – transect and point surveys completed during the BioCondition, and point surveys completed during the Access Corridor Survey. Due to these prior mentioned surveys and the number and duration of survey events completed on the site, this is considered adequate for the purposes of surveying Squatter pigeon (southern).  Other bird species– transect surveys, point surveys and opportunistic surveys. Other bird species do not have specific survey guidelines. However, the extent and frequency of bird surveys are
			2 <sup>nd</sup> Targeted Ecological Survey (18 – 22 Jan 2021) <ul style="list-style-type: none"> <li>Opportunistic survey</li> </ul>	Five-day opportunistic survey of site.	
			3 <sup>rd</sup> BioCondition Survey (24 – 27 May 2021) <ul style="list-style-type: none"> <li>Opportunistic survey</li> <li>Habitat assessment</li> </ul>	Two-day opportunistic survey of site and habitat assessment.	
		Access Corridor	3 <sup>rd</sup> Access Corridor Survey (24 – 27 May 2021) <ul style="list-style-type: none"> <li>Opportunistic survey</li> </ul>	Two-day opportunistic survey of site and habitat assessment.	

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Species	Recommended Survey Methods	Project Component	Survey Type(s)	Effort	Justification
	<p>Following up records from the general public, including from Indigenous communities, land managers and bird watchers.</p> <p><b><u>Painted honeyeater</u></b> Guideline, SPRAT and Conservation advice – No specific survey guidelines described.</p> <p><b><u>Regent honeyeater</u></b> Guideline</p> <ul style="list-style-type: none"> <li>Area searches in suitable habitat, preferably in the morning but other times may also be appropriate. Detection by call is possible when birds are most vocal (outside the breeding season). Otherwise, detection is by sighting. Targeted searches of woodland patches with heavily flowering trees are useful, especially around waterpoints such as dams and creek lines. Also check among flocks of other blossom nomads such as lorikeets and other honeyeaters. Broadcast surveys immediately before and during the breeding season may also be useful.</li> </ul> <p><b><u>White throated needletail</u></b> Guideline and Conservation Advice – NO SPRAT:</p> <ul style="list-style-type: none"> <li>The species is quite distinct, as it is larger than other swifts that occur in Australia, such as the Fork-tailed Swift, and its blunt tail instantly distinguishes it from that species. Needletails may</li> </ul>		<ul style="list-style-type: none"> <li>Habitat assessments</li> </ul>		<p>considered adequate for the purposes of surveying other bird species.</p> <p>Grey Falcon –</p> <ul style="list-style-type: none"> <li>Area searches and opportunistic surveys are adequate.</li> </ul> <p>Painted honeyeater</p> <ul style="list-style-type: none"> <li>Area searches and opportunistic surveys are adequate.</li> </ul> <p>Regent honeyeater</p> <ul style="list-style-type: none"> <li>Area searches and opportunistic surveys are adequate.</li> <li>Transect and point surveys completed. Survey guidelines include area searches and targeted searches for the species and may include call detection outside breeding season.</li> <li>Extent and frequency of bird surveys are</li> </ul>

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Species	Recommended Survey Methods	Project Component	Survey Type(s)	Effort	Justification
	<p>occur at great elevations, where they are visible only as 'specks in the sky' (Cooper 1971) and only visible with the aid of binoculars, but when flying at lower altitudes are readily detectable as long as the observer is alert to the possibility that the species may be present and looks skyward regularly, as White-throated needletails quietly circling at heights of a hundred metres or so may be easily missed by unwary birdwatchers, even though they may be present in good numbers.</p> <ul style="list-style-type: none"> <li>It is difficult to conduct systematic surveys of the White-throated needletail due to its mobility and ability to cover huge distances in a day. In the past there have been attempts to survey the species by soliciting and collating sightings from scattered observers at disparate sites throughout the species' range in Australia between 1951 and 1967 (Bouchier &amp; Noonan 1962; Noonan et al. 1964, 1967; Wheeler 1952, 1957), but though they were organized, these cannot be considered to have been systematic. Any surveys must be conducted between October and April in northern and eastern Australia, and between December and March in south-eastern Australia, when numbers of White-throated needletails are highest. It has been suggested that White-throated needletails are often associated with the arrival of frontal weather changes or atmospheric disturbances (Higgins 1999), which would influence the</li> </ul>				<p>considered adequate for this species.</p> <p>White-throated needletail</p> <ul style="list-style-type: none"> <li>Area searches and opportunistic surveys are adequate.</li> </ul>

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Species	Recommended Survey Methods	Project Component	Survey Type(s)	Effort	Justification
	timing of any surveys, but this correlation has been refuted (Higgins 1999).				
<p>Corben’s long-eared bat.</p> <p>Survey guidelines for Australia’s threatened bats Guidelines for detecting bats listed as threatened under the <i>Environment Protection and Biodiversity Conservation Act 1999</i></p>	<p>Guideline</p> <p>1. Prior to the survey. In agricultural or other heavily modified landscapes, digital aerial photography of the study area can be examined to determine the size and pattern of vegetation remnants so that trapping effort can be planned.</p> <p>2. Passive acoustic detection. Bat detectors can be used to identify areas used by long-eared bats, even if they cannot be identified to species level. Acoustic detection can then be followed up with an appropriate level of trapping.</p> <p>3. Trapping. Mist nets and harp traps should be placed in woodland, mallee and forest, given that the species forages below the tree canopy, often to ground level. Equipment should be placed both in open flyways and within cluttered vegetation. If open water bodies (earth dams, fire dams, open top tanks and watercourses) occur in or near the project area, then significant effort should be given to mist-netting or harp trapping over the water. For project sites where there is no surface water, mist nets can be set over temporary water pools specifically constructed for the purpose of the survey.</p>	PV Power Station	<p>1<sup>st</sup> Preliminary Ecological Survey (6 – 8 May 2020)</p> <ul style="list-style-type: none"> <li>• Anabat recording</li> </ul>	Anabat – four separate sites on nights of 6 and 7 May 2020.	<p>Harp traps established in accordance with the survey guidelines. Traps successfully detected various bat types except for the Corben’s Long-eared Bat and Large-eared Pied Bat.</p> <p>This is considered adequate for the purposes of surveying Corben’s long-eared bat.</p>
			<p>2<sup>nd</sup> Targeted Ecological Survey (18 – 22 Jan 2021)</p> <ul style="list-style-type: none"> <li>• Harp traps</li> </ul>	A series of trapping, involving harp traps, was utilised and involved a survey effort of 20 trap nights.	
			<p>3<sup>rd</sup> BioCondition Survey (24 – 27 May 2021)</p> <ul style="list-style-type: none"> <li>• Opportunistic survey</li> <li>• Habitat assessment</li> </ul>	Two-day opportunistic survey of site and habitat assessment.	
		Access Corridor	<p>3<sup>rd</sup> Access Corridor Survey (24 – 27 May 2021)</p> <ul style="list-style-type: none"> <li>• Opportunistic survey</li> <li>• Habitat assessments</li> </ul>	Two-day opportunistic survey of site and habitat assessment.	

## Section 3 Description of the Environment and MNES

Species	Recommended Survey Methods	Project Component	Survey Type(s)	Effort	Justification
<p>Greater glider (southern and central) (<i>Petauroides armillatus</i>)</p> <p>Survey guidelines for Australia’s threatened mammals Guidelines for detecting mammals listed as threatened under the <i>Environment Protection and Biodiversity Conservation Act 1999</i></p>	<p>Guideline</p> <ul style="list-style-type: none"> <li>Daytime searches for the presence of potentially suitable habitat resources for nest or den sites, such as tree hollows, dreys or tree species used exclusively as shelter sites by some species (see species profiles for details), and food trees, including characteristic feeding signs and/or favoured food trees (description of the survey technique and recommended effort is outlined in Section 3.3.1 of the guideline).</li> <li>Daytime searches for signs of the species’ presence, such as scratches on tree trunks and scats beneath trees (description of the survey technique and recommended effort is outlined in Section 3.3.2 of the guideline).</li> <li>Stag watching to distinguish arboreal species emerging from tree hollows or nests at dusk, with this being the primary detection technique for some species (description of the survey technique and recommended effort is outlined in Section 3.3.4 of the guideline)</li> <li>Spotlight surveys in suitable vegetation types for the presence of active or vocalising individuals at night (description of the survey technique and recommended effort is outlined in Section 3.3.3 of the guideline).</li> <li>Call detection and/or call playback surveys for vocal species, in addition to playback of the calls of owl predators</li> </ul>	PV Power Station	<p>1<sup>st</sup> Preliminary Ecological Survey (6 – 8 May 2020)</p> <ul style="list-style-type: none"> <li>3 remote cameras were established over a 2-night period.</li> <li>Nocturnal survey</li> </ul>	Nocturnal surveys (2 nights/2 people - approximately 12 hrs in total for nocturnal assessments)	<p>Habitat assessments undertaken.</p> <p>Nocturnal surveys and hollow surveys undertaken during the BioCondition, fauna habitat assessments and ecological surveys.</p> <p>Survey effort does not meet guidelines, however very limited potential Greater glider (southern and central) habitat was detected within the Project Area, and as such survey effort was likely to be adequate given the absence of habitat features required for the presence of greater glider.</p>
			<p>2<sup>nd</sup> Targeted Ecological Survey (18 – 22 Jan 2021)</p> <ul style="list-style-type: none"> <li>Opportunistic survey</li> </ul>	Five-day opportunistic survey of site.	
			<p>3<sup>rd</sup> BioCondition Survey (24 – 27 May 2021)</p> <ul style="list-style-type: none"> <li>Opportunistic survey</li> <li>Habitat assessments</li> </ul>	Two-day opportunistic survey of site and habitat assessments.	
			<p>3<sup>rd</sup> Access Corridor Survey (24 – 27 May 2021)</p> <ul style="list-style-type: none"> <li>Opportunistic survey</li> <li>Habitat assessments</li> </ul>	Two-day opportunistic survey of site and habitat assessment.	

## Section 3 Description of the Environment and MNES

Species	Recommended Survey Methods	Project Component	Survey Type(s)	Effort	Justification
	that are known to induce a call response (description of the survey technique and recommended effort is outlined in Section 3.3.3 of the guideline).				
Koala  EPBC Act referral guidelines for the vulnerable Koala	<p>Guideline:</p> <ul style="list-style-type: none"> <li>Survey effort must be determined on a case-by-case basis.</li> <li>Direct observation surveys should be undertaken between August and January for peak activity.</li> </ul> <p><u>Direct surveys:</u></p> <ul style="list-style-type: none"> <li>Strip transects;</li> <li>Nocturnal spotlighting;</li> <li>Call Playback;</li> <li>Detection dogs; and</li> <li>Camera trapping in areas where fresh scats and/or scratching have been detected.</li> </ul> <p><u>Indirect surveys:</u></p> <ul style="list-style-type: none"> <li>Scratchings;</li> <li>Scats – spot assessment technique;</li> <li>Scats - Regularised Grid Based Spot Assessment Technique;</li> <li>Scats— Koala optimised Rapid Assessment Methodology; and</li> <li>Faecal standing crop assessment.</li> </ul>	PV Power Station	<p>1<sup>st</sup> Preliminary Ecological Survey (6 – 8 May 2020)</p> <ul style="list-style-type: none"> <li>Presence and absence</li> </ul>	3 remote cameras were established over a 2-night period	<p>On ground surveys and koala detection dog surveys have adequately assessed the potential for this species to occur in the Project Area.</p> <p>This is considered adequate for the purposes of surveying Koala. Potential presence of koala was detected.</p>
			<p>2<sup>nd</sup> Targeted Ecological Survey (18 – 22 Jan 2021)</p> <ul style="list-style-type: none"> <li>Koala detection team</li> <li>Opportunistic survey</li> </ul>	Koala detection dog covered 18.9 km section during the survey.	
			<p>3<sup>rd</sup> BioCondition Survey (24 – 27 May 2021)</p> <ul style="list-style-type: none"> <li>Opportunistic survey</li> <li>Habitat assessments</li> </ul>	Two-day opportunistic survey of site and habitat assessment.	
		Access Corridor	<p>3<sup>rd</sup> Access Corridor Survey (24 – 27 May 2021)</p> <ul style="list-style-type: none"> <li>Opportunistic survey</li> <li>Habitat assessments</li> </ul>	Two-day opportunistic survey of site and habitat assessment.	
Brigalow woodland snail	There are no survey guidelines for the Brigalow woodland snail that are publicly available.	PV Power station	<p>1<sup>st</sup> Preliminary Ecological Survey (6 – 8 May 2020)</p> <ul style="list-style-type: none"> <li>Opportunistic survey</li> </ul>	Three-day opportunistic diurnal survey of site. Turning logs and debris.	Consideration of the Brigalow woodland snail is given following a

## Section 3 Description of the Environment and MNES

Species	Recommended Survey Methods	Project Component	Survey Type(s)	Effort	Justification
	<p>As per the species conservation advice (TSSC, 2016), surveys for the Brigalow woodland snail should be conducted during summer months with storm and rain (October to March).</p> <p>All of the species of Adclarkia shelter in leaf litter by day and under logs and other ground debris. They are active at night after rain. Although it occurs within Brigalow woodlands, it also favours the heavy soils associated with the Condamine River and its tributaries. As the species is nocturnal, night spotlighting surveys are preferable, however daylight surveys are equally effective. Preferable survey techniques include turning logs and raking accumulated leaves.</p> <p>Evidence of dead shells, particularly those of juvenile/younger snails is an indication of living adults (Stansic 2011 cited in TSSC, 2016).</p> <p>Adequate survey efforts include two person-hours targeting areas of preferred snail microhabitat.</p>		<p>2<sup>nd</sup> Targeted Ecological Survey (18 – 22 Jan 2021)</p> <ul style="list-style-type: none"> <li>Opportunistic survey</li> </ul>	Five-day opportunistic survey of site including spotlighting.	<p>meeting with DCCEEW in May 2023. Targeted surveys were not undertaken initially as (1) the species was not on the PMST at the time of controlled action decisions and (2) habitat for the species is not present at the impact site.</p> <p>Opportunistic surveys were undertaken throughout the survey period including during spotlighting surveys (however these were targeting amphibians and arboreal mammals).</p> <p>Survey timing was only met for one survey, being the 2<sup>nd</sup> targeted ecological survey conducted in January 2021.</p> <p>Survey effort does not meet survey recommendations due to not reaching targeted person-hours in areas of preferred microhabitat during summer months (October to March), as at the time of surveys this species was considered unlikely to occur in the Project Area</p>
			<p>3<sup>rd</sup> BioCondition Survey (24 – 27 May 2021)</p> <ul style="list-style-type: none"> <li>Opportunistic survey</li> </ul>	Two-day opportunistic survey of site and habitat assessment.	
		Access Corridor	<p>3<sup>rd</sup> Access Corridor Survey (24 – 27 May 2021)</p> <ul style="list-style-type: none"> <li>Opportunistic survey</li> </ul>	Two-day opportunistic survey of site and habitat assessment.	



### Section 3 Description of the Environment and MNES

Species	Recommended Survey Methods	Project Component	Survey Type(s)	Effort	Justification
					<p>given the absence of brigalow woodlands at the impact site. Survey effort in May 2020, however, does meet survey recommendations, albeit during a less suitable season.</p>

### 3.2.2.2 Habitat Mapping Approach

Mapping and quantification of potential habitat types within the Project Area for the listed species was completed. The maps for these species are included in **Appendix L**. The habitat mapping was informed by field investigations and the following subsequent reviews:

- Review of ground-truthed REs and review of potential habitat for relevant listed species.
- The presence of the following microhabitat features such as:
  - Cracking clay soils;
  - Presence of waterbodies (drainage lines, waterholes and farm dams);
  - Native vegetation present; and
  - Shelter sites such as woody debris, hollows, burrows, leaf litter; and obvious soil cracking.
- Undertaking koala habitat scoring and habitat quality assessment (refer to Section 3.2.2.3).

### 3.2.2.3 BioCondition Assessment

The BioCondition survey was undertaken in the PV Power Station in accordance with the following guidelines:

- Methodology for Survey and Mapping of REs and Vegetation Communities in Queensland (Neldner et al. 2020);
- A Condition Assessment Framework for Terrestrial Biodiversity in Queensland – Assessment Manual (Eyre et al. 2015); and
- Guide to Determining Terrestrial Habitat Quality Version 1.2 (DEHP 2017).

Field surveys were undertaken to confirm the identity of REs and correct the mapping, collect BioCondition data and to conduct targeted searches for threatened flora species and potential habitat for threatened fauna species across the proposed impact area. Vegetation communities within 5 assigned assessment units were assessed at a total of 10 sites within the Project site (refer to Figure 3-2). A BioCondition and fauna habitat survey was conducted at each site. Further information on method is explained below in the Habitat Quality section (Section 3.2.2.4).

Three sources were used to establish proposed sites within approximate assessment units to allow BioCondition data to be collected, including:

- State mapped REs were identified through the RE mapping, version 11 (Department of Resources 2021) and Regulated Vegetation Management mapping (version 4.12) to identify areas of assessable and non-assessable vegetation (Department of Resources 2021);
- The QImagery historical aerial photo series was used to verify clearing areas and whether they accorded with currently mapped high value regrowth (HVR) areas and currently mapped remnant vegetation; and
- Data collected as part of the previous site surveys including review and a subsequent ecological report (CDM Smith 2021) was assessed to further refine likely REs and assessment units.

Ten BioCondition site locations were proposed to allow further RE ground truthing and refine assessment unit boundaries in the field. Field adjustment of the locations of the BioCondition sites would allow for variations in the assessment unit boundaries and the condition of each unit to allow data collection from representative sites.

The following site attributes were field recorded and scored against the benchmarks for Assessment Units 2-5:

- Number of large trees;
- Recruitment of canopy species;
- Tree canopy cover;
- Tree canopy height;
- Shrub canopy cover;

## Section 3 Description of the Environment and MNES

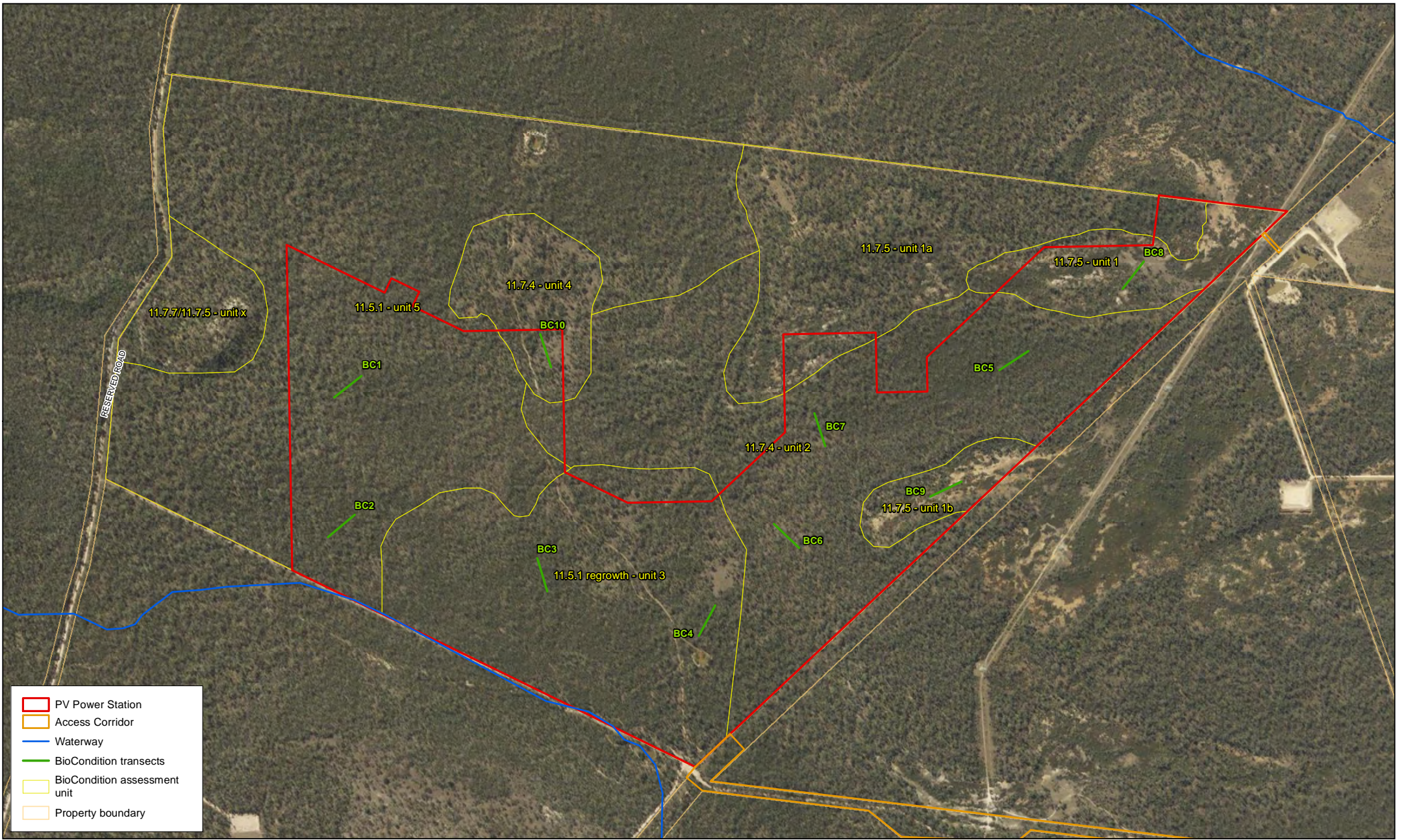
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- Coarse woody debris;
- Native plant richness for trees, shrubs, grasses and, forbs and other;
- Non-native plant cover; and
- Litter cover.

The flowing site attributes were field recorded and scored against the benchmarks for Assessment Unit 1:

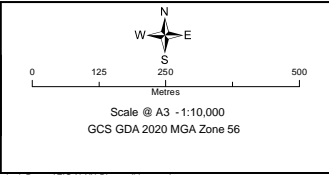
- Recruitment of canopy species;
- Tree emergent canopy cover;
- Tree emergent canopy height;
- Shrub canopy cover;
- Native plant richness for trees, shrubs, grasses and, forbs and other;
- Non-native plant cover; and
- Litter cover.





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CDM Smith Modelling Data

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FIGURE 3-2

**BioCondition Assessment Units**

DRG Ref: FIG X-XX Biocondition



## Section 3 Description of the Environment and MNES

### 3.2.2.4 Habitat Quality Assessment

The 'Guide to Determining Terrestrial Habitat Quality' Version 1.2 (DEHP 2017) forms the basis of the methodology for sampling of terrestrial habitat quality relevant to the Project and should be referenced for a detailed description of the methodology applied. Habitat quality is assessed through a strategic combination of indicators that measure the overall viability of the site and its capacity to support a prescribed environmental matter. The three key indicators for determining habitat quality of a land-based impact or offset site are:

- Site condition: a general condition assessment of vegetation compared to a benchmark (the results of the BioCondition survey);
- Site context: an analysis of the site in relation to the surrounding environment; and
- Species habitat index: the ability of the site to support a species.

Each of the three indicators are scored individually and not summed to arrive at a total site score.

The BioCondition site reports (**Appendix J**) follow the BioCondition method and are recorded as such with landscape attributes scored. Derived scores for specific Habitat Quality exclude the Landscape Attribute score as prescribed by the Habitat Quality method.

The distinction between using the BioCondition assessment method for a BioCondition score and using the BioCondition assessment method for a Terrestrial Habitat Quality score is of no consequence for this assessment as a Terrestrial Habitat Quality score is the only required outcome for the matters likely to require offsetting.

The following sub-headings below provide additional detail regarding:

- Site Condition for the entire impact site is calculated as a weighted average for each assessment unit based on individual site scores multiplied by the area weighting (the amount each assessment unit contributes to the entire impact area);
- Landscape Attributes are calculated as a score but are not something that necessarily has to be considered for an offset because they are generally fixed for a particular site and management actions within the offset will have little bearing on a future Landscape Attribute score. However, it is worth noting that a favourable position with the landscape may contribute to the long-term usefulness of an offset for a particular matter (e.g., proximity to protected areas where species mobility is an issue); and
- Species Habitat Index is calculated as a weighted average for the entire impact site in a similar manner as the Site Condition score. The site Terrestrial Habitat Quality score forms the third component of the assessment.

The proposed habitat quality assessment methodology for the future offset site is detailed in **Appendix N**. This generally reflects the habitat quality assessment methodology detailed below.

#### *Site Condition*

The methodology employed at each of the terrestrial habitat quality assessment sites involved the collection of the following data within a 100m x 50m transect:

- Recruitment of woody perennial species in the ecologically dominant layer;
- Native plant species richness for trees, shrubs, grasses and forbs;
- Tree canopy height;
- Tree canopy cover;
- Shrub canopy cover;
- Native perennial grass cover;
- Organic litter;

## Section 3 Description of the Environment and MNES

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- Large trees;
- Coarse woody debris; and
- Non-native plant cover.

Each survey site's data was scored individually against a BioCondition benchmark relevant to the RE represented and compared against a set of maximum scores defined in A Condition Assessment Framework for Terrestrial Biodiversity in Queensland – Assessment Manual (Eyre et al. 2015).

### **Site context**

GIS analysis was undertaken to score the following site context attributes:

- Size of patch;
- Connectedness; and
- Context.

Each of the above attributes is associated with a score determined in the 'Guide to Determining Terrestrial Habitat Quality' (DEHP 2017) and compared to a set of maximum scores. Once all the scores are collected for each attribute the overall site context score can be calculated.

### **Species Habitat Index (for fauna species offsets)**

Species habitat index measures the capacity of a site to support a species and requires field survey data, available modelling and current species records. The index represents an analysis of the quality and availability of habitat for the species, and the likelihood of continued existence of the species at the site. At the same time as the site condition data was collected, the following fauna site attributes relevant to each target species were recorded in a 1 ha site:

- Threats to species (e.g., clearing, barriers, disease, fire, hydrological change, pests etc.);
- Quality and availability of food and foraging habitat;
- Quality and availability of shelter;
- Species mobility capacity; and
- Role of site location to overall population.

Each of the above attributes is associated with a score determined in the 'Guide to Determining Terrestrial Habitat Quality' (DEHP 2017) and compared to a set of maximum scores. Once all the scores are collected for each attribute the overall site species habitat index score can be calculated.

For the scoring of Koala habitat within the impact area the closely aligned EPBC koala habitat assessment matrix was used to provide a score out of 10. Additional, stand alone, data on the number of non-juvenile koala habitat trees was collected as per the 'Guide to Determining Terrestrial Habitat Quality' (DEHP 2017).



### 3.3 Description of the Environment

#### 3.3.1 Topography

Topography across the PV Power Station ranges from 337.8m AHD to 442.1m AHD above sea level. Although there is over 100 m difference between the lowest and highest point, which is due to a small section containing a rocky outcrop, the area can be considered as flat with gently undulating areas from the southwest to the northeast (where the lowest point is located) (refer to Figure 3-3).

#### 3.3.2 Land Use

The dominant land use within the Project area includes grazing native vegetation and production forestry (along the access road). The Project area has been subject to a history of grazing and agricultural use (along with forestry use) resulting in a non-pristine environment currently. As per a desktop search of Queensland Government mapping, and associated ecology surveys, majority of the Project area is remnant vegetation with a substantial portion being category C high-value regrowth vegetation, particularly in the western portion of the Project area. The entire Project area is covered by three petroleum leases, including PL 273, PL 275 and PL 466 by QGC Pty Limited, granted in September and December of 2011.

As per the Project's CHMP, several remnant non-indigenous historical artefacts were identified onsite, including:

- 15 artefact scatters identified and moved into Keeping Place;
- 48 isolated artefacts were identified and salvaged to be placed in Keeping Place;
- 4 quarry stones were recorded in detail and a permanent protection barrier was implemented; and
- 3 scarred trees were recorded, and barrier and signage installed to avoid impacts consistent with Project approvals / land access agreements.

The primary land uses surrounding the Project Area include Forestry / Production Native Forests (i.e., Braemar State Forest) with coal-seam gas wells (north and west), Weranga State Forest (southeast) and the Daandine State Forest (east) (refer to Figure 3-4). There is some cropping land to the south and some minor residential and farming infrastructure to the south-west.

The proposed electricity sub-station to help facilitate the project is approximately 1km to the north of the Project connecting through proposed infrastructure along the existing easements.

#### 3.3.3 Geology

The Project is located in the Surat Basin Regional Mapping Extent. This basin is a large, mature intracratonic, early Jurassic to Albian (early Cretaceous) basin (Geoscience Australia 2021). The basin has a maximum sediment thickness of 2500 m and deposition was relatively continuous and widespread. The basin is generally flat-lying and sedimentation is widespread and relatively uniform (Geoscience Australia 2021).

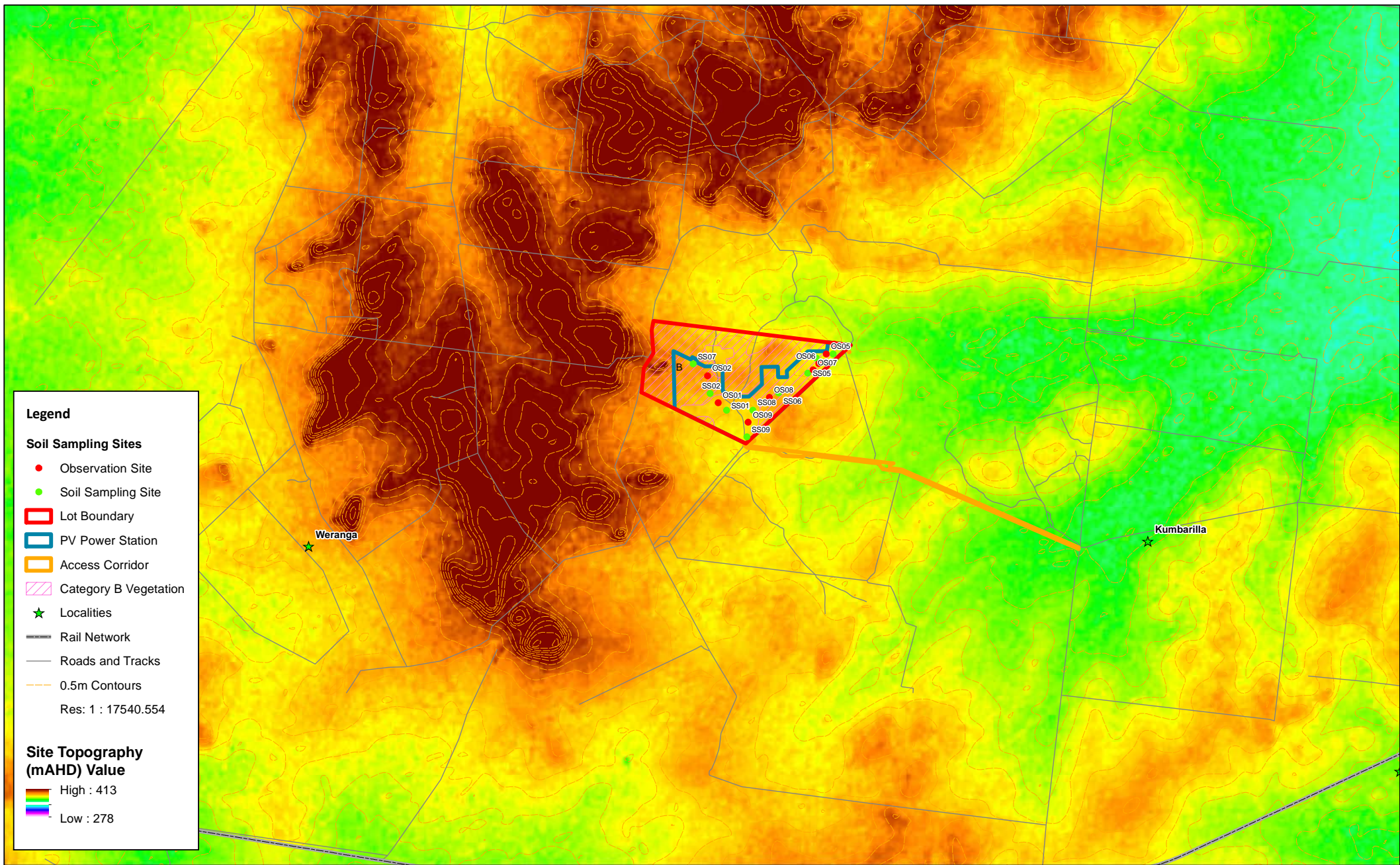
The Surat Basin is bordered in the east by the Auburn Arch and the New England Fold Belt. Between these two blocks it intertongues with the Moreton Basin across the Kumbarilla Ridge (Exon, 1967). To the west the Surat Basin interrelates with the Eromanga Basin across the Nebine Ridge and its broad southerly extension, the Cunnamulla Shelf (Exon, 1967). In the south it is bounded by the Central West Folded Belt, and in the north, it has been eroded (Exon, 1967).

The Project is in the mid-central portion of the Surat Basin as shown on Figure 3-5. The detailed surface geology of the Project Area summarised in Table 3-2. The Project Area is split between two types of surface geology, Qs-SQ and Kumbarilla Beds(w).

## Section 3 Description of the Environment and MNES

**Table 3-2 Detailed Surface Geology**

Rock-Unit Name	Lithological Summary	Dominant Rock	Rock Type	Age
Qs-SQ	Sand, red sandy soil, silt and some gravel; flood out and sheet sand with some alluvium	Miscellaneous Unconsolidated Sediment	Stratified Unit (Including Volcanic and Metamorphic)	Quaternary
Kumbarilla beds(w) (JKk(w))	Sandstone, siltstone, mudstone, conglomerate - kaolinized deeply weathered sediments	Arenite-Mudrock	Stratified Unit (Including Volcanic and Metamorphic)	Late Jurassic - Early Cretaceous

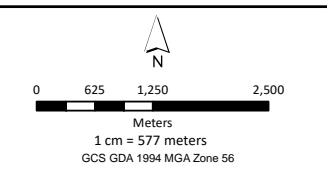


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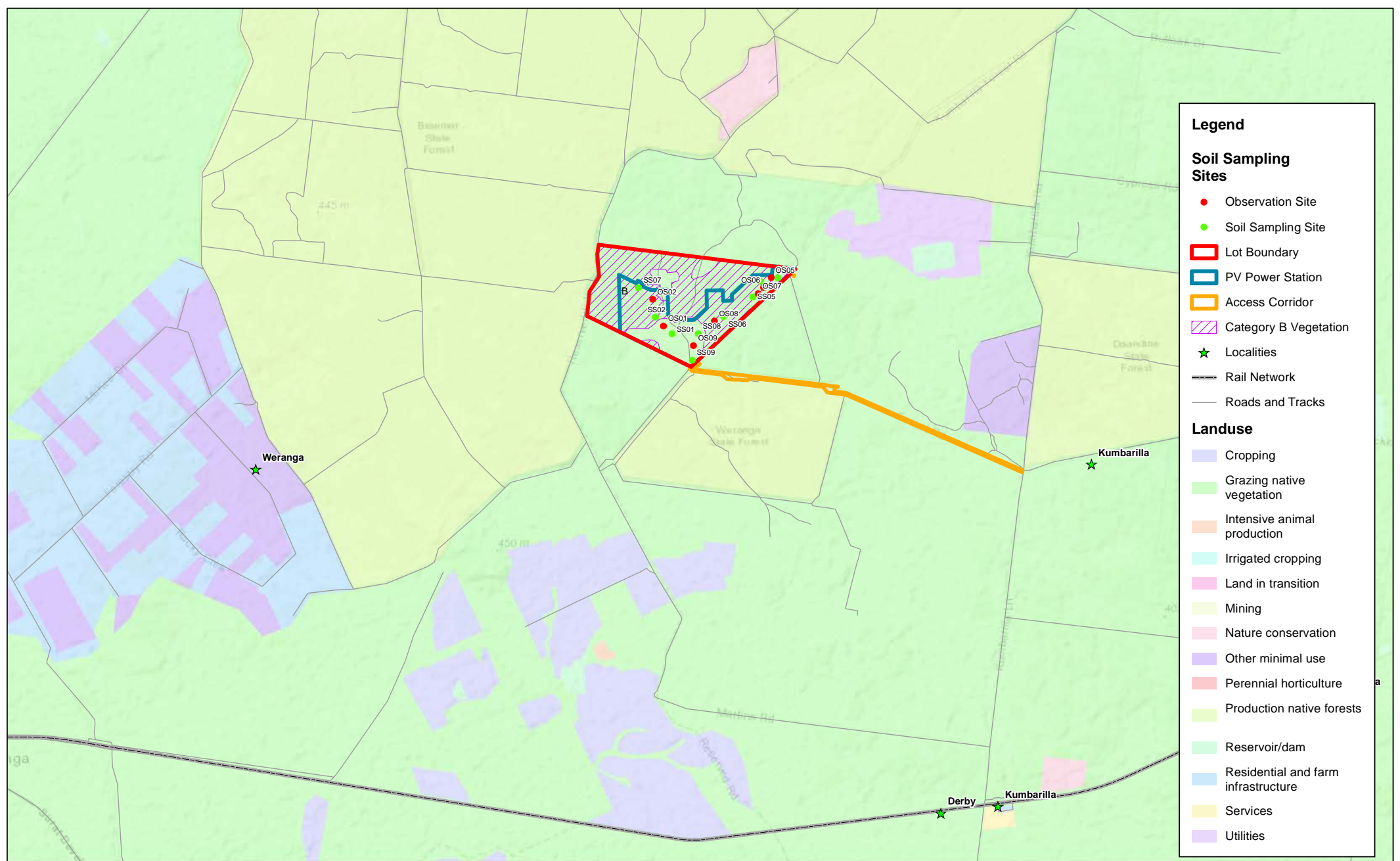
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FIGURE 3-3

**Topography**

DRG Ref: Figure 3 Topography\_22112021





### Legend

#### Soil Sampling Sites

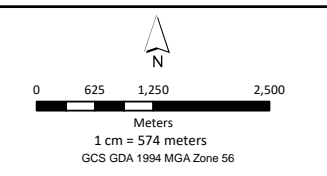
- Observation Site
- Soil Sampling Site
- ▭ Lot Boundary
- ▭ PV Power Station
- ▭ Access Corridor
- ▭ Category B Vegetation
- ★ Localities
- Rail Network
- Roads and Tracks

#### Landuse

- ▭ Cropping
- ▭ Grazing native vegetation
- ▭ Intensive animal production
- ▭ Irrigated cropping
- ▭ Land in transition
- ▭ Mining
- ▭ Nature conservation
- ▭ Other minimal use
- ▭ Perennial horticulture
- ▭ Production native forests
- ▭ Reservoir/dam
- ▭ Residential and farm infrastructure
- ▭ Services
- ▭ Utilities

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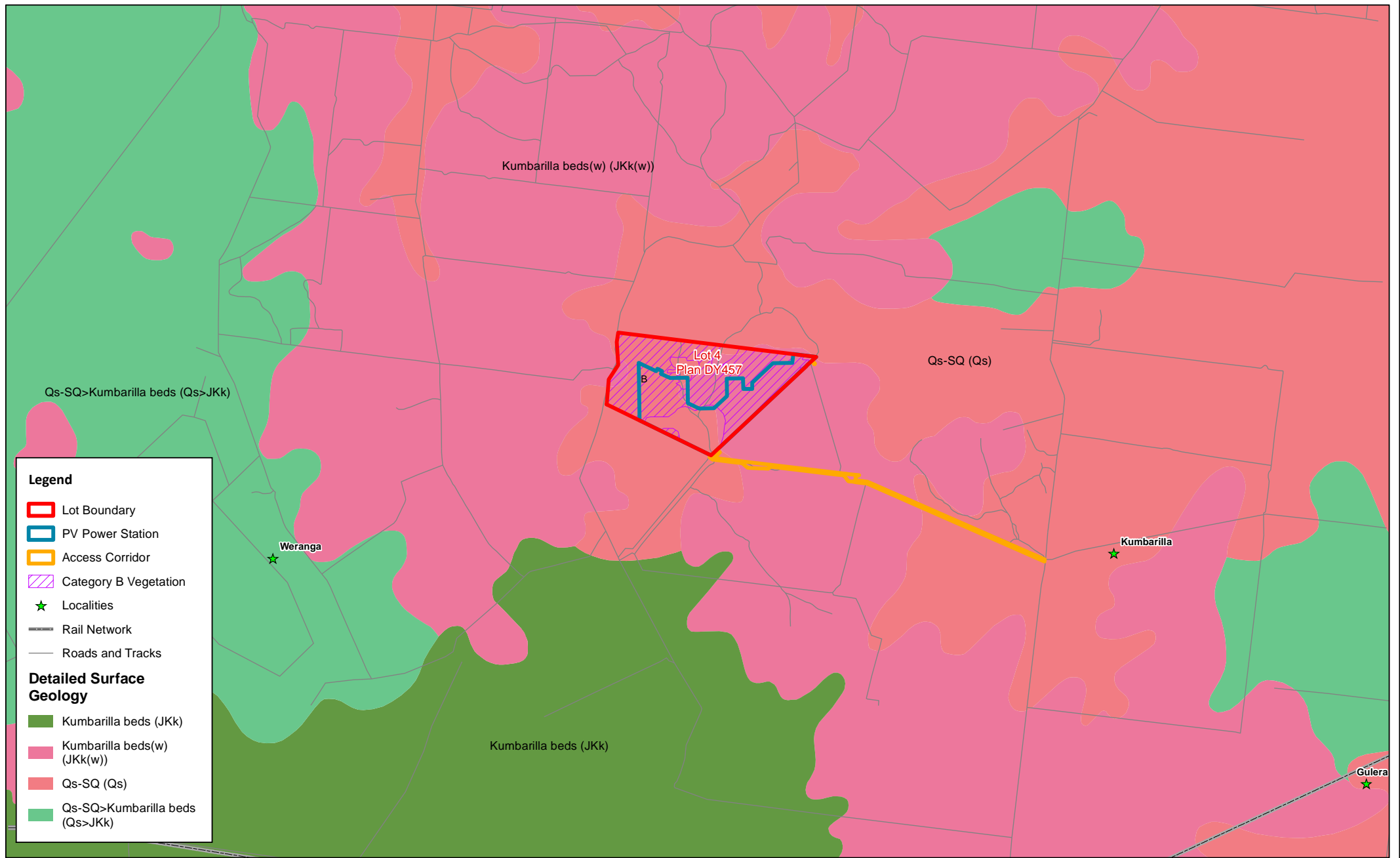
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FIGURE 3-4

**Landuse**

DRG Ref: Figure 4 Landuse\_22112021



**Legend**

- Lot Boundary
- PV Power Station
- Access Corridor
- Category B Vegetation
- ★ Localities
- Rail Network
- Roads and Tracks

**Detailed Surface Geology**

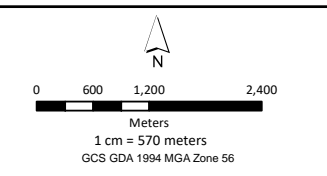
- Kumbarilla beds (JKK)
- Kumbarilla beds(w) (JKk(w))
- Qs-SQ (Qs)
- Qs-SQ>Kumbarilla beds (Qs>JKK)

R	Details	Date
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FIGURE 3-5

**Geology**

DRG Ref: Figure 3-5 Geology\_22112021

### 3.3.4 Soils

A soil mapping, sampling and characterisation exercise was undertaken for the PV Power Station. This was undertaken to acquire sufficient soil property data to inform the development of a Salinity Management Plan (SMP) and Erosion and Sediment Control Plan (ESCP) for the Project. It was completed to adequately assess the potential impacts that the Project may have on soils. The following assessments have been undertaken in the PV Power Station area:

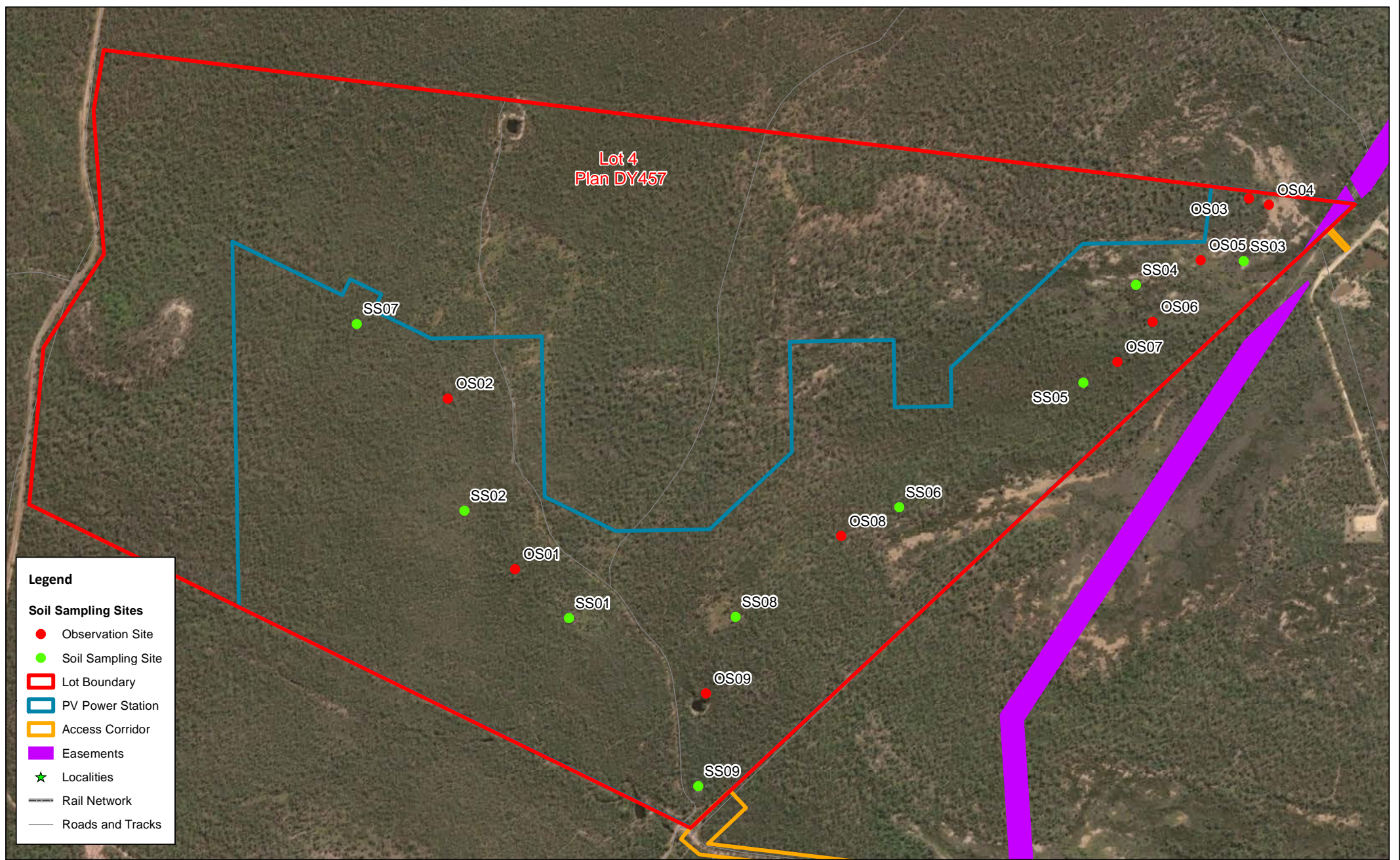
- Desktop assessment, including review of publicly available literature, maps and resources relevant to the geology, soils and landforms in the Project Area (this report and subsequent reporting); and
- Field assessment and laboratory analyses were undertaken focusing on characterisation of soils for land use suitability and potential rehabilitation (as required) to improve understanding of soils within the Project Area. A detailed field soil survey of the Project Area was conducted over a three-day period between 20 January 2021 and 22 January 2021. Detailed soil profile descriptions were made at nine sites in the Project Area (shown as the soil sample locations in Figure 3-6). The detailed sites were augured to the second profile change or until refusal was reached. Soil sampling of profiles was conducted as per the Guidelines for Surveying Soil and Land Resources (McKenzie et al. 2008).

The field investigation has identified Sodosol and Kurosol soil throughout the Project Area which have been subdivided by colour into brown sodosol and brown kurosol. A summary of the field-based soil types has been provided in Table 3-3.

**Table 3-3 Field Based Soil Summary**

Soil Properties	Brown Sodosol	Brown Kurosol
<b>Soil Physical Properties</b>		
<b>Texture</b>	Increase in clay throughout profiles	Increase in clay throughout profiles
<b>Permeability</b>	Generally permeable. Some drainage issues possible given high clay content.	Generally permeable. Some drainage issues possible given high clay content.
<b>Soil Erosion Susceptibility</b>	High soil erosion susceptibility	High soil erosion susceptibility
<b>Soil Chemical Properties</b>		
<b>pH</b>	Strongly Acidic	Strongly Acidic
<b>Salinity</b>	Very Low to Very High	Low to Medium
<b>Sodicity</b>	Strongly sodic	Sodic
<b>Cation Exchange Capacity</b>	Very Low to Medium	Very Low to Medium
<b>Total Organic Carbon</b>	Low to Medium	Medium





**Legend**

**Soil Sampling Sites**

- Observation Site
- Soil Sampling Site
- ▭ Lot Boundary
- ▭ PV Power Station
- ▭ Access Corridor
- ▭ Easements
- ★ Localities
- ▬ Rail Network
- ▬ Roads and Tracks

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Meters

1 cm = 90 meters

GCS GDA 1994 MGA Zone 56

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FIGURE 3-6

**Soil Sampling Location Sites and Observation Sites**

DRG Ref: Figure 2 Detailed Sampling Locations\_22112021



### 3.3.5 Surface Water and Groundwater

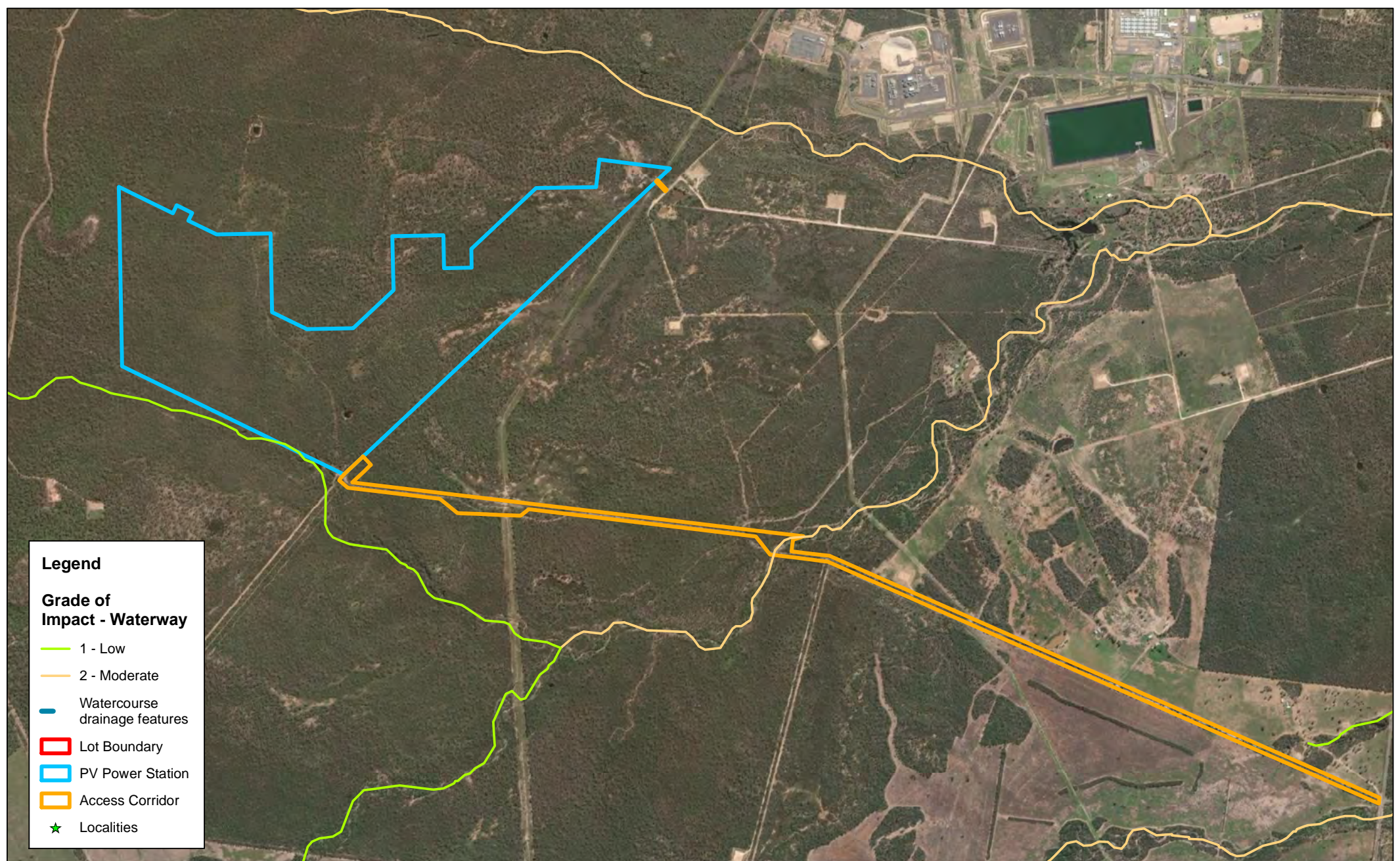
A stream order one water feature is mapped outside the PV Power Station on the southern boundary (refer to Figure 3-7). This watercourse was assessed as a natural drainage feature which develops into a watercourse as it progresses downstream. It was assessed that there would be no impact to this water feature as a result of the Project. Refer to **Appendix J** for the field assessment sheets for this water feature.

The Access Corridor intersects a low stream order (2) creek (refer to Figure 3-7). The creek is typically dry for most of the year and only flows during heavy rainfall events. For this reason, the creek is considered not to have permanent flow conditions and exhibits ephemeral flow characteristics. The creek has a discernible low flow/high flow channel as well as high banks. The creek is partly incised into the underlying bedrock and there are semi-permanent waterholes present within the main channel. Plate 3-1, presents a view of this ephemeral creek, noting the recent rainfall event has filled the waterholes with a low trickle flow still occurring. Refer to **Appendix J** for the field assessment sheets for this water feature. The creek is mapped as an Amber (Moderate) waterway under the Queensland Waterways for Waterway Barrier Works, as defined under the *Fisheries Act 1994*. The field determination of the creek is as a defined watercourse under the *Water Act 2000*.



Plate 3-1 Access Corridor Creek





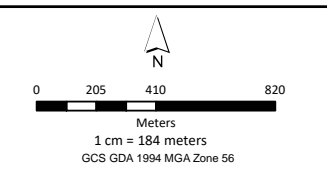
**Legend**

**Grade of Impact - Waterway**

- 1 - Low
- 2 - Moderate
- Watercourse drainage features
- Lot Boundary
- PV Power Station
- Access Corridor
- ★ Localities

R	Details	Date
2	Revision	29/11/21
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FIGURE 3-7

**Water Features**

DRG Ref: Figure 3-8 Water Features\_23112021

## Section 3 Description of the Environment and MNES

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Groundwater is unlikely to be encountered as a part of construction works. A review of registered bores in the area record aquifers upwards of approximately 200 m below the ground level.

A stormwater and drainage report has been prepared for the PV Power Station. The conclusion from the report found that no adverse impacts due to additional hard surfaces (solar panels, access tracks and buildings) would occur on the land.

### 3.3.6 Ecological

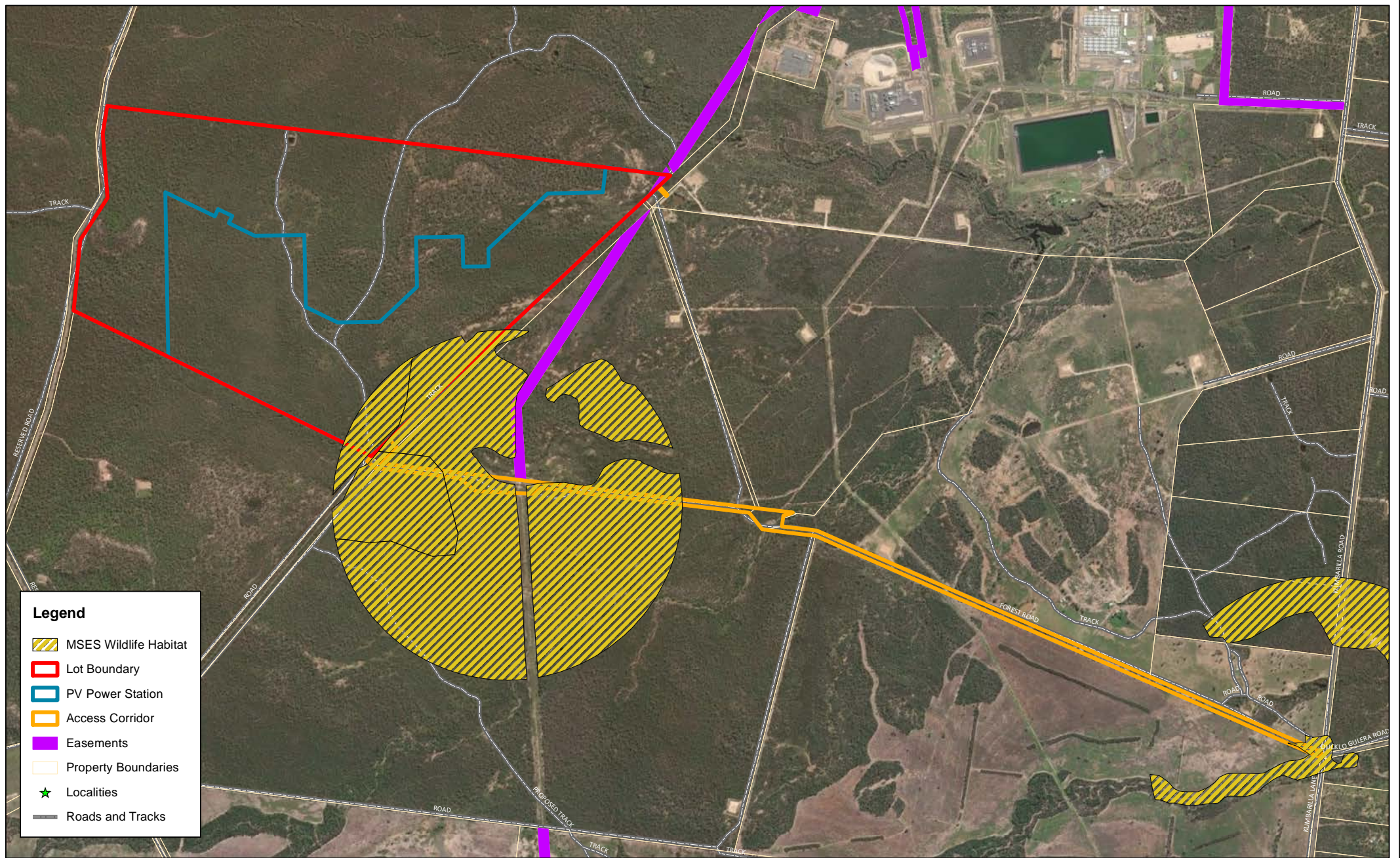
#### 3.3.6.1 Matters of State Environmental Significance

Intensive targeted field surveys were undertaken in hopes of recording the Golden-tailed gecko within the Project area, however despite these surveys, the species was not recorded.

The DES maintains a mapping database of MSES as a guide to assist the planning and development decision-making process. Schedule 2 of the Environmental Offsets Regulation 2014 lists prescribed environmental matters that may require offsets for resource activities. As shown on Figure 3-8 there is an area mapped as MSES Wildlife Habitat, which indicates wildlife habitat for threatened and special least concerned animals.

As shown on Figure 3-8, regulated vegetation essential habitat is located in south-east corner of the Project Area and in the north-east corner of the Project Area. There are also areas of Regulated Vegetation, Category B Endangered or Of Concern mapped within the Project Area (Figure 3-9).





**Legend**

- MSES Wildlife Habitat
- Lot Boundary
- PV Power Station
- Access Corridor
- Easements
- Property Boundaries
- Localities
- Roads and Tracks

R	Details	Date
2	Revision	22/11/21
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0    220    440    880

Meters  
1 cm = 200 meters  
GCS GDA 1994 MGA Zone 56

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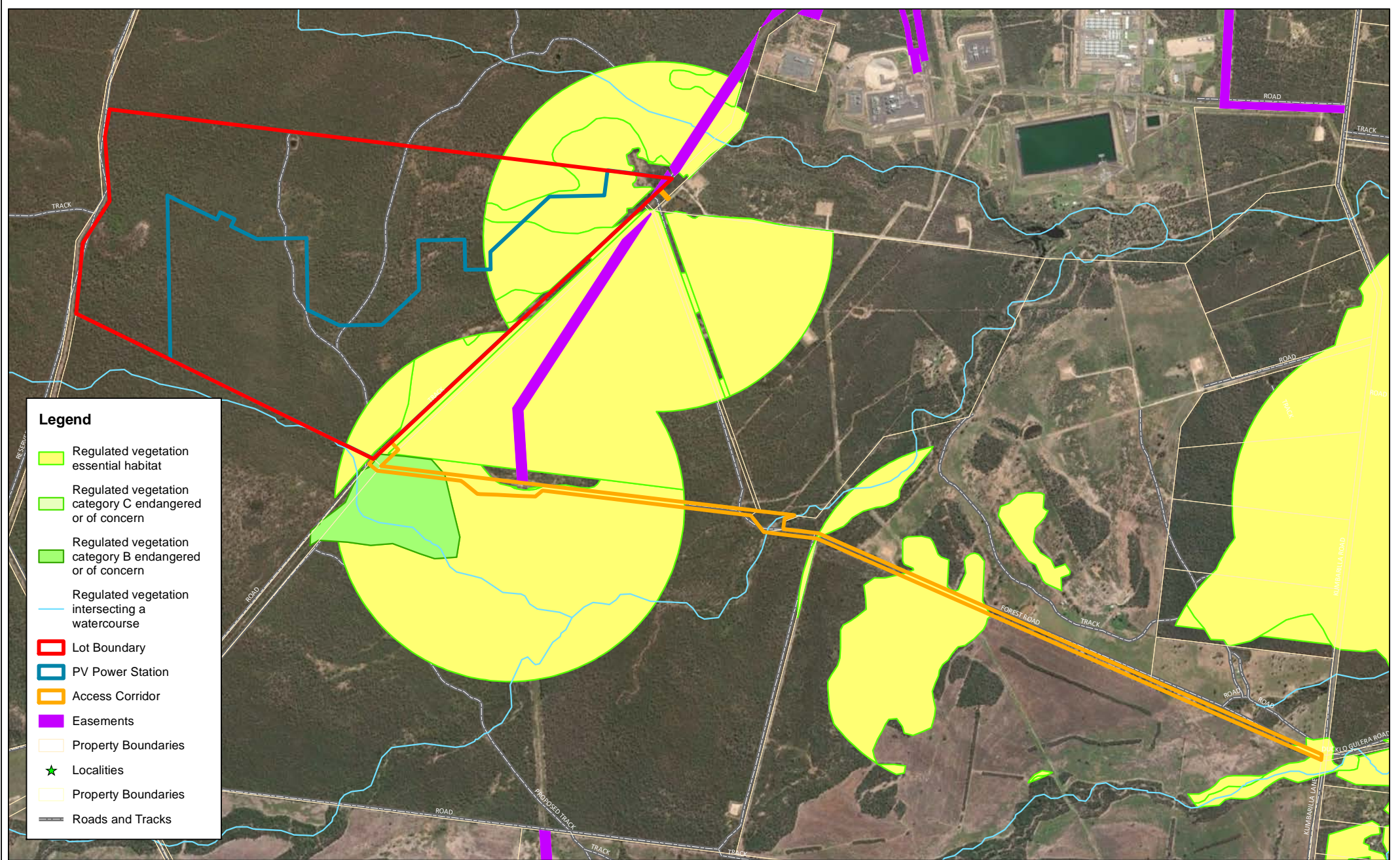
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FIGURE 3-8

**MSES - Wildlife Habitat**

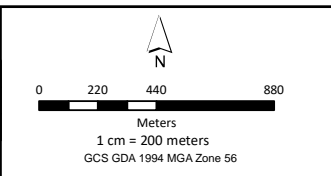
DRG Ref: Figure 4-1 MSES - Wildlife Habitat\_22112021





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FIGURE 3-9

**MSES - Regulated Vegetation**

DRG Ref: Figure 4-2 MSES - Regulated Vegetation\_22112021

## Section 3 Description of the Environment and MNES

### 3.3.6.2 Regional Ecosystems

A list of REs considered to have possibility to occur within the assessment area based on the desktop study is provided in Table 3-4. These are shown on Figure 3-10 and Figure 3-11.

**Table 3-4 Mapped Regional Ecosystems within and surrounding the Project Area**

RE	VM Act Status	Biodiversity Status	Description
11.3.25	Least Concern	Of Concern	<i>Eucalyptus tereticornis</i> or <i>E. camaldulensis</i> woodland fringing drainage lines
11.5.1	Least Concern	No concern at present	<i>Eucalyptus crebra</i> and/or <i>E. populnea</i> , <i>Callitris glaucophylla</i> , <i>Angophora leiocarpa</i> , <i>Allocasuarina luehmannii</i> woodland on Cainozoic sand plains and/or remnant surfaces
11.5.4	Least Concern	No Concern at present	<i>Eucalyptus crebra</i> and/or <i>E. populnea</i> , <i>Callitris glaucophylla</i> , <i>Angophora leiocarpa</i> , <i>Allocasuarina luehmannii</i> woodland on Cainozoic sand plains and/or remnant surfaces.
11.7.4	Least Concern	No concern at present	<i>Eucalyptus decorticans</i> and/or <i>Eucalyptus</i> spp., <i>Corymbia</i> spp., <i>Acacia</i> spp., <i>Lysicarpus angustifolius</i> woodland on Cainozoic lateritic duricrust
11.7.5	Least Concern	No concern at present	Shrubland on natural scalds on deeply weathered coarse-grained sedimentary rocks
11.7.7	Least Concern	No concern at present	<i>Eucalyptus fibrosa</i> subsp. <i>nubilis</i> +/- <i>Corymbia</i> spp. +/- <i>Eucalyptus</i> spp. woodland on Cainozoic lateritic duricrust
11.9.5	Endangered	Endangered	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest to woodland on fine-grained sedimentary rocks.
Non-remnant	None	None	None

The vegetation across the PV Power Station component of the Project Area is generally Least Concern RE 11.5.1. Some areas mapped as remnant least concern is considered high value regrowth – mostly in the western portion of the Project Area. All vegetation communities are Least Concern. The small area of Endangered RE (RE 11.9.5 - *Acacia harpophylla* and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks) along the southern portion of the Lot which is mapped on State mapping was ground-truthed and determined to be incorrect.

Key changes identified in the BioCondition assessment are below with corrected mapping shown on Figure 3-12 and areas brown shown in Table 3-5.

- Areas previously mapped as RE 11.7.4/11.7.5 high value regrowth (HVR) were determined to be RE 11.7.5 remnant. Historical aerial imagery suggested that those areas had never been cleared which was confirmed by field verification. The areas of RE 11.7.5 (three scald areas) were used to form BioCondition Assessment Unit (AU) 1;
- The area previously mapped as Category X and more recently as HVR RE 11.5.1 was assessed at a desktop level, likely to be advanced regrowth. Historical aerial imagery revealed that the area had been previously cleared but now was likely to be advanced regrowth around 50 years age. Structurally the area was sparser than the remnant area of RE 11.5.1 to the west but not significantly different. The two subsequent BioCondition sites recorded within this polygon confirmed that the area was sufficiently regrown to meet the 50/70 rule for remnant vegetation in that the canopy cover had reached 50% of the remnant benchmark and canopy height had reached 70 % of the



## Section 3 Description of the Environment and MNES

remnant benchmark. This area was used to form AU 3. The BioCondition scores for this AU were higher than for the remnant RE 11.5.1 unit, AU 5.

- The area previously mapped as RE 11.7.4/11.7.5 was determined to be exclusively RE 11.7.4. The ground truthed polygon boundary was roughly consistent with the state mapped boundary, however there is room to suggest that much of the mapped RE 11.7.4 could have been mapped as RE 11.5.1. Both REs are structurally similar and contain similar species in this locality. Structurally, RE 11.5.1 often contains a denser subcanopy dominated by bull oak whereas RE 11.7.4 has a subcanopy containing a higher diversity of species but often containing bull oak. Geologically, the difference between Landzone 7 and Landzone 5 is based on soil depth (Wilson and Taylor 2012). Landzone 7 soils are generally restricted to 0.5 m whereas Landzone 5 soils are deeper than 0.5 m. Further refining of the mapping could be done by testing soil depths, however there are only minor differences in the benchmarks between the two ecosystems and it is doubtful there would be a significant difference using either benchmark. This area was used to form AU 2;
- A small area previously mapped as high value regrowth RE 11.5.1 was determined to be more consistent with high value regrowth RE 11.7.4. This patch was used to form AU 4.
- The area of remnant RE 11.5.1 was confirmed to be correctly mapped and formed AU 5.

Six REs were verified as occurring along the length of the Access Corridor including RE 11.3.25, 11.3.27, 11.5.1, 11.5.4, 11.7.4 and 11.7.5. These REs were observed to be in average to good condition with little apparent edge effect from adjacent clearing and the road corridor, in most parts. Ecological function has been limited due to the narrow nature of the vegetation though it would be considered a useful corridor for wildlife movement due to the low traffic volume on the road.

**Table 3-5 Ground-truthed Regional Ecosystems**

Regional Ecosystem	Project Component (ha)					
	PV Power Station		Access Corridor		Total (Project Area)	
	Project Extent	Disturbance Area	Project Extent	Disturbance Area	Project Extent	Disturbance Area
11.3.25	0	0	1.2	0.6	1.2	0.6
11.3.27	0	0	0.1	0.1	0.1	0.1
11.5.1	46.4	46.4	6.9	6.8	53.4	53.2
11.5.1 regrowth	58.6	58.6	0	0	58.6	58.6
11.5.4	0	0	0.8	0.7	0.8	0.7
11.7.4	63.0	62.8	5.2	3.8	68.2	66.7
11.7.5	23.4	22.5	1.9	1.6	25.2	24.2
Non-remnant	0	0	5.9	5.4	5.9	5.4

### 3.3.6.3 BioCondition

As described in 3.2.2.3 ten BioCondition sites were established within the PV Power Station. A BioCondition report was generated for each site and subsequently scored. The BioCondition reports can be found in **Appendix J**.

Table 3-6 below describes the assessment units, the vegetation within each assessment unit and the area of each assessment unit. The mapped assessment units can be seen in Figure 3-2.

## Section 3 Description of the Environment and MNES

**Table 3-6 Assessment Unit Area Breakdown – PV Power Station**

Assessment Unit	Description	Assessment Unit Area (ha)
1	RE 11.7.5 remnant Shrubland on natural scalds on deeply weathered coarse-grained sedimentary rocks	23.9
2	RE 11.7.4 remnant <i>Eucalyptus decorticans</i> and/or <i>Eucalyptus spp.</i> , <i>Corymbia spp.</i> , <i>Acacia spp.</i> , <i>Lysicarpus angustifolius</i> woodland on Cainozoic lateritic duricrust	58.4
3	RE 11.5.1 advanced regrowth of <i>Eucalyptus crebra</i> and/or <i>E. populnea</i> , <i>Callitris glaucophylla</i> , <i>Angophora leiocarpa</i> , <i>Allocasuarina luehmannii</i> woodland on Cainozoic sand plains and/or remnant surfaces	58.5
4	RE 11.7.4 advanced regrowth <i>Eucalyptus decorticans</i> and/or <i>Eucalyptus spp.</i> , <i>Corymbia spp.</i> , <i>Acacia spp.</i> , <i>Lysicarpus angustifolius</i> woodland on Cainozoic lateritic duricrust	2.7
5	RE 11.5.1 remnant of <i>Eucalyptus crebra</i> and/or <i>E. populnea</i> , <i>Callitris glaucophylla</i> , <i>Angophora leiocarpa</i> , <i>Allocasuarina luehmannii</i> woodland on Cainozoic sand plains and/or remnant surfaces	47.9
<b>Total Site area</b>	-	<b>191.4</b>

Table 3-7 below summarises the scores derived from the BioCondition reports (refer to **Appendix J**). The BioCondition results for each assessment unit were given an area weighting by dividing the assessment unit area by the total impact area. The area weighting was multiplied by each assessment unit's averaged score and totalled to give an overall BioCondition score for the Study Area.

**Table 3-7 Summary of BioCondition Site Scores from Site Reports**

Assessment Unit	Description	Site Number	BioCondition Score <sup>1</sup>	Averaged Assessment Unit BioCondition Score <sup>2</sup>
1	RE 11.7.5 remnant Shrubland on natural scalds on deeply weathered coarse-grained sedimentary rocks	BC8	9.5	9 (8.95)
		BC9	8.4	
2	RE 11.7.4 remnant <i>Eucalyptus decorticans</i> and/or <i>Eucalyptus spp.</i> , <i>Corymbia spp.</i> , <i>Acacia spp.</i> , <i>Lysicarpus angustifolius</i> woodland on Cainozoic lateritic duricrust	BC5	8.7	9 (8.5)
		BC6	8.6	
		BC7	8.2	
3	RE 11.5.1 advanced regrowth of <i>Eucalyptus crebra</i> and/or <i>E. populnea</i> , <i>Callitris glaucophylla</i> , <i>Angophora leiocarpa</i> , <i>Allocasuarina luehmannii</i> woodland on Cainozoic sand plains and/or remnant surfaces	BC3	9.1	9 (9.35)
		BC4	9.6	
4	RE 11.7.4 advanced regrowth <i>Eucalyptus decorticans</i> and/or <i>Eucalyptus spp.</i> , <i>Corymbia spp.</i> , <i>Acacia spp.</i> , <i>Lysicarpus angustifolius</i> woodland on Cainozoic lateritic duricrust	BC10	8.8	9 (8.8)
5	RE 11.5.1 remnant of <i>Eucalyptus crebra</i> and/or <i>E. populnea</i> , <i>Callitris glaucophylla</i> , <i>Angophora leiocarpa</i> , <i>Allocasuarina luehmannii</i> woodland on Cainozoic sand plains and/or remnant surfaces	BC1	9.1	9 (9.05)
		BC2	9	

Notes: <sup>1</sup> Includes site attribute score (maximum score of 10); <sup>2</sup> As per BioCondition Score.

## Section 3 Description of the Environment and MNES

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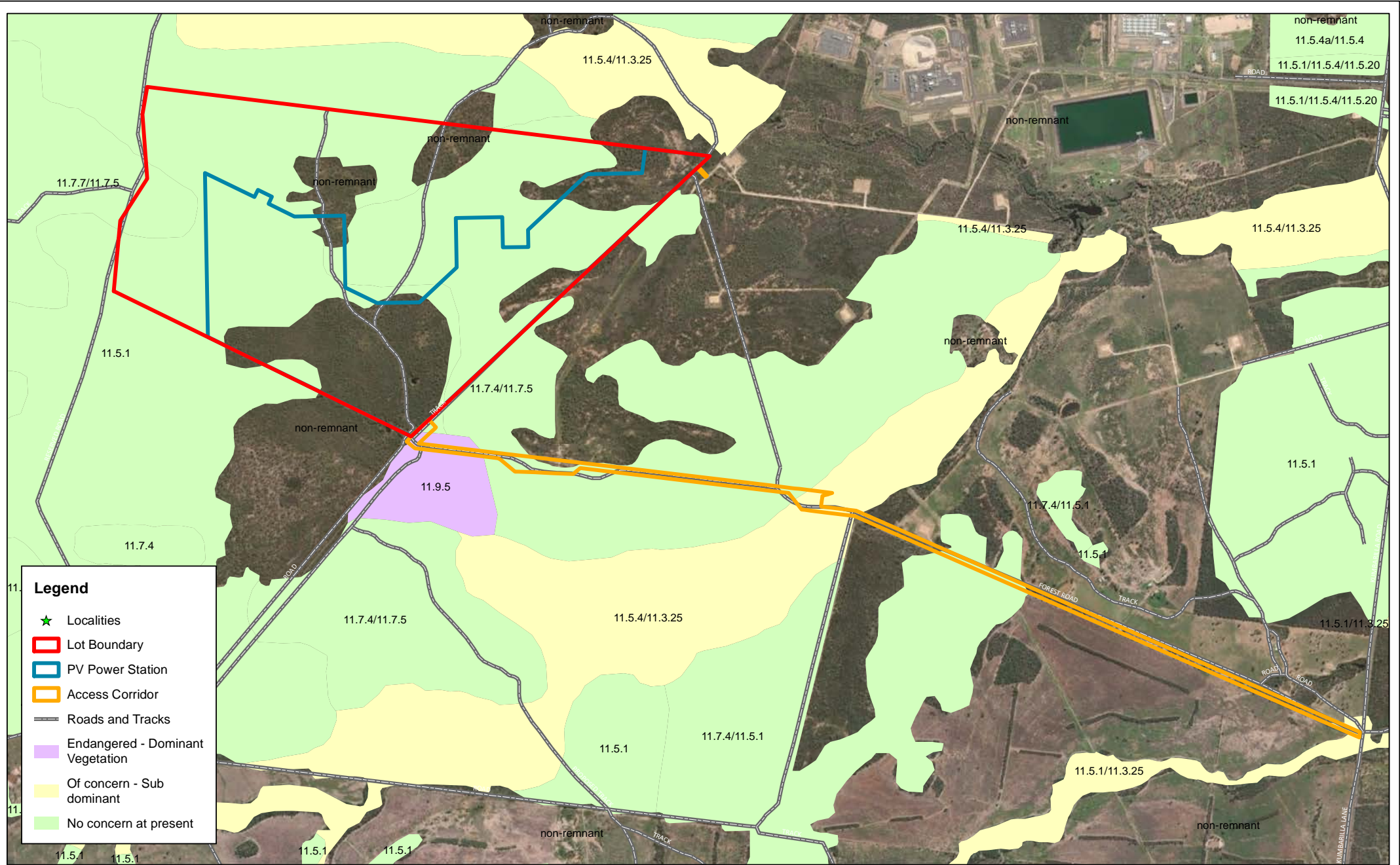
The ten BioCondition sites were each assessed at a GIS level for the following landscape attributes that apply to fragmented landscapes:

- Size of patch;
- Context (refers to the amount of native vegetation that is retained in the landscape proximal to the site being assessed within a 1 km radius buffer); and
- Connectivity (assesses the degree to which the assessment unit is connected to adjacent native vegetation).

In this assessment component the two advanced regrowth assessment units (AU2 and AU4) were treated as remnant vegetation as all three BioCondition site data confirmed that the vegetation within the units met the benchmarks for remnant vegetation. For all sites, the following criteria were met:

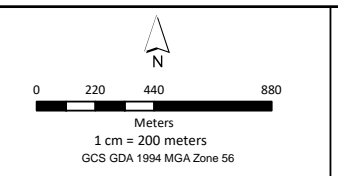
- The contiguous patch size of remnant vegetation is greater than 200 ha;
- The amount of native vegetation within the 1 km buffer of the site is greater than 75 %, and
- The landscape proximal to the site includes greater than 500 ha of remnant vegetation.

Consequently, all ten BioCondition sites scored 20/20 for the Landscape Attribute score.



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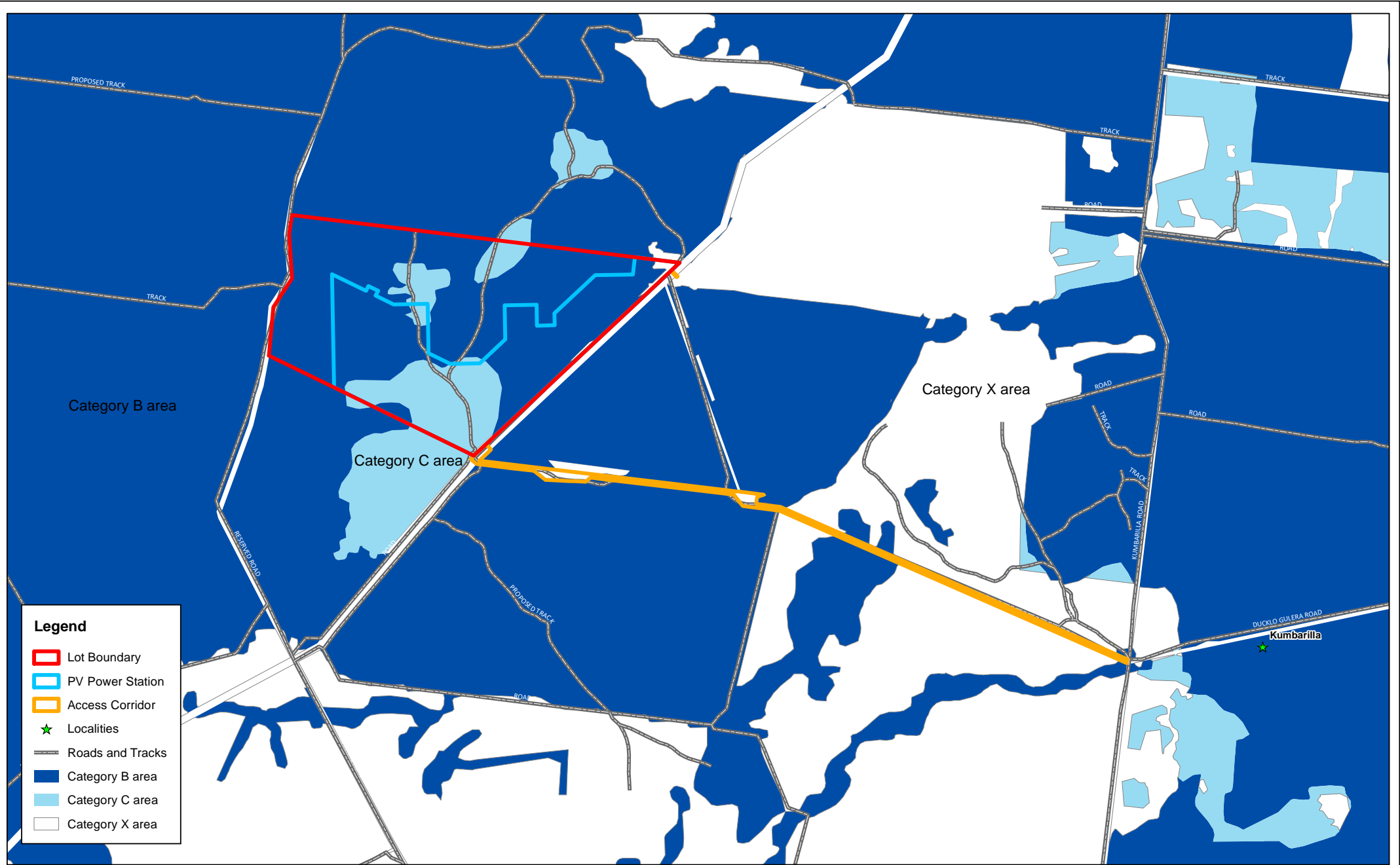
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FIGURE 3-10

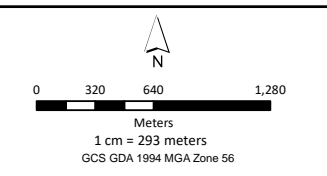
**Regional Ecosystems (Biodiversity Status)**

DRG Ref: Figure 3-12 Regional Ecosystems Biodiversity Status\_23112021



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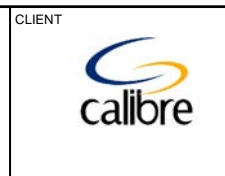
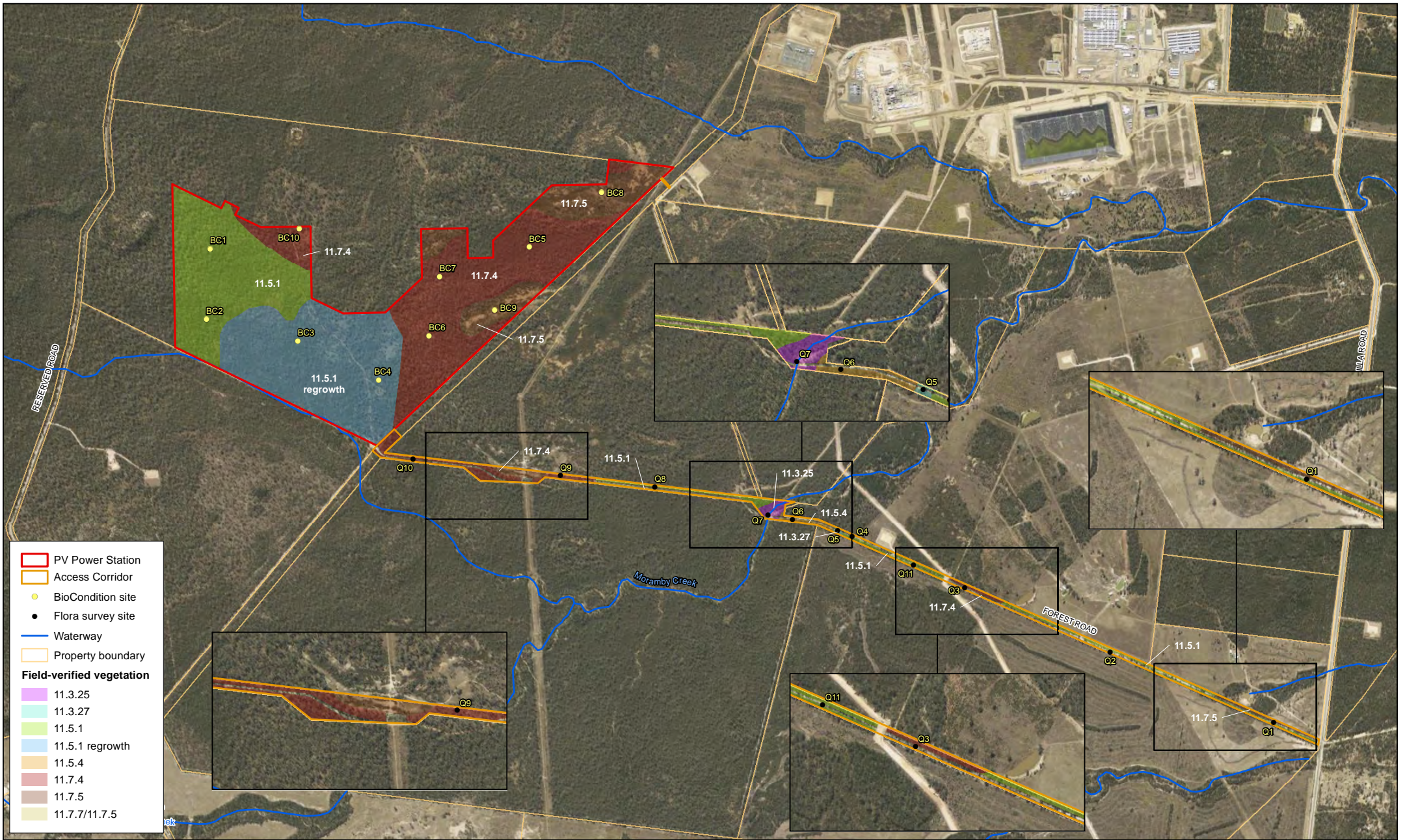


FIGURE 3-11

**Regional Ecosystems  
(Vegetation Management Act)**

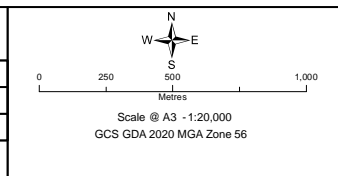
DRG Ref: Figure 3-13 Regional Ecosystems VMA\_22112021





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FIGURE 3-12

**Field Verified Vegetation**

DRG Ref: FIG 5-11 GT\_Vegetation



## Section 3 Description of the Environment and MNES

### 3.3.6.4 Protected Plants Flora Survey Trigger Map

The Project Area does not intersect any areas mapped under the Protected Plants Survey Trigger Mapping administered by DES. Although the Project site is not within a mapped protected plant 'flora survey trigger' area, a threatened plant species was identified during preliminary surveys. Kogan waxflower, listed as Near Threatened under the NC Act and Not Listed (delisted recently in December 2020) under the EPBC Act was identified in the south-eastern portion of the site.

A pre-lodgement meeting took place with the DES on 15 July 2021 to discuss the most appropriate course of action, with options being to avoid the plants, or mitigate for disturbance through either translocation or replanting. A decision was made to avoid any direct disturbance to the plants however clearing will occur within 100 m of the outermost plants and therefore a clearing permit (protected plants) is required. An Impact Management Plan (IMP) for this population of Kogan waxflower has been prepared and submitted in support of a clearing permit (protected plants) application in accordance with Section 87 of the Nature Conservation (Plants) Regulation 2020. This application was submitted on 04 November 2021.

### 3.3.6.5 Terrestrial Flora

A total of approximately 240 flora species are known to occur within a 25 km radius of the Project Area (based on the Wildlife Online database search). Sixteen conservation significant flora species are known or predicted to occur within a 25 km radius of the Project Area based on the database searches (EPBC PMST (**Appendix E**) and Wildlife Online (**Appendix G**)).

Table 3-8 outlines the relevant conservation significant species and their likelihood of occurring on site based on the presence of suitable habitat on site and historical records.

Flora species recorded during the surveys are included in **Appendix H**. Habitat requirements for flora species listed under the NC Act and/or EPBC Act were considered during the flora assessments. Opportunistic searches for threatened flora species were carried out during the flora survey / site traverse across the Project Area. Table 3-8 lists 13 species that were identified through desktop searches, and their possibility to occur within the Project Area.

The identification of the Kogan waxflower during the preliminary survey triggered an additional survey to determine the population extent and density in accordance with the Protected Plant Flora Survey Guidelines V2.01 (Department of Environment and Science, 2020). The population extent and the location of each individual of Kogan waxflower plant was recorded, with a total of 157 individual plants documented. Of the 157 plants, only 2 juvenile plants (15-20cm high) were recorded. The landscape the population of Kogan Waxflower was recorded on consisted of RE 11.7.5 with adjacent RE 11.7.4 and RE 11.5.1. This is consistent with where Kogan Waxflower is found in the local region (rocky scalds).

As identified in Table 3-8 there are no listed MNES flora species likely to occur within the Project Area. Therefore, no MNES Significant Impact Assessment has been completed for any flora species in Section 3.4. No other state threatened flora was found within the Project Area during field surveys.

The Black orchid (*Cymbidium canaliculatum*) (Special Least Concern, NC Act) was detected at one BioCondition Assessment site during ecological surveys. Special Least Concern species do not require a clearing permit (according to Part 5 Division 1 Section 85(1)(a) of the Nature Conservation (Plants) Regulation 2020) and therefore are not required to be assessed for impacts of clearing.

## Section 3 Description of the Environment and MNES

**Table 3-8 Likelihood of Occurrence of Conservation Significant Flora**

Species	Status		Description and Habitat	Possibility to Occur	Source
	NC Act	EPBC Act			
<i>Acacia lauta</i> Tara Wattle	Vulnerable	Vulnerable	<i>Acacia lauta</i> is a shrub 1.5-3 m high, branching from the base. Associated with sandy soils hosting ironbark woodland. Known populations have been mapped within REs 11.7.7, 11.7.4 and 11.7.5. Populations are localised to the area surrounding Tara and Inglewood	<b>Unlikely:</b> Suitable habitat is mapped, however over 15 km from closest historical record	WildNet
<i>Acacia wardellii</i> Wardell's Wattle	Near Threatened	-	<i>Acacia wardellii</i> grows in gravelly soil on shallow weathered sandstone in eucalypt woodland and has been recorded from disturbed and recently burnt areas (Queensland Herbarium 2011).	<b>Unlikely:</b> Suitable habitat not mapped. Two records within 10km buffer, approximately 8 km northeast.	PMST WildNet
<i>Cadellia pentastylis</i> Ooline	Vulnerable	Vulnerable	<i>Ooline</i> is a very slow growing medium-sized tree that generally grows to 10 m high, but occasionally reaching 25 m. The species has glossy leaves with prominent venation that grow to 2-4 cm long, 1.5-2 cm wide and with broadly rounded tips. The upper sides of the leaves are darker and glossier than the undersides. The white flowers are small and usually single. Each flower produces a cluster of up to five rounded, brown berries, 3-5 mm wide.  Grows in semievergreen vine thickets, brigalow and occasionally in adjacent eucalypt woodland.	<b>Unlikely:</b> Out of general species range. No ALA records within 10 km.	PMST
<i>Dichanthium setosum</i> Bluegrass	-	Vulnerable	Erect perennial grass to about 70 cm tall. Occurs in heavy soils (predominantly cracking clays or alluvium, often in gilgai) in woodland or open woodland usually dominated by <i>Acacia</i> (brigalow) and/or <i>Eucalyptus</i> species.	<b>Unlikely</b> no ALA records within 10 km.	PMST
<i>Eucalyptus curtisii</i> Plunkett mallee	Near Threatened	-	In its natural habitat it forms a mallee-like shrub or small tree 2 - 7 m high. The main distinguishing character of mallees is their lignotuber - a swollen mass of woody tissue that occurs at ground level from which a number of thin stems arise.  Prefers habitats associated with lateritic rises and stony jump-ups, Nearest record is over 40 km west of the assessment area	<b>Possible:</b> Suitable habitat exists within the Project Area. Seven ALA records within 10 km buffer.	WildNet

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Species	Status		Description and Habitat	Possibility to Occur	Source
	NC Act	EPBC Act			
<i>Homopholis belsonii</i> Belson's Panic	Endangered	Vulnerable	Belson's Panic is a rhizomatous and stoloniferous perennial grass growing to 0.5 m high. Belson's Panic spreads mainly by the stolons and can form colonies in a matter of months. The leaves, mostly glabrous, are 0.8–1.5 mm long and blades are 2–4.5 mm wide. Primary branches are 8–15 cm long with hairy axils. Inflorescences are also 8–15 cm long and do not fully protrude from the main stem. There are two or three laterally compressed 4.8–8 mm long spikelets on a typical lowermost branch.  It is most likely to be associated with RE 11.3.1, 11.3.17, 11.4.3, 11.9.5, 11.9.10.	<b>Unlikely:</b> Habitat within the assessment area is generally unsuitable for the species, although some potential within the Access Corridor.  Only 4 ALA records within 50 km distance.	WildNet
<i>Lepidium monoplocoides</i> Winged Peppercross	Least Concern	Endangered	Occurs predominantly in mallee scrub in semi-arid areas	<b>Unlikely:</b> Nearest record is on the NSW/QLD border and from 1919. No other QLD records exist.	PMST
<i>Picris barbororum</i>	Vulnerable	-	An erect annual daisy from 5 cm to 60 cm tall with yellow flowers. herb 5 cm to 60 cm high. The species is known from native grassland (12.3.21) of <i>Dichanthium sericeum</i> in stock routes, road reserves adjacent to disturbed areas such as cultivated paddocks and road and rail lines on black clay soil. The nearest record is located 8.2 km east of the survey area on the Cecil Plains Road.	<b>Unlikely:</b> No ALA records within 10km radius of Project Area.	WildNet
<i>Philothea sporadica</i> Kogan Waxflower	Near Threatened	Delisted December 2020	<i>Philothea sporadica</i> is an open to compact shrub that grows to 150 cm high and has numerous branches. Along its length, each branch has many small (1–4 mm long) hairless, club-shaped leaves. The white flowers are 6–10 mm in diameter, solitary and occur on short stalks (up to 0.7 mm long) at the end of branchlets.	<b>Known:</b> Recorded in the Project Area.  Eight ALA records within 10km radius of project site	PMST WildNet
<i>Pomaderris coomingalensis</i>	Endangered	-	<i>Pomaderris coomingalensis</i> is a shrub that grows from 3 to 5 m tall. The young stems have a dense, greyish covering of stellate (star-shaped) hairs. The leaves are ovate or elliptic, 20 to 60 mm long by 7 to 18 mm wide; the base is cuneate (wedge shaped), the margins are entire, the apex is obtuse; the upper side of the lamina is glabrous, smooth with the lateral veins not or slightly impressed; the lower side of the lamina is pubescent with dense, greyish stellate hairs.	<b>Possible:</b> 2 ALA records within 10km buffer radius of project site southwest.	PMST

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Species	Status		Description and Habitat	Possibility to Occur	Source
	NC Act	EPBC Act			
<i>Rhaponticum australe</i> Austral Cornflower/Native Thistle	Vulnerable	Vulnerable	The Austral Cornflower is an erect, herbaceous perennial that grows up to 60 cm high. The stems are covered in woolly hairs and the flowers are deeply toothed. Flowering heads are purplish and are clustered into terminal heads, 36 mm in diameter.  Austral cornflower grows in eucalypt open forest with grassy understorey, paddocks and along roadsides, on basalt soils and alluvial flats	<b>Unlikely:</b> no ALA records within 10km.	PMST
<i>Rutidosia glandulosa</i>	Near Threatened	-	<i>Rutidosia glandulosa</i> generally occurs on sandy or gravelly well drained soil in grassy open eucalypt woodland.	<b>Possible.</b> Suitable habitat exists within the study area, known to occur within 12 km although coordinates may be imprecise.	
<i>Thesium australe</i> Austral toadflax	Vulnerable	Vulnerable	Austral toadflax is a small biennial or perennial herb or subshrub. It grows to 40 cm tall, with wiry, slender stems. It has been collected within Popular Box woodland on alluvial flats (RE 11.3.2) northwest of Dalby.  The species is a root parasite on native grasses, particularly <i>Themeda triandra</i> and <i>Dichanthium sericeum</i> .	<b>Unlikely:</b> Suitable habitat is mapped within the study area, however closest records over 30 m away.	
<i>Tylophora linearis</i>	Endangered	Endangered	<i>Tylophora linearis</i> is a slender, almost hairless twiner with a clear sap. Leaves dark green, linear, 1-5 cm long, 0.5-3 mm wide. Flowers purplish, 3-6 mm in diameter, in radiating groups of 3-8. Fruit is cigar shaped, up to 100mm long and approximately 5 mm diameter, hairless.  Found in dry scrublands, open forests and woodlands at low altitudes and on sedimentary flats.	<b>Unlikely:</b> no ALA records within 10km.	
<i>Xerothamnella herbacea</i>	Endangered	Endangered	<i>Xerothamnella herbacea</i> , Family Acanthaceae, is a sparse, sprawling, perennial herb growing to a height of 30 cm. Stems arise from a central point but can root at the nodes where they contact the soil. Leaves in opposite pairs are soft, linear to narrowly ovate in outline, dark green above and paler beneath. Flowers are small, bright pink to mauve, two lipped, to 6.5 mm long, and occur in the upper leaf axils	<b>Unlikely:</b> Suitable habitat is mapped; however closest records are over 70 km away.	



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### 3.3.6.6 Weed Species

The PMST identified seven Weeds of National Significance (WoNS) as having the potential to occur in the Project Area (Table 3-9). All of these species are also listed as Restricted Matters under the Biosecurity Act.

An additional 12 introduced plant species were recorded on the WildNet database within the 25 km buffered radius of the site. This includes one WoNS listed species and 5 other species listed as Restricted Matters under the Biosecurity Act.

**Table 3-9 Weed Species**

Species name	Common name	WoNS	Restricted Matter	WildNet record
<i>Bryophyllum delagoense</i>	Mother of Millions		*	*
<i>Harrisia sp.</i>	Harrisia cactus		*	*
<i>Lantana camera</i>	Lantana	*	*	*
<i>Lycium ferocissimum</i>	African Boxthorn	*	*	*
<i>Opuntia spp.</i>	Prickly pear	*	*	*
<i>Parthenium hysterophorus</i>	Parthenium	*	*	
<i>Pinus radiata</i>	Radiata Pine	*	*	
<i>Prosopis sp.</i>	Mesquite	*	*	
<i>Salvinia molesta</i>	Salvinia	*	*	
<i>Solanum elaeagnifolium</i>	Night shade	*	*	*

Nine exotic plant species were recorded within the PV Power Station component of the Project Area (refer to **Appendix H**), with no species classified as 'Restricted Matter' under the Biosecurity Act and no WoNS. Nine species identified within and adjacent the PV Power Station area are non-listed exotic/naturalised flora species were detected throughout the survey area, some of which have been introduced.

Field surveys within the Access Corridor recorded ten species of non-native plants. Of these species, two are listed as WoNS. The same two species are listed as Category 3 restricted plants under the *Queensland Biosecurity Act 2014*. The two species are:

- Common Prickly Pear (*Opuntia stricta*); and
- Velvety Tree Pear (*Opuntia tomentosa*).

*Biosecurity Act 2014* Category 3 plants cannot be distributed (sold, released or traded) without a permit. WoNS must be managed as per state or local regulations. In this case, the *Queensland Biosecurity Act 2014* provides guidance on the management of these species at a state level.

African Lovegrass (*Eragrostis curvula*) was identified within the Access Corridor. Whilst not a declared plant under Biosecurity Act, African Lovegrass is recognised as requiring low priority control within the Western Downs Local Government area as per the Western Downs Regional Council Biosecurity Plan 2017.

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### 3.3.6.7 Fauna

Approximately 400 species of terrestrial vertebrate are known to occur within a 25 km radius of the site (based on the Wildlife Online database search), refer to **Appendix G**.

A total of fourteen (14) bird species listed as Migratory species under the EPBC Act (with Migratory species also being listed as Special Least Concern under the NC Act) are predicted to occur. Of these, 8 species are known to occur within a 25 km radius of the site based on the records in the Wildlife Online database.

Note that a new PMST report was run on 25 May 2023 with a buffer area of 10 km (refer to **Appendix F**). According to desktop review, 43 conservation significant and migratory fauna within a 25km radius of the Project Area (EPBC PMST and Wildlife Online database search) are noted. The following conservation significant and migratory fauna species were identified:

- Thirteen (13) species of birds;
- One (1) species of fish;
- Eight (8) species of mammals;
- Seven (7) species of reptiles;
- Two (2) species of snails;
- Twelve (12) listed migratory species (birds not included above); and
- One (1) listed marine species (bird – not included above).

The following species were included in the updated PMST report as occurring within a 10 km buffer of the Project area and are therefore included in the assessment as a precautionary measure:

- Five-clawed worm-skink (*Anomalopus mackayi*); and
- Brigalow woodland snail (*Adclarkia cameroni*).

Note that the following species were not assessed as they were listed following the controlled action decision:

- Yellow-bellied glider (south-eastern) (*Petaurus australis australis*);
- Grey snake (*Hemiaspis damelii*)
- Glossy black-cockatoo (south-eastern) (*Calyptorhynchus lathami lathami*);
- Southern whiteface (*Aphelocephala leucopsis*); and
- Diamond firetail (*Stagonopleura guttata*).

A total of 56 (potentially 58) terrestrial vertebrate species were recorded during the preliminary field survey, including six frog, three reptile, 31 bird and 16 (potentially 18) mammal species. The fauna species list of the Project Area compiled from data collected is presented in **Appendix H**. Of these species, three introduced species, cane toad, feral pig and wild dog were also recorded during the Project Area survey.

Intensive targeted field surveys were undertaken in hopes of recording the Golden-tailed gecko within the Project area, however despite these surveys, the species was not recorded.

CDM Smith has approached the predicted occurrence of conservation significant fauna species in a precautionary manner. Analysis of impact has assumed that significant fauna species for which there is habitat present and localised sighting records exist near the Project Area are considered present unless evidence to the contrary exists. Forty-three (43) conservation significant species listed under the NC Act and/or EPBC Act are considered to have some potential, albeit unlikely, to occur occasionally in the area, refer to Table 3-10.

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**Table 3-10 Likelihood of Occurrence of Conservation Significant and Migratory Fauna**

Species	Status		Habitat Preference	Likelihood of Occurrence	Tool	
	NC Act	EPBC Act			Wildlife Online	PMST
<b>Birds</b>						
<i>Calidris ferruginea</i> Curlew sandpiper	Endangered	Critically Endangered, Migratory	This species largely forages and roosts in sheltered estuarine areas, particularly estuarine mudflats	<b>Unlikely:</b> Suitable habitat is lacking. No ALA records within 10km buffer of Project Area.		*
<i>Erythrorichis radiatus</i> Red Goshawk	Endangered	Vulnerable Endangered effective 31 March 2023	Endemic to northern and eastern Australia in coastal and subcoastal areas with large home ranges of up to 200km <sup>2</sup> . Occurs in woodlands and forests and prefers mosaic habitats that hold a large population of birds and permanent water. Riparian areas are heavily favoured.	<b>Unlikely:</b> Species is not known to occur in region No ALA records within 10km buffer of Project Area.		*
<i>Falco hypoleucos</i> Grey Falcon		Vulnerable	Woodlands and lightly treed inland plains. Habitat is considered to cover many landscapes and vegetation communities. Considered more likely in more arid areas (<500 mm).	<b>Unlikely:</b> While it is possible, it is considered unlikely based on sighting history. Only seven ALA records within 100 km distance.		*
<i>Geophaps scripta scripta</i> Squatter pigeon (southern subspecies)	Vulnerable	Vulnerable	Occurs in dry woodland. Generally, on sandy soils close to water.	<b>Possible:</b> No sightings of Squatter pigeon (southern) were made during surveys. Species is rarely recorded in the local area. Marginal habitat within eastern end of Access Corridor.	*	*

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Species	Status		Habitat Preference	Likelihood of Occurrence	Tool	
	NC Act	EPBC Act			Wildlife Online	PMST
<i>Grantiella picta</i> Painted honeyeater	Vulnerable	Vulnerable	Occurs mainly in dry open woodlands and forests particularly where Brigalow ( <i>Acacia harpophylla</i> ) is present.  Has a strong association with mistletoe. They also occur in riparian forest, on plains with scattered eucalypts and in remnant trees on farmland.	<b>Possible:</b> Mistletoe is the preferred food of painted honeyeaters. Mistletoe was observed in low density within the Project Area, however not of the <i>Amyema</i> genus. The woodland on site is consistent with the woodland habitat of painted honeyeaters, however the lack of <i>Amyema</i> observed, and minimal potential habitat suggests that Painted honeyeaters may possibly occur, rather than likely.  One ALA records within 10 km buffer of Project Area	*	*
<i>Hirundapus caudacutus</i> White-throated needletail	Vulnerable	Vulnerable, Migratory	An aerial non-breeding summer visitor may occur over any habitat type, including cleared land and infrastructure.	<b>Possible:</b> Wide ranging aerial species which migrates from the northern hemisphere to eastern Australia. The species is known to roost in trees amongst dense foliage in the canopy or in hollows. May occur over the Project Area in the summer months.  Two ALA records within 10 km buffer of Project Area.	*	*
<i>Rostratula australis</i> Australian Painted Snipe	Vulnerable	Endangered Marine	Terrestrial shallow wetlands, ephemeral and permanent, usually freshwater but occasionally brackish. They also use inundated grasslands, saltmarsh, dams, rice crops, sewage farms and bore drains.	<b>Unlikely.</b> No suitable habitat exists within the Project Area.  No ALA records within 10km buffer of Project Area.		*
<i>Turnix melanogaster</i> Black-breasted Button-quail	Vulnerable	Vulnerable	The species is restricted to rainforests and forests which are low closed forests particularly semi-evergreen vine thicket, low microphyll vine forest, araucarian microphyll vine forest and araucarian notophyll vine forest.	<b>Unlikely.</b> No suitable habitat exists within the Project Area.  No ALA records within 10km buffer of Project Area.		*

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Species	Status		Habitat Preference	Likelihood of Occurrence	Tool	
	NC Act	EPBC Act			Wildlife Online	PMST
<i>Tringa stagnatilis</i> Marsh greenshank	Special Least Concern	Migratory Marine	May be found in both freshwater and estuarine habitats.	<b>Unlikely:</b> No suitable wetland habitat present or nearby. No ALA records within 10km buffer of Project Area.	*	
<i>Plegadis falcinellus</i> Glossy ibis	Special Least Concern	Migratory Marine	Terrestrial wetlands, preferring inland freshwater wetlands with abundant aquatic flora.	<b>Unlikely:</b> No suitable wetland habitat present or nearby. No ALA records within 10km buffer of Project Area.	*	
<b>Fish</b>						
<i>Maccullochella peelii</i> Murray Cod	-	Vulnerable	Occurs in a wide range of habitats in lower to mid-reach of rivers. Occurs in the Condamine and Warrego Rivers.	<b>Unlikely:</b> Waterway through the Project Area is unlikely to support this species.  No ALA records within 10km buffer of Project Area.		*



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Species	Status		Habitat Preference	Likelihood of Occurrence	Tool	
	NC Act	EPBC Act			Wildlife Online	PMST
<b>Mammals</b>						
<i>Chalinolobus dwyeri</i> Large-eared Pied Bat		Vulnerable	Sandstone cliffs and fertile woodland valley habitat within close proximity of each other is habitat of importance to the Large-eared Pied Bat. Records from south-east Queensland suggest that rainforest and moist eucalypt forest habitats on other geological substrates (rhyolite, trachyte, and basalt) at high elevation are of similar importance to the species.	<b>Unlikely:</b> Escarpment may support this species however habitat is marginal. No Large-eared Pied Bats were recorded during targeted bat surveys. Closest ALA records over 60 km distance.		*
<i>Dasyurus hallucatus</i> Northern quoll	Least Concern	Endangered	Occurs in a range of dry sclerophyll and vine-thicket habitats but prefers rocky areas within its range	<b>Unlikely:</b> No ALA records within 10km buffer of Project Area.		*
<i>Nyctophilus corbeni</i> Corben's Long-eared Bat	Vulnerable	Vulnerable	The south-eastern long-eared bat is found in a wide range of inland woodland vegetation types. These include box / ironbark / cypress pine woodlands, Buloke woodlands, Brigalow woodland, Belah woodland, smooth-barked apple woodland, river red gum forest, black box woodland, and various types of tree mallee.	<b>Unlikely:</b> A genus of bat the <i>Nyctophilus spp.</i> was recorded in the Project Area. Due to the nature of the call up to three species of the <i>Nyctophilus spp.</i> potentially occur in the Project Area, including the <i>Nyctophilus corbeni</i> . However, results from the 2 <sup>nd</sup> survey did not find evidence of the <i>Nyctophilus corbeni</i> . Closest ALA records approximately 80 km distance.		*
<i>Petauroides volans</i> Greater glider (southern and central)	Vulnerable Endangered effective November 2022 list	Vulnerable Endangered effective 5 July 2022	May occur in a range of eucalypt dominated habitats from coastal areas to ranges. Needs large hollow-bearing trees for daytime roosting. Favours wooded habitats with a diversity of eucalypt species.	<b>Possible:</b> A small number of suitable hollows were present. Suitable habitat is mapped. However, despite targeted searches and spotlighting, no animals, scat or scratch evidence were observed. Two ALA records within 10 km buffer of Project Area.	*	*

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Species	Status		Habitat Preference	Likelihood of Occurrence	Tool	
	NC Act	EPBC Act			Wildlife Online	PMST
<i>Phascolarctos cinereus</i> Koala	Vulnerable	Vulnerable Considered Vulnerable as part of this assessment process and for offsetting requirements despite listing change to Endangered on 12 February 2022 (refer to Section 1.7.1.1 for additional information).	Feed almost entirely on eucalypts, most likely in riverine and riparian habitats.	<b>Known.</b> Two skulls found on Project site and eucalyptus on site, along with discovery of Koala scats.  Five ALA records found in a 10km buffer of Project Area.	*	*
<i>Pteropus poliocephalus</i> Grey-headed Flying-fox	-	Vulnerable	The Grey-headed Flying-fox requires foraging resources and roosting sites. It is a canopy-feeding frugivore and nectarivore, which utilises vegetation communities including rainforests, open forests, closed and open woodlands,	<b>Unlikely:</b> Suitable habitat is mapped, however no sighting of this species during surveys and no evidence of recent occupation (i.e., roosting site damage). No ALA records within 10km buffer of Project Area	*	*
<i>Tachyglossus aculeatus</i> Short-beaked echidna	Special Least Concern	-	Occurs throughout Australia in almost all terrestrial habitats except for intensively managed farms. It shelters in logs, crevices, burrows, and leaf litter	<b>Known:</b> One individual identified during survey. Two ALA records in greater area.	*	

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Species	Status		Habitat Preference	Likelihood of Occurrence	Tool	
	NC Act	EPBC Act			Wildlife Online	PMST
<b>Reptiles</b>						
<i>Strophurus taenicauda</i> Golden-tailed Gecko	Near Threatened	-	The golden-tailed gecko lives in open woodland and open forest where it shelters under loose bark and hollow limbs.  Almost all known records of this species have occurred within the Brigalow Belt bioregion. <i>Strophurus t. taenicauda</i> is distributed in the south-eastern part of the Queensland Brigalow Belt bioregion, although a single record also exists from northern NSW. <i>Strophurus t. albiocularis</i> occupies the northern half of the range whilst <i>Strophurus t. triaureus</i> has a limited range in the central eastern part of the Brigalow Belt.	<b>Likely:</b> Suitable habitat is mapped within the study area and over 80 records within 20 km of the Project Area. Habitat suitable for Golden-tailed Gecko was identified throughout the Study Area. Golden-tailed Gecko were not observed during the survey.	*	
<i>Anomalopus mackayi</i> Five-clawed worm skink	Endangered effective November 2022 list	Vulnerable	Close to or on the lower slopes of slight rises in grassy White Box woodland on moist black soils, and River Red Gum-Coolibah-Bimble Box woodland on deep cracking loose clay soils. May also occur in grassland areas and open paddocks with scattered trees.  Live in permanent deep tunnel-like burrows and deep soil cracks, coming close to the surface under fallen timber and litter, especially partially buried logs.	<b>Unlikely:</b> Limited microhabitat available (cracking soils) and suitable grassland. No ALA records within 10km buffer of Project Area.		*
<i>Delma torquata</i> Adorned Delma	Vulnerable effective November 2022 list	Vulnerable	The most westerly records were made in Popular Box ( <i>Eucalyptus populnea</i> ) open woodland on alluvial plains.	<b>Unlikely:</b> No ALA records within 10km buffer of Project Area.		*
<i>Egernia rugosa</i> Yakka skink	Vulnerable	Vulnerable	Occurs in a variety of dry sclerophyll woodlands largely of the Brigalow Belt. Constructs burrows in a variety of soil types.	<b>Possible:</b> Suitable habitat is mapped. No ALA records within 10km buffer of Project Area.	*	*

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Species	Status		Habitat Preference	Likelihood of Occurrence	Tool	
	NC Act	EPBC Act			Wildlife Online	PMST
<i>Furina dunmalli</i> Dunmall's Snake	Vulnerable effective November 2022 list	Vulnerable	<p>Rarely encountered. Occurs in a variety of habitats including forests to woodlands on sandy soils, cracking soils with Brigalow scrub, and dry vine scrub.</p> <p>Dunmall's Snake has been found in a broad range of habitats, including:</p> <p>Forests and woodlands on black alluvial cracking clay and clay loams dominated by Brigalow (<i>Acacia harpophylla</i>), other Wattles (<i>A. burowii</i>, <i>A. deanii</i>, <i>A. leioclyx</i>), native Cypress (<i>Callitris spp.</i>) or Bull-oak (<i>Allocasuarina luehmannii</i>)</p> <p>Various Blue Spotted Gum (<i>Corymbia citriodora</i>), Ironbark (<i>Eucalyptus crebra</i> and <i>E. melanophloia</i>), White Cypress Pine (<i>Callitris glaucophylla</i>) and Bulloak open forest and woodland associations on sandstone derived soils).</p> <p>In other environments, one specimen was found on the edge of dry vine scrub near Tarong Power Station, Queensland, whilst another was found in hard ironstone country (Queensland RE Land Zone 7) at Lake Broadwater near Dalby, Queensland.</p>	<p><b>Unlikely:</b> Suitable habitat is mapped within the Project Area, however field surveys determined the Brigalow community is not present.</p> <p>No ALA records within 10km buffer of Project Area.</p>		*
<i>Tympanocryptis condaminensis</i> Condamine Earless Dragon	Endangered	Endangered	<p>The species occurs in areas on black-cracking clays that have been extensively cropped and generally found on private property along narrow road reserves or in headlands.</p>	<p><b>Unlikely.</b> No suitable habitat exists within the Project Area.</p> <p>No ALA records within 10km buffer of Project Area.</p>	*	*
<b>Snails</b>						

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Species	Status		Habitat Preference	Likelihood of Occurrence	Tool	
	NC Act	EPBC Act			Wildlife Online	PMST
<i>Adclarkia cameroni</i> Brigalow woodland Snail	Endangered	Endangered	The Brigalow woodland snail commonly resides under logs (Stanisic et al., 2010) and leaf litter. Stanisic (2011) notes the species required canopy and on-ground timber cover for survival and egg-laying (although egg-laying has not been recorded for this species).	<b>Possible.</b> Suitable habitat exists within the Project area.  The ALA database did not identify any records of the Brigalow woodland snail within 25 km of the Project area.		*
<i>Adclarkia dulacca</i> Dulacca Woodland Snail	Endangered	Endangered	The Dulacca woodland snail prefers to live under rocks and timber and requires both canopy and on-ground timber cover for survival and egg laying.	<b>Unlikely.</b>  No ALA records within 10 km of Project area. Closest record is located 80 km north-west of the Project area.		*
<b>Listed Migratory Species (not previously listed above)</b>						
<i>Apus pacificus</i> Fork-tailed swift	Special Least Concern	Migratory Marine	An aerial non-breeding summer visitor, may occur over any habitat type, including cleared land and infrastructure.	<b>Possible:</b> May occur over the Project Area in the summer months. Eleven database records from the wider area.  No ALA records within 10km buffer of Project Area.	*	*
<i>Cuculus optatus</i> Oriental cuckoo	Special Least Concern	Migratory	Rainforest, vine thickets, wet sclerophyll forest and open forest and woodland (Higgins 1999).	<b>Unlikely:</b> Unlikely. Most records in Queensland are to the east of the Great Dividing Range.  No ALA records within 10km buffer of Project Area.		*
<i>Motacilla flava</i> Yellow wagtail	-	Migratory Marine	In Australia occurs on the edge of shallow wetlands and short grassy areas such as sports fields. Occurs sporadically close to coast.	<b>Unlikely:</b> Vagrant to southern Queensland. EPBC Online search only.  No ALA records within 10km buffer of Project Area.		*



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Species	Status		Habitat Preference	Likelihood of Occurrence	Tool	
	NC Act	EPBC Act			Wildlife Online	PMST
<i>Myiagra cyanoleuca</i> Satin flycatcher	Special Least Concern	Migratory Marine	Mostly found in coastal forest, favouring wet forests, moist gullies and watercourses.	<b>Possible:</b> This species may occasionally utilise the Survey area during autumn/spring migrations but generally migrates along coastal areas and the Great Dividing Range. Two ALA records within 10 km buffer of Project Area.	*	*
<i>Rhipidura rufifrons</i> Rufous fantail	Special Least Concern	Migratory Marine	Generally occur in dense vegetation, mainly in rainforests, but also in wet sclerophyll forests and other dense vegetation such as mangroves, drier sclerophyll forests, woodlands, parks and gardens.	<b>Possible:</b> May occur in woodlands in winter months. One ALA records within 10 km buffer of Project Area.		*
<i>Actitis hypoleucos</i> Common sandpiper	Special Least Concern	Migratory Marine	This species largely forages and roosts in sheltered estuarine areas, particularly estuarine mudflats	<b>Unlikely.</b> No suitable wetland habitat present or nearby. No ALA records within 10km buffer of Project Area.		*
<i>Calidris acuminata</i> Sharp-tailed sandpiper	Special Least Concern	Migratory Marine	Generally found on wetland habitat along the coast including tidal flats, salt pans and sewage ponds. They also occur on nearby coastal freshwater / brackish wetlands and less commonly on inland wetlands (Pizzey and Knight 2012).	<b>Unlikely.</b> No suitable wetland habitat present or nearby. No ALA records within 10km buffer of Project Area.	*	*
<i>Calidris melanotos</i> Pectoral sandpiper	Special Least Concern	Migratory Marine	Generally found on wetland habitat along the coast including tidal flats, salt pans and sewage ponds. They also occur on nearby coastal freshwater / brackish wetlands and less commonly on inland wetlands (Pizzey and Knight 2012).	<b>Unlikely.</b> No suitable wetland habitat present or nearby. No ALA records within 10km buffer of Project Area.		*

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Species	Status		Habitat Preference	Likelihood of Occurrence	Tool	
	NC Act	EPBC Act			Wildlife Online	PMST
<i>Gallinago hardwickii</i> Latham's snipe	Special Least Concern	Migratory Marine *Under threatened listing assessment, due 30 October 2023*	Occurs in generally low numbers in a variety of permanent or ephemeral wetlands across eastern Australia.	<b>Unlikely.</b> No suitable wetland habitat present or nearby. No ALA records within 10km buffer of Project Area.	*	*
<i>Pandio haliaetus</i> Osprey	-	Migratory Marine	Mainly coastal habitats but can occur on inland rivers and lakes (Debus, et al. 2012).	<b>Unlikely:</b> No suitable habitat in Project Area. No ALA records within 10km buffer of Project Area.		*
<i>Tringa nebularia</i> Common greenshank	Special Least Concern	Migratory Marine *Under threatened listing assessment, due 30 October 2023*	May be found in both freshwater and estuarine habitats.	<b>Unlikely:</b> No suitable wetland habitat present or nearby. No ALA records within 10km buffer of Project Area.	*	*
<b>Listed Marine Species (not previously listed above)</b>						
<i>Rostratula benghalensis</i> ( <i>sensu lato</i> ) Painted snipe	Endangered/ marine	Endangered	Prefers temporary shallow wetlands. Nests in freshly flooded wetlands with low vegetation.	<b>Unlikely:</b> No suitable wetland habitat present or nearby. No ALA records within 10km buffer of Project Area.		*

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### 3.3.6.8 Pest Fauna Species

Database (EPBC Act PMST and Wildlife online) searches of the surrounding area encountered records of 17 introduced terrestrial fauna species. Three of these species are also listed as Restricted Matters under the Biosecurity Act (Table 3-11). Under the Act, a person who has control over a 'Restricted Matter' must not do the following:

- Category 3 – a person who has, or has a thing infested with, the 'Restricted Matter' in the person's possession or under the person's control must not distribute or dispose of the restricted matter unless the distribution or disposal is carried out via the methods set out in the Biosecurity Act;
- Category 4 – move the 'Restricted Matter', or cause or allow to be moved;
- Category 5 – keep in the person's possession or under the person's control; and
- Category 6 – give food to the 'Restricted Matter'.

**Table 3-11 Introduced Fauna Species Known from the Project and Surrounding Areas**

Species name	Common name	Biosecurity Act Category Numbers
<i>Rhinella marina</i>	cane toad	-
<i>Columba livia</i>	rock dove	-
<i>Streptopelia chinensis</i>	spotted dove	-
<i>Passer domesticus</i>	house sparrow	-
<i>Sturnus vulgaris</i>	common starling	-
<i>Acridotheres tristis</i>	common myna	-
<i>Danaus plexippus</i>	monarch	-
<i>Capra hircus</i>	wild goat	-
<i>Canis sp.</i>	wild dog	-
<i>Vulpes vulpes</i>	European red fox	-
<i>Canis familiaris</i>	dog	Categories 3,4,6
<i>Felis catus</i>	cat	Categories 3,4,6
<i>Lepus europaeus</i>	European brown hare	-
<i>Oryctolagus cuniculus</i>	rabbit	-
<i>Mus musculus</i>	house mouse	-
<i>Rattus rattus</i>	black rat	-
<i>Sus scrofa</i>	feral pig	Categories 3,4,6

### 3.3.6.9 Review of Shell QGC Pre-clearance Surveys and Other Surrounding Projects

The Shell QGC Ruby Jo Field Compression Station is located directly north of the K-REP Project area. Pre-clearance surveys for Ruby Jo and surrounding areas were undertaken between 2010 and 2018. A review of these pre-clearance surveys has been undertaken to understand and determine any conservation significant flora or fauna within the area. The summaries of conservation significant flora and fauna are provided below.

#### Shell QGC – Conservation Significant Flora

Flora species recorded to occur within the Shell QGC pre-clearance surveys are outlined below for all areas.

#### **PL 273**

- David:
  - Kogan waxflower (*Philothea sporadica*) – listed as Near Threatened under the NC Act. Kogan Waxflower was identified at six survey sites (DAV0004, DAV0006, DAV0021, DAV0022, DAV0025, DAV0027) during the 2011 and 2012 surveys.

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Although not recorded to occur, DAV0017 and DAV0019 were noted to be essential habitat for Kogan waxflower.

- Grass tree (*Xanthorrhoea johnsoni*) – listed as Special Least Concern, NC Act. Grass tree was recorded to occur at three survey sites (DAV0007, DAV0010, DAV0011) during the 2011 and 2012 surveys.
- The Black orchid (*Cymbidium canaliculatum*) – listed as Special Least Concern under the NC Act. Black orchid was recorded at three survey sites (DAV0007, DAV0010, DAV0011) during the 2011 and 2012 surveys.
- Sean:
  - Blake’s spike-rush (*Eleocharis blakeana*) – at the time of survey listed as Near Threatened under the NC Act, however, is now listed as least concern. Blake’s spike-rush was recorded at four survey sites (SEA0003, SEA0010, SEA0016, SEA0026) during the 2012 and 2013 survey.
  - Kogan waxflower (*Philothea sporadica*) – listed as Near Threatened under the NC Act. Kogan Waxflower was identified at five survey sites (SEA0016, SEA0019, SEA0020, SEA0028, SEA0029) during the 2013 and 2014 surveys.
  - The Black orchid (*Cymbidium canaliculatum*) – listed as Special Least Concern under the NC Act. Black orchid was recorded at one survey sites (SEA0017,) during the 2013 survey.
- Poppy:
  - Kogan waxflower (*Philothea sporadica*) – listed as Near Threatened under the NC Act. Kogan Waxflower was identified at two survey sites (POP0002, POP0003) during the 2011 survey.
  - Plunkett mallee (*Eucalyptus curtisii*) – listed as Near Threatened under the NC Act). Plunkett mallee was recorded at one survey sites (POP0002) during the 2011 survey.
  - Blake’s spike-rush (*Eleocharis blakeana*) – at the time of survey listed as Near Threatened under the NC Act, however, is now listed as least concern. Blake’s spike-rush was recorded at one survey sites (JEN0010) during the 2012 survey.

### PL 275

- Ruby Jo:
  - Plunkett mallee (*Eucalyptus curtisii*) – listed as Near Threatened under the NC Act). Plunkett mallee was recorded at two survey sites (RUB00016 and RUB00021) during the 2012 surveys.
  - The Black orchid (*Cymbidium canaliculatum*) – listed as Special Least Concern under the NC Act. Black orchid was recorded at seven survey sites (RUB00010, RUB00023, RUB00025, RUB00026, RUB00037, RUB00041, RUB00057) between 2011 and 2014.
  - Grass tree (*Xanthorrhoea johnsoni*) – listed as Special Least Concern, NC Act. Grass tree was recorded to occur at seven survey sites (RUB00022, RUB00023, RUB00030, RUB00033, RUB00037, RUB00048, RUB00057) between 2011 and 2014.
  - Kogan Waxflower (*Philothea sporadica*) – listed as Near Threatened under the NC Act. Kogan Waxflower was identified at four survey sites (RUB00011, RUB00013, RUB00021, RUB00053) during the 2012 surveys.
- Isabella:
  - Blake’s spike-rush (*Eleocharis blakeana*) – at the time of survey listed as Near Threatened under the NC Act, however, is now listed as least concern. Blake’s spike-rush was recorded at two survey sites (ISA0028, ISA0029) during the 2013 survey.
- Jen:

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- Blake’s spike-rush (*Eleocharis blakeana*) – at the time of survey listed as Near Threatened under the NC Act, however, is now listed as least concern. Blake’s spike-rush was recorded at one survey sites (POP0003) during the 2012 survey.

### *Shell QGC – Declared Weeds*

There were numerous weeds recorded during the pre-clearance surveys for Shell QGC across all sites. The most common weeds included Velvet tree pear (*Opuntia tomentosa*) and Pest pear (*Opuntia stricta*). The following weed species were also recorded to occur across the Shell QGC site: Mother-of-millions (*Bryophyllum delagoense*), Maynes pest (*Verbena aristigera*), African boxthorn (*Lycium ferocissimum*), Tiger pear (*Opuntia aurantiaca*), Sand burr (*Cenchrus sp.*), African lovegrass (*Eragrostis curvula*) and galvanised burr (*Sclerolaena birchii*).

### *Beelbee Solar Farm Conservation Significant Flora and Fauna*

Ecological surveys were previously undertaken for Beelbee solar farm and powerline corridor, located approximately 13 km north of the K-REP Project area. These ecological survey reports have also been reviewed to assess the presence/absence of conservation significant flora and fauna.

There were no flora species of conservation significance recorded during the Beelbee solar farm and powerline corridor surveys.

There were two conservation significant fauna species recorded, including two Greater glider (southern and central) individuals (refer to Section 3.4.2.8.2 for further details) and one Latham’s Snipe (*Gallinago hardwickii*) (Special Least Concern, NC Act; Migratory, EPBC Act) individual was recorded along the edge of a waterhole. No such habitat is present in the PV Power Station or Access Corridor Project Area.

Additionally, the Beelbee solar farm and powerline corridor assessed four conservation significant fauna species has being likely to occur, including the White-throated needletail (*Hirundapus caudacutus*) (Vulnerable, Migratory, EPBC Act; Vulnerable, NC Act), Golden-tailed Gecko (*Strophurus taenicauda*) (Near Threatened, NC Act); Rufous Fantail (*Rhipidura rufifrons*) (Special Least Concern, NC Act; Migratory, EPBC Act) and the Short-beaked echidna (*Tachyglossus aculeatus*) (Special Least Concern, NC Act).



### 3.4 Matters of National Environmental Significance

The PMST identified the following MNES potentially occurring in the Project Area within a 25 km radius of the Project Area (refer to **Appendix E**):

- Five Threatened Ecological Communities (TECs);
- Eleven (11) threatened flora species and twenty-five (25) threatened fauna species; and
- Fourteen (14) migratory bird species.

Other MNES are summarised below:

- There are no World Heritage Properties;
- There are no National Heritage Places;
- There are four Wetlands of International Importance, being:
  - Banrock station wetland complex: 1200 - 1300km
  - Narran lake nature reserve: 400 - 500km upstream
  - Riverland: 1100 - 1200km
  - The Coorong, and Lakes Alexandrina and albert wetland: 1400 - 1500km
- There are no Great Barrier Reef Marine Parks.

The EPBC Act PMST results are included at **Appendix E**.

Additional information relating to survey efforts as described above in Section 3.2.2 is included below and relates to Koala and bat species, specifically the Corben's long eared bat.

#### 3.4.1 MNES Threatened Ecological Communities

The PMST identified five TECs as having potential to occur within a 25 km radius of the Project Area, including:

- Brigalow (*Acacia harpophylla* dominant and codominant) (Endangered);
- Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions (Endangered);
- Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland (Critically Endangered);
- Poplar Box Grassy Woodland on Alluvial Plains (Endangered); and
- Weeping Myall Woodlands (Endangered).

Field surveys confirmed the Project Area did not contain any TECs protected under the EPBC Act. A polygon of RE 11.9.5 (*Acacia harpophylla* and/or *Casuarina cristata* open forest to woodland on fine-grained sedimentary rocks) which as mapped in the southern part of the Project Area has been incorrectly mapped (see Section 3.3.6.2). No vegetation corresponding to any EPBC listed TEC was observed within the PV Power Station or Access Corridor.

##### 3.4.1.1 Poplar Box Grassy Woodland on Alluvial Plains

###### 3.4.1.1.1 Ecological Community Description

Vegetation within the Poplar Box Grassy Woodland TEC varies from grassy woodland to grassy open woodland and can occasionally exhibit an open forest structure with overstorey dominated by Poplar Box (*Eucalyptus populnea*), with an understorey dominated by perennial forbs and C<sub>4</sub> grasses (Specht 1970; Beeston et al. 1980; Sivertsen and Clarke 2000; Metcalfe et al. 2003; Benson et al. 2010).

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The Poplar Box Grassy Woodland TEC is generally associated with ancient and recent depositional alluvial plains with clay, clay-loam, loam and sandy-loams. To classify Poplar Box Grassy Woodland TEC the following structural factors must be met, as per DotEE, 2019:

- *“A grassy woodland to grassy open woodland with a tree crown cover<sup>11</sup> of 10% or more at patch scale. A tree canopy must be present that shows these features:*
  - *Canopy tree species are capable of reaching 10 m or more in height;*
  - *Eucalyptus populnea (Poplar Box) must be present in the canopy and is the dominant tree species;*
  - *Where hybrids of Poplar Box with other Eucalyptus spp are present, they should be counted as part of the Eucalyptus populnea component of the tree canopy when assessing the previous criterion.*
- *Mid layer (1-10 m) crown cover of shrubs to small trees<sup>13</sup> is low, about 30% or less.*
- *A ground layer (<1 m) mostly dominated across a patch by native grasses, other herbs and occasionally chenopods (during extended dry periods), ranging from sparse to thick (in response to canopy development, soil moisture, disturbance and/or management history).*
- *A list of diagnostic native plant species and some of the key native fauna that make up the ecological community is given at Appendix A; although particular species may be abundant or rare, or not necessarily present, at every location.”*

Poplar Box Grassy Woodland occurs in eastern Australia and is distributed throughout New South Wales and southern Queensland, particularly occurring in the Brigalow Belt North, Brigalow Belt South, Southeast Queensland, Cobar Peneplains, Darling Riverine Plains, NSW South Western Slopes, Riverina and Murray Darling Depression IBRA bioregions (DotEE, 2019).

### 3.4.1.1.2 Occurrence in Project Area

An assessment against the criteria for the presence of Poplar Box Grassy Woodland on alluvial plains as per the conservation advice is presented in Table 3-12. Note, Poplar Box was identified in fauna habitat (FH) 9, FH14 and FH19 which corresponds to Q10, BC7 and BC10 respectively, however, was not identified during the BioCondition and quaternary assessments and if present, would not have been the dominant species. As such, these sites have not been included in the assessment in Table 3-12.

### 3.4.1.1.3 Threats

Threats to the Poplar Box Grassy Woodlands TEC include:

- Clearing and fragmentation;
- Weed invasion;
- Inappropriate fire regimes;
- Inappropriate grazing regimes;
- Dieback;
- Chemical impact and spray drift;
- Hydrological changes;
- Salinisation;
- Nutrient enrichment;
- Invasive fauna; and
- Climate change.

Table 3-12 Assessment Criteria for the Presence of Poplar Box Grassy Woodland on Alluvial Plains

Characteristics of survey sites in the Project Area*	Key diagnostic characteristics as per the Conservation Advice						Comments	Final Assessment Rating
	Location and physical environment			Structure				
	Occurs in the Brigalow Belt North, Brigalow Belt South, Southeast Queensland, Cobar Peneplains, Darling Riverine Plains, NSW South Western Slopes, Riverina and Murray Darling Depression IBRA bioregions.	Associated with ancient and recent depositional alluvial plains with clay, clay-loam, loam and sandy loam, typically duplex soils or sodosols. This includes areas that may not be part of currently defined floodplains.	<p>A tree canopy must be present that shows these features:</p> <ul style="list-style-type: none"> <li>• Canopy tree species are capable of reaching 10 m or more in height; and</li> <li>• <i>Eucalyptus populnea</i> (Poplar Box) must be present in the canopy and is the dominant tree species.</li> </ul> <p>Note: Where hybrids of Poplar Box with other <i>Eucalyptus</i> spp. are present, they should be counted as part of the <i>Eucalyptus populnea</i> component of the tree canopy when assessing the previous criterion.</p>	Mid layer (1-10 m) crown cover of shrubs to small trees is low, about 30% or less.	A ground layer (<1 m) mostly dominated across a patch by native grasses, other herbs and occasionally chenopods (during extended dry periods), ranging from sparse to thick (in response to canopy development, soil moisture, disturbance and/or management history).	A list of diagnostic native plant species and some of the key native fauna that make up the ecological community is given at Appendix A; although particular species may be abundant or rare, or not necessarily present, at every location.		
<b>Q1 Ground-truthed RE 11.5.1</b>	Survey site Q1 meets the conditions for occurring in the Brigalow belt region. <b>Condition met.</b>	Soil texture on assessment comprises of clay and sand. General description of soil mapping is hard pedal mottled-yellow duplex soils <sup>#1</sup> . <b>Condition met.</b>	Ecologically dominant layer (EDL) was 16 m on assessment. Poplar Box ( <i>Eucalyptus populnea</i> ) is present in the canopy and is a dominant tree species in T1 layer. <b>Conditions met.</b>	Not assessable with current survey data.	Ground layer is dominated by native species. Five introduced flora species recorded within survey site. <b>Condition met.</b>	Of the 27 recorded species during the site assessment, 21 are listed in Appendix A of the conservation advice. <b>Condition met.</b>	At the time of survey (Arcadian Ecology, 2021b), the site was not identified as a TEC. The survey site is not located within either land zone 3 or 4.	<b>Possibly met.</b>
<b>Q4 Ground-truthed RE 11.5.1</b>	Survey site Q4 meets the conditions for occurring in the Brigalow belt region. <b>Condition met.</b>	Soil texture on assessment comprises of sand. General description of soil mapping is hard pedal mottled-yellow duplex soils <sup>#1</sup> . <b>Condition unlikely to be met.</b>	EDL was 17 m on assessment. Poplar Box is present in the canopy and is a dominant tree species in T1 layer. <b>Conditions met.</b>	Not assessable with current survey data.	Ground layer is dominated by native species. One introduced flora species recorded within survey site. <b>Condition met.</b>	Of the 19 recorded species during the site assessment, 15 are listed in Appendix A of the conservation advice. <b>Condition met.</b>	At the time of survey (Arcadian Ecology, 2021b), the site was not identified as a TEC. The survey site is not located within either land zone 3 or 4.	<b>Possibly met.</b>
<b>BC2 Ground-truthed RE 11.5.1</b>	Survey site BC2 meets the conditions for occurring in the Brigalow belt region. <b>Condition met.</b>	Soil structure not recorded in BioCondition surveys. Soil report (CDM Smith, 2021) reports soil to be brown sodosol. General description of soil mapping is hard pedal mottled-yellow duplex soils <sup>#1</sup> . <b>Condition met.</b>	Canopy height was 18 m and sub-canopy height was 14 m on assessment. Canopy cover includes Poplar Box; however, it is not specified if this species is the dominant tree species. <b>Conditions potentially met.</b>	Mid-layer crown cover of shrubs to small trees is 8.5%. <b>Condition met.</b>	Ground layer is dominated by native species. Three introduced flora species recorded within survey site. <b>Condition met.</b>	Of the 46 recorded species during the site assessment, 35 are listed in Appendix A of the conservation advice. <b>Condition met.</b>	The survey site is not located within either land zone 3 or 4.	<b>Possibly met.</b>
<b>BC3 Ground-truthed RE 11.5.1</b>	Survey site BC3 meets the conditions for occurring in the Brigalow belt region.	Soil structure not recorded in BioCondition surveys. Soil report (CDM Smith, 2021) reports soil to be brown sodosol. General description of soil mapping is hard pedal mottled-yellow duplex soils <sup>#1</sup> . <b>Condition met.</b>	Canopy height was 14 m and sub-canopy height was 9 m on assessment. Canopy cover includes Poplar Box; however, it is not specified if this species is the dominant tree species. <b>Conditions potentially met.</b>	Mid-layer crown cover of shrubs to small trees is 17.7%. <b>Condition met.</b>	Ground layer is dominated by native species. Five introduced flora species recorded within survey site. <b>Condition met.</b>	Of the 46 recorded species during the site assessment, 30 are listed in Appendix A of the conservation advice. <b>Condition met.</b>	The survey site is not located within either land zone 3 or 4.	<b>Possibly met.</b>

Characteristics of survey sites in the Project Area*	Key diagnostic characteristics as per the Conservation Advice						Comments	Final Assessment Rating
	Location and physical environment			Structure				
	Occurs in the Brigalow Belt North, Brigalow Belt South, Southeast Queensland, Cobarr Penneplains, Darling Riverine Plains, NSW South Western Slopes, Riverina and Murray Darling Depression IBRA bioregions.	Associated with ancient and recent depositional alluvial plains with clay, clay-loam, loam and sandy loam, typically duplex soils or sodosols. This includes areas that may not be part of currently defined floodplains.	<p>A tree canopy must be present that shows these features:</p> <ul style="list-style-type: none"> <li>• Canopy tree species are capable of reaching 10 m or more in height; and</li> <li>• <i>Eucalyptus populnea</i> (Poplar Box) must be present in the canopy and is the dominant tree species.</li> </ul> <p>Note: Where hybrids of Poplar Box with other <i>Eucalyptus</i> spp. are present, they should be counted as part of the <i>Eucalyptus populnea</i> component of the tree canopy when assessing the previous criterion.</p>	Mid layer (1-10 m) crown cover of shrubs to small trees is low, about 30% or less.	A ground layer (<1 m) mostly dominated across a patch by native grasses, other herbs and occasionally chenopods (during extended dry periods), ranging from sparse to thick (in response to canopy development, soil moisture, disturbance and/or management history).	A list of diagnostic native plant species and some of the key native fauna that make up the ecological community is given at Appendix A; although particular species may be abundant or rare, or not necessarily present, at every location.		
<b>BC4 Ground-truthed RE 11.5.1</b>	Survey site FH1 meets the conditions for occurring in the Brigalow belt region.	Soil structure not recorded in BioCondition surveys. Soil report (CDM Smith, 2021) reports soil to be brown sodosol. General description of soil mapping is hard pedal mottled-yellow duplex soils <sup>#1</sup> . <b>Condition met.</b>	Canopy height was 18 m and sub-canopy height was 10 m on assessment. Canopy cover includes Poplar Box; however, it is not specified if this species is the dominant tree species. <b>Conditions potentially met.</b>	Mid-layer crown cover of shrubs to small trees is 25%. <b>Condition met.</b>	Ground layer is dominated by native species. Three introduced flora species recorded within survey site. <b>Condition met.</b>	Of the 55 recorded species during the site assessment, 41 are listed in Appendix A of the conservation advice. <b>Condition met.</b>	The survey site is not located within either land zone 3 or 4.	<b>Possibly met.</b>
<b>BC6 Ground-truthed RE 11.7.4</b>	Survey site BC6 meets the conditions for occurring in the Brigalow belt (south) region.	Soil structure not recorded in BioCondition surveys. Soil report (CDM Smith, 2021) reports soil to be brown kurosol. General description of soil mapping is hard pedal mottled-yellow duplex soils <sup>#1</sup> . <b>Condition potentially met.</b>	Canopy height was 18 m and sub-canopy height was 10 m on assessment. Canopy cover includes Poplar Box; however, it is not specified if this species is the dominant tree species. <b>Conditions potentially met.</b>	Mid-layer crown cover of shrubs to small trees is 5.8%. <b>Condition met.</b>	Ground layer is dominated by native species. Four introduced flora species recorded within survey site. <b>Condition met.</b>	Of the 46 recorded species during the site assessment, 29 are listed in Appendix A of the conservation advice. <b>Condition met.</b>	The survey site is not located within either land zone 3 or 4.	<b>Possibly met.</b>

\*Assessed survey sites all had *Eucalyptus populnea* present. Sites that were not assessed did not have *E. populnea* present.

#1 - Soil mapping information obtained from QGlobe on 07/06/2023.



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**Table 3-13 Assessment of potential TEC protection under the EPBC Act**

Category A1. Little to no perennial weeds and diverse native understorey					
Survey Site	Condition 1: The crown cover of canopy trees in the patch is $\geq 10\%$	Condition 2: $\geq 90\%$ of perennial vegetation cover in the ground layer is native	Condition 3: $\geq 30$ native plant species per patch in the ground layer	Estimated width of linear vegetation patches along Access Road <sup>2</sup>	Final Assessment Rating
Q1 Ground-truthed RE 11.5.1	✓ EDL cover is 20% <b>Condition met.</b>	<90% cover as per the RE11.5.1* <b>Condition not met.</b>	X 19 native plant species in the ground layer. <b>Condition not met.</b>	< 10 m <b>Condition not met.</b>	<b>Condition not met.</b>
Q4 Ground-truthed RE 11.5.1	✓ EDL cover is 30% <b>Condition met.</b>	<90% cover as per the RE11.5.1* <b>Condition not met.</b>	X 15 native plant species in the ground layer. <b>Condition not met.</b>	$\geq 10$ & < 20 m <b>Condition met.</b>	<b>Condition not met.</b>
BC2 Ground-truthed RE 11.5.1	✓ Canopy cover is 22.4% <b>Condition met.</b>	<90% cover as per the RE11.5.1* <b>Condition not met.</b>	✓ 42 native plant species in the ground layer. <b>Condition met.</b>	N/A	<b>Condition not met.</b>
BC3 Ground-truthed RE 11.5.1	✓ Canopy cover is 17% <b>Condition met.</b>	<90% cover as per the RE11.5.1* <b>Condition not met.</b>	✓ 44 native plant species in the ground layer. <b>Condition met.</b>	N/A	<b>Condition not met.</b>
BC4 Ground-truthed RE 11.5.1	✓ Canopy cover is 17% <b>Condition met.</b>	<90% cover as per the RE11.5.1* <b>Condition not met.</b>	✓ 48 native plant species in the ground layer. <b>Condition met.</b>	N/A	<b>Condition not met.</b>
BC6 Ground-truthed RE 11.7.4	✓ Canopy cover is 35.6% <b>Condition met.</b>	<90% cover as per the RE11.7.4* <b>Condition not met.</b>	✓ 42 native plant species in the ground layer. <b>Condition met.</b>	N/A	<b>Condition not met.</b>

<sup>2</sup> Visually estimated from site photos in Arcadian Ecology report (2021b).



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### 3.4.1.1.4 Habitat Assessment in Project Area

The Poplar Box Grassy Woodland primarily occurs within the Brigalow Belt bioregion, in areas associated with Landzone 3 and Landzone 4 (DotEE, 2019). The Project area is located within this bioregion and features REs that include the classification of a ground-truthed Landzone 3. Although the Project area is situated within the associated landzone, none of the mapped and ground-truthed REs feature the Poplar Box Grassy Woodland on Alluvial Plains TEC. Additionally, the Project area is not located in the TEC's likely to occur mapping extent.

The TEC structure is generally classified against the following criteria:

- Tree crown cover of 10% or more at patch scale;
- Canopy tree species that can reach 10 m or more in height, Poplar Box (*Eucalyptus populnea*) must be present in the canopy and be the dominant tree species;
  - Note: Where hybrids of Poplar Box with other *Eucalyptus* spp. are present, they should be counted as part of the *Eucalyptus populnea* component of the tree canopy when assessing the previous criterion.
- A mid layer (1-10 m) crown cover of shrubs to small trees is low, about 30% or less; and
- A ground layer (<1 m) mostly dominated across a patch by native grasses, other herbs and occasionally chenopods (during extended dry periods), ranging from sparse to thick (in response to canopy development, soil moisture, disturbance and/or management history).

An assessment against the above criteria is provided in Table 3-12.

Poplar Box (*Eucalyptus populnea*) has not been recorded as the dominant tree species in the canopy layer. As such, the minimum condition thresholds are considered inapplicable (refer to Table 3-13). However, the species was present in all mid (sub) canopy layers, suggesting this being the more dominant layer. This layer consisted generally of a high abundance of *Callitris glaucophylla* and *Allocasuarina luehmannii*.

In accordance with the quaternary assessments (Q1 – Q11) no TEC were verified within the Access Corridor.

Based on the BioCondition and quaternary data provided, neither the PV Power Station or the Access Corridor support the Poplar Box Grassy Woodland on Alluvial Plains TEC. Although *Eucalyptus populnea* has been recorded to occur within the Project area, the associated REs, dominance of the species, typical vegetation structure of the TEC, and the soil characteristics *Eucalyptus populnea* was recorded to occur on, do not meet the thresholds or match the identification criteria of the TEC. Therefore, no significant residual impact is expected on the Poplar Box Grassy Woodland on Alluvial Plains TEC and due to this, no habitat map has been prepared for the species.

Key data on the Poplar Box Grassy Woodland on Alluvial Plains TEC is provided in Table 3-14 with an assessment against significant impact criteria provided in Section 4.2.1.

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**Table 3-14 Key Data on Poplar Box Grassy Woodland on Alluvial Plains**

Poplar box grassy woodland on alluvial plains
<b>Baseline Data Results</b>
Neither the PV Power Station or Access Corridor support the Poplar Box Grassy Woodland on Alluvial Plains TEC.
<b>EPBC Status</b>
Endangered
<b>Key Threats</b>
<p>As per the conservation advice for the poplar box grassy woodland on alluvial plains, which is included in <b>Appendix K</b>, the main identified threat to the poplar box grassy woodland on alluvial plains is</p> <ul style="list-style-type: none"> <li>• Clearing and fragmentation;</li> <li>• Weed invasion;</li> <li>• Inappropriate fire regimes;</li> <li>• Inappropriate grazing regimes;</li> <li>• Dieback;</li> <li>• Chemical impact and spray drift;</li> <li>• Hydrological changes;</li> <li>• Salinisation;</li> <li>• Nutrient enrichment;</li> <li>• Invasive fauna; and</li> <li>• Climate change.</li> </ul>
<b>Recovery Plans</b>
A recovery plan is not considered to be required, listing plus implementation of the actions in the Conservation Advice would provide sufficient protection from extinction and guidance on the recovery of the ecological community.
<b>Threat Abatement Plans</b>
No Threat Abatement Plan has been identified as being relevant for this ecological community.

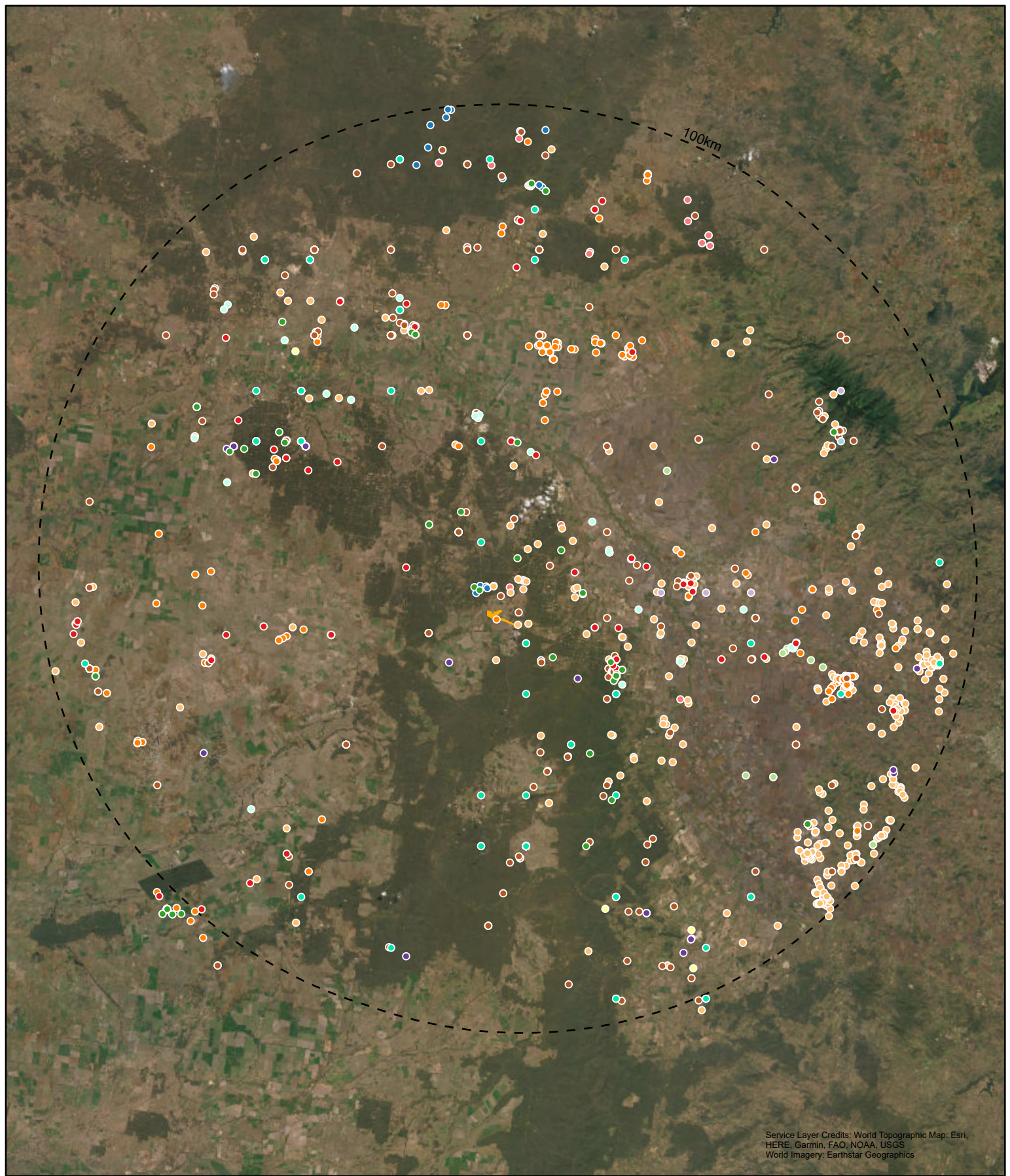
### 3.4.2 MNES Threatened Fauna Species – Possible or Known to Occur

MNES fauna species that are known or have the possibility to occur within the Project area include:

- Yakka skink (*Egernia rugosa*);
- Five-clawed worm-skink (*Anomalopus mackayi*);
- Squatter pigeon (southern) (*Geophaps scripta scripta*);
- Regent honeyeater (*Anthochaera phrygia*);
- Painted honeyeater (*Grantiella picta*);
- White-throated needletail (*Hirundapus caudacutus*);
- Greater glider (southern and central) (*Petauroides armillatus*);
- Koala (*Phascolarctos cinereus*); and
- Brigalow woodland snail (*Adclarkia cameroni*).

The records of the above listed species within the broader region (100 km radius of the Project area) are presented in Figure 3-13.





Service Layer Credits: World Topographic Map: Esri, HERE, Garmin, FAO, NOAA, USGS  
World Imagery: Earthstar Geographics

**Figure 3-14 Species records within 100 km of Project area**

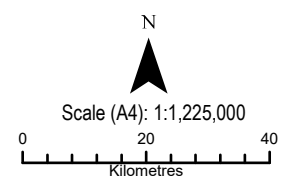
**Legend**

Project Extent

100km Buffer

**Species**

- Brigalow woodland snail
- Diamond firetail
- Five-clawed worm-skink
- Glossy black-cockatoo (south-eastern)
- Greater glider (southern and central)
- Grey snake
- Koala
- Painted honeyeater
- Regent honeyeater
- Southern whiteface
- Squatter pigeon (southern)
- White-throated needletail
- Yakka skink
- Yellow-bellied glider (south-eastern)



Date: 13/06/2023  
Author: KZ



DISCLAIMER  
CDM Smith has endeavoured to ensure accuracy and completeness of the data. CDM Smith assumes no legal liability or responsibility for any decisions or actions resulting from the information contained within this map.





### 3.4.2.1 Yakka Skink

#### 3.4.2.1.1 Species Description

The Yakka skink (*Egernia rugosa*) is a large, robust lizard up to 40 cm in length with a thick tale and limbs. The body colour ranges from pale fawn to dark brown with a broad dark stripe extending from the neck to the tip of the tail (DES 2021). The throat is cream-yellow in colour, with dark flecks/spots, and the chest and abdomen are yellow-orange (Cogger 2000).

Yakka skinks are burrowing animals that occur in colonies or small groups. They occur in a wide variety of vegetation types including poplar box, ironbark, brigalow, white cypress pine, mulga, bendee and lancewood woodlands and open forests. Substrates include rock, sand, clay and loamy red earth. They can also be found in clearings where shelter sites such as tunnel erosion, rabbit warrens and log piles exist (TSN 2008).

Suitable habitat is described in the Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles (DSEWPC 2011) as:

- Open-forests to low-woodlands and scrub in QLD RE Land Zones (LZ) 3, 4, 5, 7, 8, 9, 10 and 12 (LZ 8 not considered core habitat; LZ 12 in Wet Tropics bioregion only). Colonies have been found in large hollow logs, cavities or burrows under large fallen trees, tree stumps, logs, stick-raked piles, large rocks and rock piles, dense ground-covering vegetation, and deeply eroded gullies, tunnels and sinkholes.

Yakka skinks live in burrows and cavities under or around surface microfeatures, which provide burrows and shelter sites. Microfeatures used by the Yakka skink include dense ground vegetation, logs (especially very large logs, if available), rocks, cavities in soil-bound root systems of old trees, old rabbit burrows, deep gullies, etc. Occupied burrows may be identified by scat piles near the entrance, as the species use communal defecation sites (Eddie 2012; Wilson 2012).

#### 3.4.2.1.2 Occurrence in Region

As per the conservation advice for the Yakka skink, which is included in **Appendix K**, the core habitat of this species is within the Mulga Lands and the Brigalow Belt South Bioregions. Other populations are scattered throughout the Brigalow Belt North and Einasleigh Uplands bioregions.

The region falls within modelled distribution mapping for Yakka skink, however there are only two Atlas of Living Australia database records within a 100 km radius of the Project Area, one located in the Bunya Mountains National Park, approximately 84 km north-east of the Project area; and one recorded in cleared farm land, approximately 55 km north-west of the Project area (refer to Figure 3-13). There are an additional two records from fauna surveys undertaken in association with development of the QGC gas fields in the region (QGC 2020). It is possible the limited number of records may be attributable to the cryptic nature of the species.

#### 3.4.2.1.3 Occurrence in Project Area

Land zones within the Project Area include 3 (alluvium), 7 (ironstone jump-ups) and 5 (old loamy and sandy plains) which are considered suitable for Yakka skink (refer to Section 3.4.2.1.1). There is one QGC record of Yakka skink within the Braemar State Forest, approximately 2 km north of the Project Area (QGC 2020). Rocky sections of the Project Area are likely to provide habitat suitable for Yakka skink, with large laterite overhangs and deep hollows under the rock platform.

Given that the Yakka skink are difficult to detect, and population information is limited, the Commonwealth government considers that an occurrence of important habitat for the Yakka skink is a surrogate for an 'important population' (DSEWPC 2011; DAWE 2021d). Suitable habitat is considered important if it is:

- Habitat where the species has been identified during a survey;
- Near the limit of the species' known range;
- Large patches of contiguous, suitable habitat and viable landscape corridors; or



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- A habitat type where the species is identified during a survey, but which was previously thought not to support the species.

Although the species was not detected during surveys and there are no historical records within the site, the site falls well within modelled distribution mapping for Yakka skink (i.e., it is not at the limit of the species' known range). Lot 4 DY457 is, however, located partially within a state-wide biodiversity corridor buffer area and the lots surrounding the Project are generally undeveloped. The uniformity of the vegetation and the landscape in the vicinity of the Project Area means that the site is located within a large patch of 'contiguous suitable habitat and viable landscape corridors'. This therefore constitutes the Project Area as important habitat for the Yakka skink and should a population be present, it would be considered to be an important population.

### 3.4.2.1.4 Habitat Assessment in Project Area

As a results of desktop assessments (i.e., literature review, preliminary threatened and migratory likelihood assessment) and previous field surveys, the most recent field surveys were conducted with the intention of targeting species occurrence, including the Yakka skink.

The Yakka skink is primarily recorded in open dry sclerophyll forest or woodland (DCCEEW, 2014), which the Project area is recorded to encompass. Additionally, the land zones recorded throughout the Project area are correspondent of those of Yakka skink habitats.

The fauna habitat assessments determined there is potential habitat present for the Yakka skink across the PV Power Station and Access Corridor. Habitat suitable for Yakka skink was recorded at one particular location, being the rocky jump up (RE 11.7.5) which starts approximately 1 km from the western terminus of the access road. This area provides suitable habitat for reptiles as large laterite overhands and deep hollows under the rocky platform were observed. The current access track avoids this area, and it is advised that upgrades to this access will follow those of the current route to avoid impacts to reptile and Yakka skink habitats. Despite the presence of suitable habitat and targeted surveys, no Yakka skink individuals or indirect sightings (i.e., dropping deposits (Wilson, 2003)) were recorded at the time of surveys.

Although Yakka skink can inhabit cleared areas where tunnel erosion, rabbit warrens and log piles are evident (DCCEEW, 2014), there is no major areas of cleared habitat within the Project area to support this.

Based on BioCondition assessments and in consideration with the species conservation advice, the PV Power Station and Access Corridor provide a total 76.2 ha of habitat suitable to the Yakka skink.

Key data on the Yakka skink is included in Table 3-15 with an assessment against significant impact criteria provided in Section 4.3.1. Refer to Figure 1 in **Appendix L** for the species habitat mapping.

**Table 3-15 Key Data on Yakka Skink**

Yakka skink ( <i>Egernia rugosa</i> )
<b>Baseline Data Results</b>
Suitable habitat is present within the Project Area. Inspections of potential habitat found no presence of this species however, extensive rock cavities in RE 11.7.4/11.7.5 community suggests potential impact is possible. The Access Corridor and PV Power Station are mapped to provide 76.2 ha of suitable habitat for the Yakka skink. Refer to <b>Appendix L</b> for potential Yakka skink habitat mapping.
<b>EPBC Status</b>
Vulnerable
<b>Key Threats</b>

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### Yakka skink (*Egernia rugosa*)

As per the conservation advice for the Yakka skink, which is included in **Appendix K**, the main identified threat to the Yakka skink is broadscale land clearing and habitat destruction. Other threats include:

- Inappropriate roadside management;
- Removal of wood debris and rock microhabitat features;
- Ripping of rabbit warrens; and
- Predation by feral animals.

### Recovery Plans

A recovery plan is not considered to be required, the approved conservation advice for the species provides sufficient direction to implement priority actions and mitigate against key threats.

### Threat Abatement Plans

No Threat Abatement Plan has been identified as being relevant for this species.

### 3.4.2.2 Five-Clawed Worm-Skink

#### 3.4.2.2.1 Species Description

Five-clawed worm-skink (*Anomalopus mackayi*) are listed as Vulnerable under the EPBC Act. The Five-clawed worm-skink are a medium-sized species with three fingers and two toes and is generally a dark-brown to brown colouration with a paler underbelly. The species grows up to an average of 27 cm long. In the southern regions of its distribution range, the species is unpatterned, whereas those in the northern regions feature longitudinal rows of dark spots, approximately one per scale over the dorsal and lateral surfaces (Cogger et al., 1993; Cogger, 2000) and rows of dark spots on the ventral surface (Cogger, 2000; EPA, 2007).

The Five-clawed worm-skink inhabits a relatively small region along the western-edge of the Great Dividing Range, north-eastern NSW and south-eastern QLD (Sadlier & Pressy, 1994). However, records between 1980 and 2008 have only come from Oakey and Dalby regions in QLD and the Wallangra, Mungindi and Wee Waa regions of NSW (Sadlier & Pressy, 1994; DECC, 2005).

The Five-clawed worm-skink inhabits grassy White Box woodlands, open woodlands and River Red Gum–Coolibah–Bimble Box woodlands. These woodlands are generally supported by clay-loam soils (Shea et al., 1987). The species lives in permanent deep tunnel-like burrows and deep soil cracks, using fallen logs and timber as sheltering sites on the surface.

In Queensland, particularly in Dalby, the Five-clawed worm-skink occurs in Bluegrass (*Dichanthium sericeum*) and/or Mitchell Grass dominated grasslands or mixed grasslands dominated by other grass species but still categorised as Queensland Regional Ecosystem (RE) 11.3.21 (Brigalow Belt Reptiles Workshop 2010). In south-east Queensland, the species may occur in River Red Gum–Queensland Blue Gum–Coolibah–Bimble/Poplar Box grassy woodland/open forests (Brigalow Belt Reptiles Workshop 2010).

In Queensland, important populations occur where suitable habitat remains throughout the species' known distribution on the Condamine River Floodplain, particularly the region (including agricultural farming land) between Bowenville/Oakey, Pittsworth and Jimbour (Brigalow Belt Reptiles Workshop 2010; Richardson 2006). Whereas in north-eastern New South Wales, important populations occur in suitable remnant vegetation and non-remnant vegetation corridors linking remnant patches on the Namoi and Gwydir River floodplains and on the lower north-western slopes of the Great Dividing Range (Brigalow Belt Reptiles Workshop 2010).

#### 3.4.2.2.2 Occurrence in Region

The ALA database identified 25 records of the species within 100 km of the Project area (refer to Figure 3-13). Of which, majority of records are located in the immediate vicinity of Bowenville, QLD. The closest records of the species were recorded in Dalby town centre, approximately 37 km north-east of the Project area.

#### 3.4.2.2.3 Occurrence in Project Area

Although suitable habitat occurs within a small area of the Access Corridor in *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines (RE 11.3.25), there have been no confirmed records of the species within 25 km of the Project area. This habitat occurs where the Access Corridor intersects Moramby Creek.

#### 3.4.2.2.4 Habitat Assessment in Project Area

Given that the Five-clawed worm-skink are difficult to detect, and population information is limited, the Commonwealth government considers that an occurrence of important habitat for the Five-clawed worm-skink is a surrogate for an 'important population' (DSEWPC 2011; DAWE 2021). Suitable habitat is considered important if it is:

- Habitat where the species has been identified during a survey;
- Near the limit of the species' known range;
- Large patches of contiguous, suitable habitat and viable landscape corridors; or

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- A habitat type where the species is identified during a survey, but which was previously thought not to support the species.

The species was not detected during surveys and there are no historical records within the site. The site falls outside of the modelled distribution mapping for Five-clawed worm-skink, as per the species SPRAT distribution mapping. The Five-clawed worm-skink inhabits the lower slopes of grassy White box woodlands, open woodland and River red gum-Coolibah-Bimble box woodland. These woodlands are generally supported by red, black to black clay-loam soils (Shea et al., 1987). The field surveys did not record any REs that are typically corresponding to grassy White box woodlands, open woodland and River red gum-Coolibah-Bimble box woodland. Five-clawed worm-skink occurrences are further associated with riverine plains woodland and require habitat connectivity for survival (DCCEEW, 2011). There was one instance of an RE (RE 11.3.25) verified to occur within the Access Corridor that is in association with a waterway crossing. Although a small occurrence, this is an area that is woodland/grassland and is considered to consist of a wet soil / riverine habitat suitable for the Five-clawed worm-skink. Specific habitat features for the Five-clawed worm-skink include well embedded rocks, leaf litter and fallen logs, all of which were observed at some abundance within the Access Corridor site.

The habitat assessment, alongside BioCondition data, can conclude the Access Corridor, where RE 11.3.25 and the surrounding area is mapped, is considered to provide 2.5 ha of suitable habitat for the Five-clawed worm-skink due to the presence of some habitat features (e.g., logs and litter cover). There is no suitable habitat mapped for the Five-clawed worm-skink within the PV Power Station impact site.

Key data on the Painted honeyeater is included in Table 3-16 with an assessment against significant impact criteria provided in Section 4.3.2. Refer to Figure 2 **Appendix L** for the species habitat mapping.

**Table 3-16 Key Data on Five-Clawed Worm-Skink**

Five-clawed worm-skink ( <i>Anomalopus mackayi</i> )
<b>Baseline Data Results</b>
A search of the ALA database did not identify any records of the Five-clawed worm-skink within 25 km of the Project area. The ALA database identified 8 records of the species within 100 km of the Project area. Suitable habitat occurs within a small area (2.5 ha) of the Access Corridor in <i>Eucalyptus tereticornis</i> or <i>E. camaldulensis</i> woodland fringing drainage lines (RE 11.3.25). This occurs where the Access Corridor intersects Moramby Creek. The Access Corridor is mapped to provide 2.5 ha of suitable habitat for the Five-clawed worm-skink. Refer to <b>Appendix L</b> for potential Five-clawed worm-skink habitat mapping
<b>EPBC Status</b>
Vulnerable
<b>Key Threats</b>
As per the conservation advice for the Five-clawed worm-skink, which is included in <b>Appendix K</b> , habitat loss is the key threat to this species. Additional threats are as follows: <ul style="list-style-type: none"> <li>• Clearing and fragmentation of habitat for agriculture and development;</li> <li>• Habitat degradation from overgrazing;</li> <li>• Removal of refuge sites and litter;</li> <li>• Predation by feral cats and foxes; and</li> <li>• Soil and water pollution</li> </ul>
<b>Recovery Plans</b>
There is no adopted or made Recovery Plan for this species
<b>Threat Abatement Plans</b>
Threat abatement plan for predation by feral cats (DoE, 2015a)

### 3.4.2.3 Squatter Pigeon (Southern)

#### 3.4.2.3.1 Species Description

The Squatter pigeon (southern) (*Geophaps scripta scripta*) is a medium sized ground dwelling bird approximately 30 cm in length. Adults are predominantly grey-brown, with bold black and white stripes on the face and throat. Upper wings are dark brown, the upper breast light grey-brown grading to blue grey on the lower breast and centre of the belly, and the rest of the belly and flanks are white. The underwings are white. It has a black bill and dull-purple legs and feet (Higgins & Davies 1996).

Squatter pigeon (southern) habitat is generally defined as open forests to sparse, open woodlands and scrub, and less often, savannas. Habitats are mostly remnant, regrowth or partly modified vegetation communities dominated in the overstorey by Eucalyptus, Corymbia, Acacia or Callitris species. It is nearly always found near permanent water such as rivers, creeks and waterholes.

In Queensland, foraging and breeding habitat is known to occur on well-draining, sandy or loamy soils on low, gently sloping, flat to undulating plains and foothills (i.e., RE Land Zone 5) and lateritic (duplex) soils on low 'jump-ups' and escarpments (i.e., RE Land Zone 7).

#### 3.4.2.3.2 Occurrence in Region

As per the conservation advice for the Squatter pigeon, which is included in **Appendix K**, the Squatter pigeon (southern) has a large distribution extending from the Burdekin-Lynd divide in Central Queensland, west to Charleville and Longreach, east to the coast between Proserpine and Port Curtis (near Gladstone) and south to a number of scattered sites throughout south-eastern Queensland.

While potential habitat connectivity still occurs between the Carnarvon Ranges and the Nandewar and Southern Brigalow Belt bioregions, in southern Queensland and northern New South Wales, only small, isolated and sparsely distributed sub-populations of the subspecies occur in this part of its range (Cooper et al. 2014 & Squatter pigeon Workshop 2011 cited in DAWE 2021a). All of the relatively small isolated and sparsely distributed sub-populations south of Carnarvon Ranges in Central Queensland are considered to be important populations of the subspecies (Squatter pigeon Workshop 2011).

There are 11 ALA records of the Squatter pigeon (southern) within a 100 km radius of the Project Area, primarily observed along road tracks or on farmland (refer to Figure 3-13). There are no additional records in proximity to the Project Area from fauna surveys undertaken in association with development of the QGC gas fields in the region (QGC 2020).

#### 3.4.2.3.3 Occurrence in Project Area

The RE Land Zones within the Project Area include 5 and 7 which are consistent with the suitable foraging and breeding habitat description for Squatter pigeon (southern) (refer to Section 3.4.2.1.1). There are no ALA records of Squatter pigeon (southern) within the Project Area. The closest record is located in Dalby, approximately 35 km to the north-east (refer to Figure 3-13).

#### 3.4.2.3.4 Habitat Assessment in Project Area

The Project area is located within the potential modelled habitat for the species, as per the species SPRAT distribution mapping. Ground-truthing assessments of the Project area identified the vegetation within the PV Power Station impact site to consist of:

- Eucalypt dry woodlands on Cainozoic sand plains corresponding to advanced regrowth and remnant RE 11.5.1;
- Eucalypt woodlands on laterite soils corresponding to RE 11.7.4 advanced regrowth; and
- Shrublands on laterite scalds corresponding to remnant RE 11.7.5 (emergent Eucalyptus and Acacia in the shrub layer).



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Whilst the Access Corridor impact site consists of:

- Eucalyptus woodland fringing drainage lines corresponding to remnant RE 11.3.25;
- Freshwater wetlands corresponding to non-remnant RE 11.3.27 (canopy dominated by *E. tereticornis*);
- Eucalypt dry woodlands on Cainozoic sand plains corresponding to non-remnant and remnant RE 11.5.1 and 11.5.4;
- Eucalypt woodlands on laterite soils corresponding to non-remnant and remnant RE 11.7.4; and
- Shrublands on laterite scalds corresponding to non-remnant to remnant RE 11.7.5 (emergent Eucalyptus and Acacia in the shrub layer).

The ground-truthed REs within the Project area are definite of open forests, woodland to open woodland, or shrublands. However, a large portion of the Project area is heavily dominated by a thick mid story of *Callitris* and *Casuarina*, providing sub optimal environments for the Squatter Pigeon (southern). Additionally, parts of the Project area are open areas with minimal mid storey vegetation cover, and as such, could be considered more conducive to the habitat of the species, including the road sides.

Squatter pigeon (southern) utilise waterbodies on low, gently slopes and plateaus of sandstone ranges (equivalent to QLD RE Land Zone 10), alluvial clay soils on river or creek flats (represented by QLD RE Land Zone 3) or non-alluvial clay soils on flats or plains which are not associated with current alluvial deposits (represented by QLD RE Land Zone 4) (DoE, 2023). The water bodies observed onsite that are most suitable to the Squatter pigeon (southern) occur within Landzone 3, that is the waterway that runs through the central portion of the Access Corridor and the waterway in proximity to the eastern end of the Access Corridor. The dams within the impact site occur on Landzone 5 and 7, and thus are not considered as suitable for the species.

Foraging and breeding habitat for the Squatter pigeon (southern) occur on well-draining, sandy or loamy soils, on low, gently sloping, flat to undulating plains and foothills (i.e., QLD RE Land Zone 5), and lateritic (duplex) soils on low 'jump-ups' and escarpments (i.e., QLD RE Land Zone 7) (DoE, 2023). Majority of the Project area is situated on Landzone 5 and 7, with the exception of waterway areas that comprise Landzone 3 and soils that are alluvial, grey and brown cracking clays. Suitable breeding habitat for the Squatter pigeon (southern) includes habitats within 1 km of a permanent water body. As waterbodies are located on Landzone 3, any area within 1 km of this is considered the most suitable breeding habitat.

Squatter pigeon (southern) favour patchy ground cover consisting of native, perennial tussock grasses or a mix of perennial tussock grasses and low shrubs or forbs for foraging and breeding habitat. Within the Project area, perennial tussock grasses, low shrubs and forbs are commonly found, albeit seeding native grass cover does not exceed 50% across the site and is regularly below 25%. Seeds from grass, herbs and shrubs are considered abundant across the majority of the Project area, providing adequate foraging habitat.

Using the information provided by the species conservation advice (DoE, 2023) and SPRAT profile, the Project area is considered to contain suitable habitat for the Squatter pigeon (southern). As the species habitat types (i.e., foraging, breeding, and dispersing) contain differing characteristics, these have been broken down into three categories, respectively. Foraging habitat within the Project area comprises 147 ha, breeding habitat (any area within 1 km of a permanent waterbody and land within Landzone 5 and 7) comprises 59 ha, and 1.22 ha is mapped a dispersal habitat.

Key data on the Squatter pigeon (southern) is included in Table 3-17 with an assessment against significant impact criteria provided in Section 4.3.3. Refer to Figure 3 in **Appendix L** for potential Squatter pigeon (southern) habitat mapping.

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**Table 3-17 Key Data on Squatter Pigeon (Southern)**

Squatter Pigeon (southern) ( <i>Geophaps scripta scripta</i> )
<b>Baseline Data Results</b>
<p>The species occurs in grassy woodlands and it is known to prefer sandy soils in areas close to water. This species can also occur in cleared areas. Known to occur in the wider area, suitable habitat is present (broken down into foraging and breeding habitat), although marginal at best. No sightings of Squatter pigeon were made during surveys.</p> <p>The impact area comprises 59 ha of breeding habitat, 147 ha of foraging habitat and 1.22 ha of dispersal habitat for the Squatter pigeon (southern). Refer to <b>Appendix L</b> for potential Squatter pigeon (southern) habitat mapping.</p>
<b>EPBC Status</b>
Vulnerable
<b>Key Threats</b>
<p>As per the conservation advice for the Squatter pigeon (southern), which is included in <b>Appendix K</b>, threats to the Squatter pigeon (southern) include:</p> <ul style="list-style-type: none"> <li>• Vegetation clearing and fragmentation;</li> <li>• Overgrazing of habitat by livestock and feral herbivores;</li> <li>• Introduction of weeds;</li> <li>• Inappropriate fire regimes;</li> <li>• Thickening of understorey vegetation; predation by feral cats and foxes;</li> <li>• Trampling of nests by livestock; and</li> <li>• Illegal shooting.</li> </ul>
<b>Recovery Plans</b>
There is no adopted or made Recovery Plan for this species.
<b>Threat Abatement Plans</b>
<p>For Squatter pigeon (southern), the following Commonwealth Threat Abatement Plans are considered relevant:</p> <ul style="list-style-type: none"> <li>• Threat abatement plan for predation by feral cats (DoE 2015a): <ul style="list-style-type: none"> <li>- Sets out four objectives for controlling feral cats including control in different landscapes, effectiveness of control options, alternative strategies to aid threatened species recovery and public support for cat management</li> </ul> </li> <li>• Threat abatement plan for competition and land degradation by rabbits (DotEE 2016): <ul style="list-style-type: none"> <li>- Establishes a national framework to guide and coordinate Australia's response to the impacts of European rabbits on biodiversity. Identifies the research and management actions required to ensure the long-term survival of those native species and communities impacted by the presence of rabbits. Replaces the previous threat abatement plan published in 2008 (DEWHA)</li> </ul> </li> <li>• Threat Abatement Plan for Predation by the European Red Fox (DEWHA 2008): <ul style="list-style-type: none"> <li>- Sets out prioritising management areas including ascertain the degree of threat to the survival of threatened species and communities, the potential for recovery of threatened species and communities, threatened species likely to benefit through fox control in specific areas, and cost efficiency and effectiveness of fox control in a particular area.</li> </ul> </li> </ul>

### 3.4.2.4 Regent Honeyeater

#### 3.4.2.4.1 Species Description

Regent honeyeater (*Anthochaera phrygia*) are listed as critically endangered under the EPBC Act. The Regent honeyeater is a predominantly black bodied bird, with a yellow under-tail and warty pink skin around the eyes. The bird's body features pale-yellow specks over its body.

The Regent honeyeater is endemic to mainland south-eastern Australia. The species is disturbed in a patchy manner across south-east Queensland, New South Wales, the Australian Capital Territory to central Victoria, where records are widely distributed throughout. Species range has declined, with historical records showing the species previously ranged from Rockhampton (QLD) to South Australia, where it is now considered extinct within the state. Movement patterns of the Regent honeyeater are known to be governed by flowering Eucalypt species.

Regent honeyeater typically inhabit the inland slopes of the Great Dividing Range where box-ironbark eucalypt woodland and dry sclerophyll forest with moist, fertile soils are present. Regent honeyeater are also known to occur in riparian vegetation including sheoak (*Casuarina spp*) for the purpose of breeding and feeding on needle-leaved mistletoe (Franklin et al., 1989; Higgins et al., 2001; Oliver et al., 1998; Webster and Menkhorst, 1992). Coastal forests may also be used by Regent honeyeater in the event of drought affecting their usual habitat (Menkhorst, 1999).

Breeding timing varies throughout its range and is thought to coincide with the flowering of eucalypt and mistletoe species (Franklin et al., 1989; Geering and French, 1998). However, breeding generally occurs during the spring and summer months of August to January (Franklin et al., 1989), where nests are typically placed in canopies of mature trees with rough bark. Females lay two to three eggs per breeding season. There are currently four known breeding areas for the Regent honeyeater, three of which are in NSW and one in Victoria (Garnett et al., 2011; Higgins et al., 2001; Ingwersen et al., 2013; Webster and Menkhorst, 1992).

#### 3.4.2.4.2 Occurrence in Region

A search of the ALA database identified eight records of the species within 100 km of the Project area, of which the closest record is located near Dalby, approximately 32 km north-east of the Project area (refer to Figure 3-13). All eight records were observed on farmland.

#### 3.4.2.4.3 Occurrence in Project Area

A search of the ALA database did not identify any records of the Regent honeyeater within 25 km of the Project area. The species was also not recorded during field surveys.

#### 3.4.2.4.4 Habitat Assessment in Project Area

Natural occurrence of the species falls outside the modelled habitat distribution as per the species SPRAT mapping. The impact site is located (approximately < 25 km) outside of the most western range of the natural distribution mapping of the species, which is more than 200 km geographical distance off the coastline.

As per BioCondition and soil survey reports, the impact site does not portray areas of low to moderate relief with moist, fertile soils. Soils onsite can be considered sandy soil, laterite soil or laterite scalds, which are generally known as low fertility soils.

Regent honeyeaters are generally associated with Box-ironbark eucalypt woodland and dry sclerophyll forest. The species is also known to inhabit areas of riparian vegetation including Sheoak (*Casuarina spp.*) primarily for foraging of Needle-leaved mistletoe, however, may also breed within these habitats. The impact areas consist of:

- Approximately 40.23 ha of eucalypt dry woodlands on Cainozoic sand plains corresponding to remnant RE 11.5.1;
- Approximately 60.66 ha of eucalypt woodlands on laterite soils corresponding to RE 11.7.4;
- Approximately 50.07 ha of eucalypt dry woodlands on Cainozoic sand plains corresponding to RE 11.5.1 advanced regrowth;

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- Approximately 1.57 ha of eucalypt woodlands on laterite soils corresponding to RE 11.7.4 advanced regrowth; and
- Approximately 23.94 ha of shrublands on laterite scalds corresponding to remnant RE 11.7.5.

It is noted that REs 11.5.1 and 11.7.4 provide remnant patches of dry sclerophyll forest habitat, however, this habitat do not persist in soils that are considered fertile enough to provide foraging habitat features for the species.

Regent honeyeaters are known to prefer large diameter trees for foraging as these produce a higher abundance of nectar, however, it was observed that larger trees across the impact sites were lacking, with an average of 1 large tree per hectare. Where nectar producing trees were observed, these included *Eucalyptus crebra*, *Eucalyptus tereticornis*, *Eucalyptus populnea* and *Corymbia clarksoniana*. Additionally, Mistletoe (*Lysiana excarpi*) was noted in transect BC5 and at point Q2.

It can be concluded, based on the habitat assessments and BioCondition data, that the impact site is not considered to provide suitable habitat for the Regent Honeyeater as:

- The general distribution of the species falls outside of the impact site location;
- The impact site is not located in the vicinity of a low coastal forest habitat environment; and
- Despite the presence of nectar producing tree species, these trees were considered either not tall or large enough to be producing suitable amounts of nectar.

Therefore, no significant residual impact is expected on Regent Honeyeater habitat and due to this, no habitat map has been prepared for the species.

Key data on the Regent honeyeater is included in Table 3-18 with an assessment against significant impact criteria provided in Section 4.3.4.

**Table 3-18 Key Data on Regent Honeyeater**

Regent honeyeater ( <i>Anthochaera phrygia</i> )
<b>Baseline Data Results</b>
A search of the ALA database identified 8 records of the species within 100 km of the Project area, of which the closest record is located near Dalby, approximately 32 km north-east of the Project area. All eight records were observed on farmland. There are no records of the species within the Project area. As per habitat assessments, the impact site is not considered to provide suitable habitat for the Regent Honeyeater.
<b>EPBC Status</b>
Critically Endangered
<b>Key Threats</b>
As per the conservation advice for the Regent honeyeater, which is included in <b>Appendix K</b> , habitat loss is the key threat to this species. Additional threats are as follows: <ul style="list-style-type: none"> <li>• Habitat clearing, fragmentation and degradation;</li> <li>• Competition for resources with nectarivorous and non-nectarivorous birds; and</li> <li>• Increased predation by native nest predators, including pied currawongs (<i>Strepera graculina</i>).</li> </ul>
<b>Recovery Plans</b>
National Recovery Plan for the Regent Honeyeater ( <i>Anthochaera phrygia</i> ) (DoE, 2016).
<b>Threat Abatement Plans</b>
Threat abatement plan for competition and land degradation by rabbits (DoEE, 2016).

### 3.4.2.5 Painted Honeyeater

#### 3.4.2.5.1 Species Description

The Painted honeyeater (*Grantiella picta*) is a small bird, approximately 16 cm in length, with a similar wingspan. The Painted honeyeater has black upperparts, white underparts, black spots on its flanks and yellow edges to the flight and tail feathers. The bill is deep pink, and the eye is red (DoE, 2015c).

The Painted honeyeater occurs in woodland habitats which have an abundance of mistletoes. These woodlands are usually dominated by *Acacia* spp. (e.g., brigalow *A. harpophylla*, weeping myall *A. pendula*, and mulga *A. aneura*), belah *Casuarina cristata* and bull-oak *Allocasuarina luehmannii*. Also found in white cypress *Callitris glaucophylla* woodlands in the eastern part of their range, if mistletoes are abundant. Riparian woodlands of *Eucalyptus* spp. (i.e., River Red Gum *E. camaldulensis* (Rowland 2012).

The Painted honeyeater has a highly specialised diet consisting mainly of mistletoe fruit (e.g. Maiden's Mistletoe *Amyema mainenii*). Nectar and insects will also be consumed in the absence of mistletoe. In addition, Painted honeyeater have been recorded feeding on similar sized fruit from other plants such as the introduced Pepper-corn Tree *Schinus mole* and grapes (Watson 2012).

#### 3.4.2.5.2 Occurrence in Region

As per the conservation advice for the Painted honeyeater, which is included in **Appendix K**, the species is sparsely distributed from south-eastern Australia to north-western Queensland and eastern Northern Territory. In Queensland, the species regularly occurs west of the Great Dividing Range (Whitmore and Eller 1982). There are 690 ALA records for Painted honeyeater within a 100 km radius of the Project Area, and two ALA records within 25 km (refer to Figure 3-13).

#### 3.4.2.5.3 Occurrence in Project Area

Targeted surveys were undertaken within the Project Area, in accordance with the 'Survey guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999*' (DEWHA 2010), however, the species was not recorded.

Essential habitat was mapped for Painted honeyeater and there is one publicly available record located in Weranga State Forest, just south of the Access Corridor. It is considered possible that the species occurs within the Project Area. A search of the ALA database identified 1 record of the Painted honeyeater within 10 km of the Project area (refer to Figure 3-13).

#### 3.4.2.5.4 Habitat Assessment in Project Area

Habitat assessments for the Painted honeyeater found that the impact site is located within the modelled distribution for the species, as per the species SPRAT distribution mapping. Additionally, the impact site is located south-east of the boundary of the greatest concentrations and breeding populations of the species, which occur south of 26°S, on inland slopes of the Great Dividing Range between the Grampians, Victoria and Roma, Queensland.

Painted honeyeaters forage on mistletoe fruits (primarily *Amyema* mistletoes), nectar (from flowering mistletoe, eucalypts and potentially banksias) and arthropods, particularly in the non-breeding season. Nectar producing flora was recorded onsite, including *Eucalyptus crebra*, *Eucalyptus tereticornis*, *Eucalyptus populnea* and *Corymbia clarksoniana*. Additionally, mistletoe (*Lysiana excarpi*) was noted in transect BC5 and at point Q2, although the quantity of mistletoe was not recorded in the assessments.

Painted honeyeaters occupy areas containing mistletoes in eucalypt forests/woodlands, riparian woodlands of black box and river red gum, box-ironbark-yellow gum woodlands, acacia-dominated woodlands, paperbarks, casuarinas, callitris, and trees on farmland or gardens. As per the BioCondition reports, the PV Power Station contains vegetation consisting of:



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- Eucalypt dry woodlands on Cainozoic sand plains corresponding to advanced regrowth and remnant RE 11.5.1;
- Eucalypt woodlands on laterite soils corresponding to RE 11.7.4 advanced regrowth; and
- Shrublands on laterite scalds corresponding to remnant RE 11.7.5 (emergent Eucalyptus and Acacia in the shrub layer).

The Access Corridor consists of vegetation consisting of:

- Eucalyptus woodland fringing drainage lines corresponding to remnant RE 11.3.25;
- Freshwater wetlands corresponding to non-remnant RE 11.3.27 (canopy dominated by *E. tereticornis*);
- Eucalypt dry woodlands on Cainozoic sand plains corresponding to non-remnant and remnant RE 11.5.1 and 11.5.4;
- Eucalypt woodlands on laterite soils corresponding to non-remnant and remnant RE 11.7.4; and
- Shrublands on laterite scalds corresponding to non-remnant to remnant RE 11.7.5 (emergent Eucalyptus and Acacia in the shrub layer).

As per the vegetation communities observed onsite, it is confirmed that eucalypt woodlands/open forests (containing *Casuarina* and *Callitris*), and riparian woodlands (RE 11.3.25) occur on site. River Red Gum (*Eucalyptus camaldulensis*) was not recorded to occur in the riparian woodland onsite.

Painted honeyeaters generally favour habitats with a high abundance of mature trees as these host more mistletoes. The BioCondition reports noted that larger trees across the impact sites were lacking, with an average of 1 large tree per hectare. Additional fauna habitat assessments recorded some large habitat trees within the Access Corridor.

Following habitat assessments and BioCondition surveys, a large portion of the impact site is not considered to provide suitable habitat for the Painted Honeyeater due to the lack of large mature trees and absence of *Amyema* mistletoe species. However, due to the presence of some larger mature trees within the Access Corridor which provide both suitable nectar flow and mistletoe, 11.3 ha has been mapped as potential habitat for the species. There is no suitable habitat mapped for the Painted honeyeater within the PV Power Station impact site.

Key data on the Painted honeyeater is included in Table 3-19 with an assessment against significant impact criteria provided in Section 4.3.5. Refer to Figure 4 in **Appendix L** for the species habitat mapping.

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**Table 3-19 Key Data on Painted Honeyeater**

<b>Painted honeyeater (<i>Grantiella picta</i>)</b>
<b>Baseline Data Results</b>
Possibly occurs on site. Surveys concluded that suitable habitat on site is consistent with woodland habitat of Painted honeyeaters. A maximum of 11.3 ha of potential habitat occurs in the Project Area. Refer to <b>Appendix L</b> for potential Painted honeyeater habitat mapping.
<b>EPBC Status</b>
Vulnerable
<b>Key Threats</b>
As per the conservation advice for the Painted honeyeater, which is included in <b>Appendix K</b> , habitat loss is the key threat to this species. Additional threats are as follows: <ul style="list-style-type: none"> <li>• Competition with the aggressive noisy miner (<i>Manorina melanocephala</i>);</li> <li>• Predation by invasive species (e.g. black rats);</li> <li>• Deliberate destruction of mistletoe in production forests</li> <li>• Exacerbation of tree decline through pasture improvement activities</li> <li>• Collision with road vehicles; and</li> <li>• Nest predation by over-abundant Pied currawongs (<i>Strepera graculina</i>), Pied and Grey butcherbirds (<i>Cracticus nigrogularis</i> and <i>Cracticus torquatus</i>), and crows and ravens.</li> </ul>
<b>Recovery Plans</b>
<i>National Recovery Plan for the Painted Honeyeater (Grantiella picta)</i> (DAWE, 2021e).
<b>Threat Abatement Plans</b>
No Threat Abatement Plan has been identified as being relevant for this species

### 3.4.2.6 White-throated Needletail

#### 3.4.2.6.1 Species Description

The White-throated needletail (*Hirundapus caudacutus*) is a large swift measuring about 20 cm in length, with a robust, barrel-like body and a short, square tail, it has long pointed wings. The plumage is predominantly grey-brown, glossed with green. The throat and undertail are white.

The White-tailed Needletail often occur in large flocks over eastern and northern Australia, comprising hundreds or thousands of birds (DAWE 2021b). Almost exclusively aerial, they are known to fly at varying heights as they feed on airborne insects. It was originally believed that the White-throated needletail did not land while in Australia, however it has now been confirmed that birds will regularly roost in trees (Carter 2020).

The species is a seasonal visitor to Australia. Their breeding ground is in the Northern Hemisphere where they lay their eggs from late May to early June before flying south for the boreal winter (Chantler 1999, cited in TSSC 2019). Arriving in Australia from September, they move south along both sides of the Great Dividing Range in Queensland and NSW in October and November, usually arriving in the southern parts of their range (Victoria and Tasmania) in November, with increasing numbers from December, peaking in March (Emison et al. 1987; Higgins 1999, cited in TSSC 2019).

#### 3.4.2.6.2 Occurrence in Region

As per the conservation advice for the White-throated needletail, which is included in **Appendix K**, in eastern Australia, the White-throated needletail is recorded in all coastal regions of Queensland and New South Wales, extending inland to the western slopes of the Great Dividing Range and occasionally onto the adjacent inland plains (TSSC 2019). This species is known to occur in the region, with 366 ALA records within a 100 km radius of the Project Area (refer to Figure 3-13).

#### 3.4.2.6.3 Occurrence in Project Area

There are two ALA records within a 10 km radius of the Project Area, which were recorded within state forest habitats and farmland (refer to Figure 3-13). The species may be a seasonal visitor to the area between September and November, mostly likely flying over on their migration south, and again in March and April on their northward migration from Australia (Higgins 1999, cited in TSSC 2019).

#### 3.4.2.6.4 Habitat Assessment in Project Area

White-throated needletail are recorded to occur in all coastal regions of Queensland, including inland western slopes of the Great Dividing Range and occasionally onto the adjacent inland plains (TSSC 2019). As this is the case, the Project area is located within the species geographical distribution. White-throated needletail are considered exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground (TSSC 2019). The species occurs over majority of habitat types, particularly above areas of woodlands, open forest and rainforest, therefore, suitable habitat for the species occurs within RE 11.5.1 and RE 11.7.4 of the Project area. The Project area consists of 207.5 ha of White-throated needletail habitat.

Key data on the White-throated needletail is included in Table 3-20 with an assessment against significant impact criteria provided in Section 4.3.6. Refer to Figure 5 in **Appendix L** for the species habitat mapping.

**Table 3-20 Key Data on White-throated Needletail**

White-throated needletail ( <i>Hirundapus caudacutus</i> )
<b>Baseline Data Results</b>
Wide ranging aerial species which migrates from the northern hemisphere to eastern Australia. May occur over the Project Area in the summer months. The species is known to roost in trees amongst dense foliage in the canopy or in hollows. No sightings during field surveys. Two ALA records within 10 km buffer of Project Area. The Project area consists of 207.5 ha of White-throated needletail habitat. Refer to <b>Appendix L</b> for potential White-throated needletail habitat mapping.
<b>EPBC Status</b>

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White-throated needletail ( <i>Hirundapus caudacutus</i> )
Vulnerable / Migratory
<b>Key Threats</b>
As per the conservation advice for the White-throated needletail, which is included in <b>Appendix K</b> , threats include habitat loss and fragmentation, direct mortality from wind turbines and overhead wires and poisoning. Other threats include collision with windows and lighthouses although this affects only a few individuals and therefore is not a threat to the species overall. Other threats may include the use of insecticides and loss of roosting sites in Australia.
<b>Recovery Plans</b>
There is no adopted or made Recovery Plan for this species.
<b>Threat Abatement Plans</b>
No Threat Abatement Plan has been identified as being relevant for this species

### 3.4.2.7 Koala

#### 3.4.2.7.1 Species Description

The Koala is an arboreal, medium sized marsupial with a stocky body, large round ears, sharp claws and predominantly grey-coloured fur (DSEWPC 2012).

Koala habitat is forest and woodland containing species that are known Koala food trees, or shrubland with emergent food trees. The Koala's diet is restricted mainly to foliage of the *Eucalyptus* spp., however it may also consume leaves of *Corymbia* spp., *Angophora* spp. and *Lophostemon* spp. Within the Brigalow Belt bioregion, Koala's are more likely to inhabit fringing riparian REs associated with watercourses and adjoining woodlands and low ranges particularly dominated by *E. camaldulensis*, *E. coolabah*, *E. populnea*, *E. thozetiana*, *E. melanophloia* and *E. tereticornis* (Wu, 2012).

The Koala is not generally territorial, and the home ranges of individuals extensively overlap. Individuals tend to use the same trees, but not generally at the same time. Home ranges are variable depending on the quality of habitat, with those in poorer habitats being larger than in higher quality habitats (DAWE 2022a).

#### 3.4.2.7.2 Important Populations

The conservation advice for Koalas identifies important populations as *“those that are valued for cultural, social, and economic reasons as well as for the species conservation.”*

- *For conservation of the listed koala, among other reasons, it will be imperative to maintain populations that:*
  - *have the potential to act as source populations to adjacent areas of suitable, or potentially suitable, habitat;*
  - *Exist in areas of climatically suitable refugia during periods of environmental stress including droughts, heatwaves, and long-term climate change;*
  - *Are genetically diverse;*
  - *Are disease free and/or exhibit low rates of infection with important pathogens;*
  - *Contain genes which may confer adaptation to current and future environmental stressors;*
  - *Are geographical or environmental outliers within the species range.*
- *Populations are also valued for social, cultural or economic reasons, and may or may not, overlap with populations listed above. Reasons may include, but not limited to:*
  - *Cultural and spiritual importance to Indigenous people;*
  - *The social value and enjoyment of having koalas close to residential areas;*
  - *The economic value brought to local business and tourism;*
  - *The iconic species value at the national and international political and community level.”*

There are four spatially distinct, genetic Koala management units identified nationally, including:

1. Queensland and New South Wales populations north of the Clarence River Valley, New South Wales;
2. South of the Clarence River Valley, New South Wales to north of the Sydney Basin;
3. South of the Sydney Basin to approximately the New South Wales /Victorian boarder; and
4. Victoria and South Australia populations.

#### 3.4.2.7.3 Occurrence in Region

As per the conservation advice for the Koala, which is included in **Appendix K**, the Koala is known to occur throughout the Brigalow Belt Bioregion. The mean population of Koalas within the southern Brigalow Belt Bioregion was estimated by Adams-Hosking *et al.* (2016) at 11,071 or 13.97% of the Queensland population (Wallis *et al.* 2020). There are 37 ALA



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records within a 100 km radius of the Project Area. There additional records from fauna surveys undertaken in association with development of the QGC gas fields in the region (QGC 2020). The ALA database further identified 602 records of the species within 100 km of the Project area (refer to Figure 3-13).

### 3.4.2.7.4 Occurrence in Project Area

The species is known to occur within the Project Area. Two skulls were found on Project site, along with discovery of Koala scats. As per the ALA database, there are 7 records within 10 km of the Project area and 23 records within 25 km of the Project area, with all records dating between 1987 and 2016 (refer to Figure 3-13).

### 3.4.2.7.5 Habitat Assessment in Project Area

Evidence of Koala was identified in the Project Area during field surveys, through the discovery of Koala scats (see Plate 3-2) and Koala skulls (refer to Plate 3-3 and Plate 3-4). The low density, condition and sizes of the Koala scats within the PV Power Station area suggest a Koalas had been present several months prior to the surveys. The species is known to occur in the wider area. The Koala is listed as vulnerable under the EPBC Act and Vulnerable under NC Act (refer to **Section 1.7.1.1**). Details of evidence of Koala presence found during the surveys includes:

- Preliminary survey and targeted survey - Koala skull (refer to Plate 3-3 and Plate 3-4);
- Targeted survey - Scats age 4 (months old), of similar size and shape (likely from the same Koala) (refer to Plate 3-2);
- BioCondition survey – Evidence of koala skull and scats; and
- Access Corridor Survey – Evidence of presence in form of tree scratches and scats found at three survey locations.



Plate 3-2 Typical Koala Scat Shape Found in the Field



**Plate 3-3** On-site Koala (*Phascolarctos cinereus*) Skull – Photo 1



**Plate 3-4** On-site Koala (*Phascolarctos cinereus*) Skull – Photo 2

Additional information has been prepared outlining the results of the Koala field assessment and include mapping of presence / absence and the survey coverage area. In addition to the report, a table has been prepared that considers the Koala Habitat Assessment Tool in accordance with the Matters of National Environmental Significance, Significant Impact Guidelines (1.1), Department of Environment (DoE), 2013 and the EPBC Act referral guidelines for the vulnerable Koala, DoE, 2014 (Koala referral guidelines).



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Assessment of the Project Area scored ten on the Koala Habitat Assessment Tool. Impact areas that score five or more using the habitat assessment tool for the Koala are considered to contain habitat that is critical for the survival of the Koala.

The full technical memorandum of the Koala Habitat Assessment Tool which contains the details of responses to the matrix assessment tool used to achieve the site ranking (and associated site survey) can be viewed in **Appendix I**.

The 'EPBC Act referral guidelines for the vulnerable Koala' (DoE 2014) do not refer to any 'important populations' of Koala due to a lack of information at the time of writing. The guidelines provide a 'Koala habitat assessment tool' to assist in determining the sensitivity, value and quality of lands potentially impacted under development proposals. The assessment tool is to be used to determine whether lands may be considered 'critical to the survival of the Koala' and therefore critical to the long-term survival and recovery of the species. The results of the assessment are to aid the decision-making process and determine whether a Project may need to be referred to DAWE based on potential significant impacts to Koalas and/or habitat critical to the survival of the species. Koala habitat assessments undertaken for the Project Area found the habitat within the Access Corridor constitutes habitat critical to the survival of the species.

Under the referral guidelines for Koala (DoE 2014) it is recommended that a project be referred where it is proposed to 'clear  $\geq 20$  ha of habitat containing known Koala food trees in an area with a habitat score  $\geq 8$ .' Where this is not proposed, the guidelines recommend that a referral be based on an appraisal of the Project considering factors such as Koala density and level of habitat fragmentation.

Koala surveys using Koala detection dogs were used to survey the Project Area for signs of Koalas. Currently the use of Koala detection dogs is one of the most efficient and effective methods for determining Koala presence and use of habitat in an area (Cristescu et al. 2015; Cristescu et al. 2020). During the survey of the Project Area, the detection dog was not constrained by the handler (unleashed), increasing the likelihood of detecting all signs of Koalas in the area. Additionally, conditions during the detection dog survey were ideal for detection of scats, although evidence of fire was apparent in part of the Project area at the time of surveys which has the potential to increase scat decay. Cristescu et al. (2015) show that the detectability of Koala scats of a range of ages is extremely high when surveying using a detection dog, detecting 97% of scats overall and 100% of scats when unleashed. Although drone surveys using thermal imaging are also highly effective (Howell et al. 2021), they only result in a snapshot of current koala locations and numbers. Koala detection dogs are highly effective in finding Koalas, Koala scats and other signs, and diseased Koalas (where necessary) which can provide other valuable information regarding the status of the Koala population and use of the habitat during the recent preceding months (Woosnam-Merchez et al. 2012; Cristescu et al. 2015; Cristescu et al. 2020). The detection dog surveys conducted in the Project area are the most appropriate and reliable method for determining the presence and recent (months) use of the area by Koalas.

Evidence of Koala was identified in the Project Area during field surveys, through the discovery of Koala scats and a Koala skull within the PV Power Station component of the Project Area. The low density, condition and sizes of the Koala scats suggest a single Koala has been present within the site boundary several months prior to the survey. Evidence of Koala habitation in the form of scratches and scats was also located at three sites within the Access Corridor. Evidence of Koalas was primarily recorded in the south-east portion of the PV Power Station impact area, and central to the Access Corridor. These locations suggest the waterway corridors may provide important movement corridors for the Koala. The eastern section of the Access Corridor, although largely running through cleared pasture country, does provide a usable fauna corridor from Daandine State Forrest (on the eastern side of Kubarilla Road) to the west.

The reason for the low density of Koala presence in the area is not known but could relate to naturally low-density populations in the western parts of their distribution, climate impacts (heat stress on the trees and Koalas), disease, or predation. Although the Project area is outside of the higher densities observed in areas of south-east Queensland, Dalby is not near the western limit of the Koala distribution. Of note in the Koala Survey report is that there were signs of possible heat stress on the trees in part of the surveyed area, which would likely impact the quality of the foraging habitat for Koalas and the Koalas directly (Adams-Hosking et al. 2011; Narayan and Williams 2016). Disease and predation pressures on the population are unknown at the site.

As per the BioCondition and fauna habitat assessments conducted for the Project area, Koala food trees are present in all the fauna assessment locations within the impact site, particularly including *Eucalyptus crebra*, *Eucalyptus populnea*,

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*Eucalyptus tereticornis* and *Eucalyptus exserta*. However, there were no primary koala food trees (as per Mitchell, 2015) and ancillary habitat tree species (as per Youngentob et al., 2021) present within the Project area during field surveys. Koala food trees were observed in the emergent layer as mature trees and within the shrub layer as immature trees. Stem density assessments were not completed as part of the BioCondition and fauna habitat assessments, and therefore, an assessment of this cannot be made.

Both the PV Power Station and Access Corridor impact areas contain both remnant and advanced regrowth vegetation. The Access Corridor consists of a narrow strip of vegetation either side of the road in two assessment locations (Q1 and Q2). Both sites contain a diversity of tree sizes and age classes, with majority of eucalypt trees within the impact site ranging from 44-46 cm, non-eucalypts ranging from 24-26 cm in diameter and an overall height range of all trees being 2 – 19 m. It can be noted that there is minimal weed cover that would hinder opportunities for safe Koala movement across the site.

Both impact areas contain sodosols soils, which generally consist of a low-nutrient status. A waterway is location along the south/south-western boundary of the PV Power Station impact area, in close proximity to the location where Koala scats and a skull were recorded. Conclusions can be made that both the impact sites are of lower fertility than suitable for the Koala, although the waterways are likely to provide areas of potential climate refugia in drying conditions.

The Project is considered unlikely to impact the recovery of the Koala as habitat is likely to be used for dispersal and movement only. Additionally, there is better habitat and connectivity surrounding the Project area that is likely to be preferred for safe Koala dispersal and movements.

Key data on the Koala is included in Table 3-21 with an assessment against significant impact criteria provided in Section 4.3.7. Refer to Figure 6 **Appendix L** for the species habitat mapping.

Additional information is provided in Section 4.3.7, Section 6.3 and in **Appendix I**.

**Table 3-21 Key Data on Koala**

Koala ( <i>Phascolarctos cinereus</i> )
<b>Baseline Data Results</b>
Known on site. Two skulls found on Project site and eucalyptus on site, along with discovery of Koala scats. Eight ALA records found in a 10 km buffer of the Project Area. The impact areas provide 207 ha of suitable habitat for an important population of Koala, with the exception of the cleared road reserve. Refer to <b>Appendix L</b> for potential Koala habitat mapping.
<b>EPBC Status</b>
Vulnerable Considered Vulnerable as part of this assessment process and for offsetting requirements despite listing change on 12 February 2022 (refer to Section 1.7.1.1 for additional information)
<b>Key Threats</b>
Koala populations have undergone a substantial decline in the past few decades. DSEWPac (2012b) identified the following the following known threats to the Koala: <ul style="list-style-type: none"> <li>• Habitat loss and fragmentation;</li> <li>• Deaths from vehicle collisions;</li> <li>• Deaths from dog (feral and domestic) attacks;</li> <li>• Diseases including Chlamydia strains and Koala Retrovirus; and</li> <li>• The effects of climate change and droughts.</li> </ul>
<b>Recovery Plans</b>
<ul style="list-style-type: none"> <li>• There is no adopted or made Recovery Plan for this species.</li> </ul>
<b>Threat Abatement Plans</b>
No Threat Abatement Plan has been identified as being relevant for this species

### 3.4.2.8 Greater Glider (Southern and Central)

#### 3.4.2.8.1 Species Description

The Greater glider (southern and central) is the largest glider in Australia, with a head and body length of 35-46 cm and a long furry tail measuring 45 – 60 cm (TSSC 2016a). Their colouration is variable and can include dark grey, brown or cream, with a whitish or paler underside (Van Dyck et al. 2013).

The Greater glider (southern and central) occurs from Victoria, north to the Atherton Tablelands in Queensland and until recently was conventionally accepted as a single species (*Petauroides volans*). The north Queensland population was considered a separate subspecies (*Petauroides volans minor*) from the widespread south-eastern population (*Petauroides volans volans*). However, in 2020 it was discovered that there are two distinct species:

- *Petauroides minor* (Greater glider (northern)); and
- *Petauroides volans* (Greater glider (southern and central)).

While it is possible that *Petauroides volans* also constitutes two separate species, this requires further confirmation and so the taxonomic separation remains at the subspecies level:

- *Petauroides volans armillatus* (Greater glider (central)); and
- *Petauroides volans volans* (Greater glider (southern)).

The division of the Greater glider into multiple species reduces the presumed widespread distribution of the original species. The Project Area is located within the occurrence of what was the south-eastern population which now corresponds with the Greater glider (southern and central).

High quality habitat for the Greater glider (southern and central) is represented by remnant vegetation, particularly large patches, where the canopy is dominated by eucalypt species and there is an abundance of hollow bearing trees, particularly trees with multiple hollows. They are known to prefer hollows in live trees, particularly those high up in the tree trunk. Areas without a dominance of eucalypt species or where hollow bearing trees are absent are not considered suitable habitat.

#### 3.4.2.8.2 Occurrence in Region

As per the conservation advice for the Greater glider (southern and central), which is included in **Appendix K**, the greater glider is restricted to Eastern Australia. The Project Area lies in the western extent of the Greater glider's (southern and central) range in Queensland (DAWE 2021c). There are 22 ALA records within a 100 km radius of the Project Area, the majority of which were observed in state forests located to the northeast of the Project Area (refer to Figure 3-13). There are no additional records in proximity to the Project Area from fauna surveys undertaken in association with development of the QGC gas fields in the region (QGC 2020).

Field surveys were conducted in June 2017 and October 2017 at the Beelbee Solar Farm site located approximately 10 km north of the Project area. During the June 2017 survey, one individual was recorded in Spotted Gum woodland in the western corner of the Beelbee Solar Farm site. The second record of the species was recorded during the spotlighting survey in October 2017 where an individual was recorded in Red Gum woodlands associated with Braemar Creek.

There are two ALA records of Greater glider (southern and central) recorded within 10 km of the Project area, located within Braemar State Forest, to the north of the Project Area which were both recorded in 2010 (refer to Figure 3-13).

#### 3.4.2.8.3 Occurrence in Project Area

There are no records of within the Project Area.

#### 3.4.2.8.4 Habitat Assessment in Project Area

Parts of the Project Area contained marginally suitable habitat for Greater glider (southern and central). The presence of tree hollows combined with a belt of vegetation associated with a watercourse at the eastern end of Forest Road



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should be treated as having potential for Greater glider (southern and central) although no evidence within the Project Area for this species was found.

Field surveys identified the majority of the Project area to contain young trees and an overall lack of trees with medium to large hollows that would be considered suitable for Greater gliders (southern and central). In areas where potentially suitable hollows are present, these were of medium size (11-20 cm), rare (one to five trees with 1 ha plot) with majority occurring in dead trees. Field data was cross referenced with the latest species conservation advice (DCCEEW, 2022a) and the 'Guide to Greater glider habitat in Queensland' (Eyre et al., 2022). As per these documents, suitable denning hollow habitat for the Greater glider (southern and central) consists of hollows that are greater than 10 cm in diameter, as such BioCondition transects 2-5 and BIO8 may contain suitable sized hollows, however these were rare within the transects. There are two areas within the Access Corridor that may provide potential habitat for the Greater glider (southern and central) at FH1 and FH8, however these are of marginal quality only. It is to be noted that the field ecologist did not classify the 10 fauna habitat transects to contain suitable hollows for the Greater glider (southern and central) (Arcadian Ecology, 2021a.).

As per the Kubarilla Renewable Energy Park, Western Downs, Queensland Cultural Heritage Field Assessment Report, over half (60%) of the Project area was cleared in 1950, with regrowth vegetation beginning to reoccur in 1959. This suggests the average age of the vegetation within the Project area is 64 years, and thus, deemed too young in terms of old trees critical in the formation of hollows (trees which are 100 years +). This would suggest the habitat trees present at the Project area would need to mature another 36 years to be considered old trees as per the species conservation advice (DCCEEW, 2022a).

Whilst hollows were not specifically counted during the impact surveys, the BioCondition and Fauna Habitat surveys provide a range and size metric of potential hollows. Using data collected from the surveys and coupled with studies from the 'Guide to Greater glider habitat in Queensland' (Eyre et al., 2022), the following inferences can be made:

- Habitat denning trees occur at larger DBH's with a significant increase in hollow in trees with a DBH of 70 cm or larger;
- Hollows begin to reach Greater glider (southern and central) size requirements, at larger prevalence on trees with a DBH of 50 cm or larger; and
- In extremely minor tree quantities, some Greater glider (southern and central) suitable hollows occur at DBH's from 30 cm.

Large trees were recorded within BioCondition transects 1-5 and BIO10, however these were rare (1-2 large trees recorded at each BioCondition transect), and the overall DBH of each large tree was between 44 – 46 cm, therefore not reaching the ideal benchmark for Greater glider (southern and central) habitat.

The most recent Greater glider (southern and central) conservation advice (DCCEEW, 2022a) notes that the species home ranges approximate to 1 – 4 ha and requires 4 to 20 different dens to be considered suitable denning habitat. Additionally, the 'Guide to Greater glider habitat in Queensland' (Eyre et al., 2022), informs that the Greater glider (southern and central) is estimated to require a minimum of 2 – 4 live denning trees for every 2 ha of suitable forest habitat. Using this information, there is potential for BIO4 to contain enough suitable large trees and hollows to support the Greater glider (southern and central) with 3 large trees (1.5 hollows) per hectare.

Using the government's information in line with the field surveys, RE 11.7.5 is not considered suitable Greater glider (southern and central) habitat as it consists of predominantly shrubland and is not conducive to denning or foraging habitat. When considering this assessment over the entire Project area, it is considered extremely unlikely that the entire Project area's available denning habitat could support an important population of Greater glider (southern and central).

It has been assumed that trees of 30 cm DBH and above are available on the impact site, and therefore recruitment of habitat is occurring, albeit with low species richness. Based on the clearing information provided in the Cultural Heritage report, 60% of the impact area will be required to age for another 34 years to be considered consisting of old trees suitable to provide Greater glider (southern and central) habitat features (large hollows). Current information

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contained in the BioCondition assessments and Fauna Habitat assessments, provides little evidence to indicate suitable Greater glider (southern and central) habitat in its current form.

Field surveys recorded four denning species within RE 11.7.5, RE 11.7.4 and RE 11.5.1, including *Eucalyptus crebra*, *Eucalyptus exserta*, *Angophora leiocarpa* and *Eucalyptus tereticornis*, however these were confirmed to provide a low species richness. Therefore, it has been determined that the Project area provides a reduced number of species that are suitable for Greater glider (southern and central) dens. Similarly, foraging species recorded within the Project area included *Eucalyptus crebra*, *Eucalyptus exserta* and *Eucalyptus tereticornis*, and again provide a low species richness. As Greater glider (southern and central) favour areas of high species richness due to seasonal variation in nutrition and growth, it is reasonable to assume that RE 11.7.4 does not provide habitat that is considered optimal for the Greater Glider (southern and central) as it only provides one foraging species, *Eucalyptus crebra*. Regional ecosystems 11.7.5 and 11.5.1 provide two species suitable for Greater glider foraging, *Eucalyptus crebra* and *Eucalyptus tereticornis*, however of the two, only *Eucalyptus tereticornis* is known to be a significant species for Greater glider (southern and central) habitat (Eyre et al., 2022).

Additionally, Greater glider (southern and central) densities in southern Queensland have been identified as sensitive to a proportion of cleared land within a 1 km radius (Eyre 2006). As such, the patch of potential Greater glider (southern and central) habitat located at the eastern end of the Access Corridor is highly unlikely contain Greater gliders (southern and central) unless the surrounding landscape is revegetated. If revegetation in this were to occur, this could take over 100 years to create suitable hollows for Greater gliders (southern and central) (DCCEE 2022a). Greater gliders (southern and central) are not known to readily use nest boxes (Goldingay et al. 2020), and while there is emerging research into nest box designs in which Greater gliders (southern and central) will inhabit (WWF Australia 2023), they would require large, sturdy trees for installation.

Based on the field surveys and habitat assessment, it is highly unlikely that the Project area provides a large contiguous patch of suitable foraging and denning habitat for the Greater glider (southern and central) as there are only two small areas that provide marginal, isolated habitat quality for the species. As such, no habitat mapping has been developed for this species.

Key data on the Greater glider (southern and central) is included in Table 3-22 with an assessment against significant impact criteria provided in Section 4.3.7.

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**Table 3-22 Key Data on Greater Glider (southern and central)**

Greater glider (southern and central) ( <i>Petauroides volans</i> )
<b>Baseline Data Results</b>
<p>Four ALA record within 10 km buffer of the Project Area. Suitable hollow-bearing trees were identified on site however no animals, scat or scratch evidence were observed during targeted searches and spotlighting activities. Only two small patches of potential habitat were identified within the Project Area.</p> <p>It is highly unlikely that the Project area provides a large contiguous patch of suitable foraging and denning habitat for the Greater glider (southern and central) as there are only two small areas that provide marginal, isolated habitat quality for the species.</p>
<b>EPBC Status</b>
Vulnerable
<b>Key Threats</b>
<p>The broad area of occurrence likely remains similar to pre-European settlement, although the actual area of occupancy has declined substantially, mostly due to land clearing (TSSC 2016a). As per the conservation advice for the Greater glider (southern and central), which is included in <b>Appendix K</b>, the following are considered known threats to the Greater glider (southern and central):</p> <ul style="list-style-type: none"> <li>• Habitat loss and fragmentation;</li> <li>• High intensity or frequent fires;</li> <li>• Timber production;</li> <li>• Climate change (may reduce area of occupancy);</li> <li>• Barbed wire entanglement;</li> <li>• Phytophthora root fungus (known to impact on the health of eucalyptus); and</li> <li>• Over predation by owl species (TSSC 2016a).</li> </ul>
<b>Recovery Plans</b>
<p>There is no recovery plan for this species. The Commonwealth's Approved Conservation Advice for Greater glider (TSSC 2016a) lists priority conservation actions that may be applicable to the Project including:</p> <ul style="list-style-type: none"> <li>• Reduce the frequency and intensity of prescribed burns;</li> <li>• Identify appropriate levels of patch retention, habitat tree retention, and logging rotation in hardwood production; and</li> <li>• Protect and retain hollow-bearing trees, suitable habitat and habitat connectivity.</li> </ul>
<b>Threat Abatement Plans</b>
No Threat Abatement Plan has been identified as being relevant for this species

### 3.4.2.9 Brigalow Woodland Snail

#### 3.4.2.9.1 Species Description

The Brigalow woodland snail (*Adclarkia cameroni*) is listed as Endangered under the EPBC Act and NC Act. The snail species exhibits a medium to large-sized shell (approx. diameter 20 mm) which is brownish yellow in colour with a reddish band on the whorls. The whorls are rounded and tightly coiled with the last whorl being flared. The snail's shell is partially flattened with a low, domed spine (TSSC, 2016).

The Brigalow woodland snail is endemic to southeast Queensland, occurring only in a small number of remnant and scattered brigalow and eucalypt woodland patches, particularly road verges and riparian corridors along the Condamine River floodplain. The species predominantly occurs in Dalby and Chinchilla. Species distribution is severely fragmented with an area of occupancy of 76 m<sup>2</sup> (DotEE, 2016).

The Brigalow woodland snail occurs in the 'Brigalow (*Acacia harpophylla* dominant and co-dominant)' ecological community, currently listed as Endangered under the EPBC Act (TSSC, 2013), however may also occur in the Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt Bioregions' ecological community, also currently listed as Endangered under the EPBC Act (TSSC, 2011).

The Brigalow woodland snail commonly resides under logs (Stanisic et al., 2010) and leaf litter. Stanisic (2011) notes the species requires canopy and on-ground timber cover for survival and egg-laying (although egg-laying has not been recorded for this species).

It is currently unknown at what age the Brigalow woodland snail reaches sexual maturity, however it is thought to be at approximately two years of age due to similarities of other snails in the family (Stanisic, 2011). Eggs are laid on an annual basis by mature snails. Mature snails may lay more than one clutch of eggs in a year dependent on the length of the summer rain period. The species life expectancy is also unknown; however, they are thought to live up to five years.

#### 3.4.2.9.2 Occurrence in Region

As per the ALA database, there are 22 records of the Brigalow woodland snail within 100 km of the Project area, with the closest record located 26 km north-east and east of the Project area (refer to Figure 3-13).

#### 3.4.2.9.3 Occurrence in Project Area

The ALA database did not identify any records of the Brigalow woodland snail within 25 km of the Project area. The species has not been recorded during field surveys. However, as of recent, DCCEE have confirmed a Brigalow woodland snail individual recorded in close vicinity to the Project area; however, this point data cannot be obtained.

#### 3.4.2.9.4 Habitat Assessment in Project Area

Brigalow woodland snail occur in small numbers of remnant and scattered *Acacia harpophylla* (brigalow) and Eucalypt woodland patches (such as road verges and riparian corridors) on the Condamine River floodplain, especially in the area around Dalby and Chinchilla (TSSC, 2016). As such, the Project area falls within the species known modelled distribution area. The Project area is consistent with Eucalypt woodlands as per REs 11.7.4 and 11.5.1.

The Project area is not located within an important refuge for the species as these only occur within the Condamine River riparian corridor.

The Project area contains litter and timber in small portions, available to the Brigalow woodland snail as shelter. Within the Project area, the canopy cover from mid canopy Callitris and Casuarina is thick in portions, however, these areas are not dense with ground debris. Furthermore, the debris within the Project area is not moist and therefore does not produce favourable conditions for the species. The topography of the Project area is generally sloping on an average gradient of 2% (0.02 degree if grade). Soils are not conducive to water retention in RE 11.5.1. More so, the Project area is not on or bordering a major tributary; and therefore, making consistent soggy conditions possible, and where flood debris is abundant.

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Brigalow woodland snail reside under logs and leaf litter, where fungi, lichen and algae are abundant. All BioCondition transects recorded log and litter attributes across the Project area, providing suitable habitat for the Brigalow woodland snail. Although logs and leaf litter are present, moist conditions are still required, which is not common in dry sclerophyll ecosystems. These ecosystems therefore are not conducive to supporting significant fungi growth, algae to form, and other detritus for species foraging requirements.

Although habitat characteristics in the form of leaf litter and logs are present, moisture within the environment, and therefore food sources, is lacking. The Project area is not considered conducive of suitable habitat for the Brigalow Woodland Snail, however portions along the Access Corridor nearing the permanent waterway provides potential habitat in ideal conditions (2.5ha). There is no suitable habitat mapped for the Brigalow woodland snail within the PV Power Station impact site.

Key data on the Brigalow woodland snail is included in Table 3-23 with an assessment against significant impact criteria provided in Section 4.3.9. Refer to Figure 7 in **Appendix L** for the species habitat mapping.

**Table 3-23 Key Data on Brigalow Woodland Snail**

Brigalow woodland Snail ( <i>Adclarkia cameroni</i> )
<b>Baseline Data Results</b>
<p>The ALA database did not identify any records of the Brigalow woodland snail within 25 km of the Project area. The species has not been recorded during field surveys. As per the ALA database, there are 22 records of the Brigalow woodland snail within 100 km of the Project area, with the closest record located 26 km north-east and east of the Project area.</p> <p>The Project area consists of 2.5 ha of Brigalow woodland snail habitat. Refer to <b>Appendix L</b> for potential Brigalow woodland snail habitat mapping.</p>
<b>EPBC Status</b>
Endangered
<b>Key Threats</b>
<p>Threats to the Brigalow woodland snail include:</p> <ul style="list-style-type: none"> <li>• Land clearing;</li> <li>• Habitat disturbance;</li> <li>• Predation by rats (<i>Rattus spp.</i>), mice (<i>Mus musculus</i>) and feral pigs (<i>Sus scrofa</i>);</li> <li>• Invasion of Buffel grass;</li> <li>• Trampling by cattle and horses; and</li> <li>• Fire.</li> </ul>
<b>Recovery Plans</b>
There is no adopted or made Recovery Plan for this species
<b>Threat Abatement Plans</b>
No Threat Abatement Plan has been identified as being relevant for this species



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### MNES Threatened Fauna Species – Unlikely to Occur

#### 3.4.2.11 Bat Species

Due to the frequency of the bat calls during the preliminary survey, up to three species of the *Nyctophilus spp.* were recorded in the PV Power Station area. The species that could potentially occur in the Project Area included the Corben's long eared bat; Lesser long-eared bat (*Nyctophilus geoffroyi*); and Gould's long-eared bat (*Nyctophilus gouldi*). The *Nyctophilus corbeni* is listed as Vulnerable under the EPBC Act and Vulnerable under the NC Act. The second ecological survey was completed to confirm the presence of this species.

50 bats (4 species) were captured during the survey period. All bats captured were least concern species under the NC Act and not listed under the EPBC Act. Corben's Long-eared Bat is considered unlikely to occur within the Project Area on the basis that it was not recorded despite targeted survey efforts.

Species captured were:

- Little broad-nosed bat (*Scotorepens greyii*) (refer to Plate 3-5);
- Lesser long-eared bat (refer to Plate 3-6);
- Gould's long-eared bat (refer to Plate 3-7); and
- Gould's wattled bat (*Chalinolobus gouldii*) (refer to Plate 3-8).



Plate 3-5 Little broad-nosed bat (*Scotorepens greyii*)



Plate 3-6 Lesser long-eared bat (*Nyctophilus geoffroyi*)



Plate 3-7 Gould's long-eared bat (*Nyctophilus gouldi*)





Plate 3-8 Gould's wattled bat (*Chalinolobus gouldii*)

Suitable habitat for South-eastern Long-eared Bat (*Nyctophilus corbeni*) was present within the Project Area in the form of standing trees with hollows and bark cavities, however, the species presence is considered **unlikely** given that targeted bat surveys of the PV Power Station failed to establish the presence of this species.

### 3.4.2.12 Other Species

An assessment of other MNES threatened fauna species was completed. See a summary below:

- Dunmall's Snake (*Furina dunmalli*) – **Unlikely to occur**. Within the Project Area however no activity was detected. While this species is known to utilise coarse woody cover in Cypress Pine and Eucalypt woodland its preferred habitat is cracking clay soils, in particular those soils associated with Brigalow communities. These soils or communities were not found within the Project Area.
- Grey falcon (*Falco hypoleucos*) – **Unlikely to occur**. No sightings of the Grey falcon were made during the surveys. Presence of the species is unlikely based on sighting history.
- Dulacca Woodland Snail (*Adclarkia dulacca*) – **Unlikely to Occur**. This species relies on undisturbed Brigalow communities such as the Imperial Hairstreak (*Jalmenus evagoras*) which was not evident within the Project Area.

### 3.4.3 MNES Migratory Species

The ecological assessment determined that while the Project Area would not represent useful habitat for migratory species, there are three bird species (in addition to the White-throated needletail which is also listed as Vulnerable) which have some possibility to occur. These are described in Table 3-24. No Migratory species were identified during field surveys.

Table 3-24 Significant Impact Assessment – Migratory Species

Common name	Habitat utilised by migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or	Habitat that is of critical importance to the species at particular life-cycle stages, and/or	Habitat utilised by a migratory species which is at the limit of the species range, and/or	Habitat within an area where the species is declining	Likelihood of occurrence
Fork-tailed Swift	Widespread and scattered records in the wider region, concentrating towards the coast and south-eastern Australia.	The Fork-tail swift is an aerial species utilising a variety of environments. It does not breed in Australia. May occur over heavily disturbed sites as well as natural habitats. The habitat within the Project Area is unlikely to be of critical importance to the species due to its mobility and adaptability.	The species migrates to areas across all states and territories of Australia.	The IUCN classifies the species as 'least concern' and the Action Plan for Australian Birds 2010 classifies it as 'least concern'	Unlikely
Satin Flycatcher	Widespread and scattered records in the wider region, concentrating towards the coast and south-eastern Australia.	May occasionally utilise the Project Area during autumn/spring migrations but generally migrates along coastal areas and the Great Dividing Range. The habitat within the Project Area is unlikely to be of critical importance to the species.	The species is widespread in eastern Australia.	The IUCN classifies the species as 'least concern' and the Action Plan for Australian Birds 2010 classifies it as 'least concern'	Unlikely

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Common name	Habitat utilised by migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or	Habitat that is of critical importance to the species at particular life-cycle stages, and/or	Habitat utilised by a migratory species which is at the limit of the species range, and/or	Habitat within an area where the species is declining	Likelihood of occurrence
Rufous Fantail	Widespread and scattered records in the wider region, concentrating towards the coast and south-eastern Australia.	May possibly occur in woodlands in the Project Area in winter months although most spend the winter in coastal lowlands and offshore islands in south-east Queensland. The habitat within the Project Area is unlikely to be of critical importance.	The species is widespread in eastern Australia.	The IUCN classifies the species as 'least concern' and the Action Plan for Australian Birds 2010 classifies it as 'least concern'	Unlikely



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An assessment of impacts was undertaken against the significant impact criteria for migratory species (Table 3-25). There is no habitat suitable for migratory bird species associated with wetlands in or adjacent to the Project Area apart from the small dam on site. Aerial species such as the Fork-tailed Swift may occur over heavily disturbed areas as well as natural habitats and will not be impacted by Project activities. No impacts to species listed as Migratory are expected to occur as a result of Project activities.

**Table 3-25 Assessment Against Significant Impact Criteria: Migratory Species**

Criterion	Assessment
<b>Migratory Species</b>	
Does the migratory species habitat within the Project Area represent 'important habitat'?	There is no evidence that habitat within the Project Area should be considered as important habitat for a migratory species. None of the species listed as Migratory were observed during site surveys although it is possible that they may transiently occur at times. None of the species are known to be declining or are at the limit of their range. Therefore, migratory species habitat within the Project Area is unlikely to represent 'important habitat'.
Substantially modify, destroy or isolate an area of important habitat for a migratory species.	Migratory species habitat within the Project Area is unlikely to represent 'important habitat', as noted above. There is no reason to consider the Project will have a significant impact on 'important habitat' for any of the species.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species.	Migratory species habitat within the Project Area is unlikely to represent 'important habitat', as noted above. The Project construction and operational management plans will incorporate measures to control the introduction and spread of weed and pest species across the Project Area to limit the potential impact of feral predators and weed species on migratory species and their habitat. The Project is considered unlikely to result in invasive species becoming established in migratory species habitat.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	An 'ecologically significant proportion' of a population varies with the species. Factors that should be considered include the species population status, genetic distinctiveness and species-specific behavioural patterns (i.e., site fidelity and dispersal rates) DoE 2013. None of the species assessed as possibly occurring in the Project Area have been recorded in large enough numbers that may represent an ecologically significant proportion of the population of a migratory species. Coupled with the lack of 'important habitat' for migratory species occurring within the Project Area, no significant impacts on a migratory species are expected.
<b>Assessment of potential for significant residual impacts</b>	<b>The Project does not meet any of the criteria that would constitute a significant impact to migratory species. As such, it is concluded that the proposed development is unlikely to significantly impact any of the three potentially occurring species.</b>

## Section 4 Quantification of Impacts

### 4.1 Potential Impacts to MNES

The Project has the potential to impact terrestrial EVs and MNES, including threatened flora and fauna, vegetation communities and other ecological values within the Project Area. These include:

- Potential habitat for threatened flora and fauna;
- Remnant vegetation;
- Populations of threatened flora and fauna;
- Ecological functioning (e.g., habitat connectivity).

Throughout the construction phase and operational phase, the Project has the potential to impact on these ecological values through the following activities:

- Vegetation clearing;
- Topsoil stripping;
- Construction of above ground buildings and facilities;
- Day and night-time operation and maintenance facilities;
- General transportation movements; and
- Glare and lighting.

**Table 4-1 Summary of the Potential Impacts to MNES**

Matters of National Significance	Relevant	Description
World Heritage Properties	X	There are no world heritage properties in close proximity to the Project Area. The closest is Main Range National Park, which represents one component of the Gondwana Rainforests of Australia World Heritage Area, located over 150 km to the southeast of the Project Area.
National Heritage Places	X	There are no national heritage places in close proximity to the Project Area. The closest is Main Range National Park, which represents one component of the national heritage listed Gondwana Rainforests of Australia, located over 150 km to the southeast of the Project Area.
Wetlands of international importance / Ramsar wetlands	X	There are no wetlands of international importance / Ramsar wetlands in close proximity to the Project Area. The closest Ramsar wetland is Moreton Bay, located over 200 km to the east of the Project Area.
The Great Barrier Reef Marine Park	X	The Project is not within the Great Barrier Reef Marine Park. The Project Area is located over 300 km to the closest point (the southern boundary) of the Great Barrier Reef Marine Park.
Nationally Threatened Ecological Communities	X	No TEC's have been identified in the Project Area and none are considered likely to occur.
Nationally Threatened Species	✓	Ecological assessments determined 6 nationally threatened fauna species could have the possibility or likelihood to occur within the Project Area. Koala was the only species confirmed within the Project Area during field surveys.

Matters of National Significance	Relevant	Description
Migratory Species	✓	The Project Area is not listed on the Ramsar Convention, in which Australia has entered into international agreements to protect the breeding and summer grounds of migratory birds. The ecological assessments determined that three migratory species could have the possibility or likelihood to occur within the Project Area. No migratory species were identified within the Project Area during field surveys.
Nuclear Actions (including Uranium Mining)	X	Not applicable.
A water resource, in relation to coal seam gas development and large coal mining development.	X	Not applicable.

For each MNES identified as being relevant to the Project in Table 4-1, the corresponding sub-section provides a table of assessment against the significant impact criteria for that matter based on the Significant Impact Guidelines 1.1.

### 4.1.1 Habitat Clearing and Connectivity

The Project layout will require clearing of remnant vegetation as calculated in Table 4-2. There will be no impacts to threatened vegetation communities (including TECs) and any impacts to fauna will be on those potentially utilising the remnant habitat on site. Habitat mapping for all assessed species is provided in **Appendix L**.

The Project has avoided remnant vegetation where possible. The Project will result in the clearing of up to 141.3 ha of Category B vegetation, 59.9 ha of Category C vegetation and 12.3 ha of Category X vegetation as described in Table 4-2.

**Table 4-2 Clearing per Project Component**

Description	PV Power Station (ha)		Access Corridor (ha)		Total	
	Project Extent	Disturbance Area	Project Extent	Disturbance Area	Project Extent	Disturbance Area
Total area	191.5	190.4	22.0	19.0	213.5	209.4
<b>Regional Ecosystems Biodiversity Status (Ground-truthed vegetation)</b>						
11.3.25	0	0	1.2	0.6	1.2	0.6
11.3.27	0	0	0.1	0.1	0.1	0.1
11.5.1	46.4	46.4	6.9	6.8	53.4	53.2
11.5.1 regrowth	58.6	58.6	0	0	58.6	58.6
11.5.4	0	0	0.8	0.7	0.8	0.7
11.7.4	63.0	62.8	5.2	3.8	68.2	66.7
11.7.5	23.4	22.5	1.9	1.6	25.2	24.2
Non remnant	0	0	5.9	5.4	5.9	5.4
<b>Regional Ecosystems VM Act</b>						
Category B	127.7	126.7	13.5	10.5	141.3	137.2
Category C	59.9	59.9	0	0	59.9	59.9
Category X	3.8	3.8	8.5	8.4	12.3	12.2

The impacted remnant vegetation is considered Least Concern under the VM Act and is widespread in the surrounding area and bioregion. The following mitigation measures are recommended.

Terrestrial habitat connectivity may be disturbed because of the Project by obstructing movement of fauna across the corridor within the existing remnant vegetation patches that occur in the Project Area. Any impacts to remnant vegetation that are unavoidable have sought to clear areas adjacent to existing clearance, to avoid further fragmentation.

The terrestrial habitat connectivity was considered as part of the Project design. Lot 4 DY457 is partially in a State-wide biodiversity corridor buffer area for terrestrial corridors; however, the Project Area is outside this corridor buffer area. The corridor buffer areas in vicinity to the Project Area generally moves in a north-south direction). The lots surrounding the Project are generally undeveloped except for gas development infrastructure and roads. The uniformity of the vegetation and landscape in the vicinity of the Project allows for connectivity around the Project, and the impact at a regional and local scale is expected to be minimal.

Future renewable project development is minimal within the immediate vicinity and broader region, with the closest proposed development being another solar power station and an associated transmission connection, Beelbee Solar Farm (EPBC 2018/8168), which is proposed approximately 10 km to the north of the Kumbarilla PV Power Station (State of Queensland 2023; DCCEEW 2023). This solar farm is proposed in a relatively cleared area and was determined to not be a controlled action, in 2018. Additionally, the Inland Rail Border to Gowrie project (EPBC 2018/8165) which is currently undergoing an EIS assessment, is located approximately 80 km (at its closest point) from the south-east to south-west of the Project. The Inland Rail Border to Gowrie project will see the development of a 224 km single-track dual-gauge railway from the NSW/QLD border to Gowrie, QLD, with an anticipated 40m corridor for the length of the development (896 ha).

The entire area encompassing the PV Power Station straddles three petroleum leases, PL 273, PL 466, and PL 275 (refer to Figure 2-2). If the PV Power Station does not proceed, the Project disturbance footprint has the potential to be fragmented by expanding gas fields, pursuant to existing approvals for these projects that have been issued by the Federal and State governments.

In terms of connectivity, the southern boundary of the Project site Lot does not include the Project Area fence right up to the boundary. This provides a corridor to facilitate east-west movements within the Lot boundary. This is shown on the site plan and is approximately 100 metres wide. While the Access Corridor, which runs in an east-west direction along the northern boundary of Weranga State Forest, will potentially impact movement of fauna between the state forest and vegetation to the north, the eastern section of the Access Corridor, although largely running through cleared pasture country, does provide a narrow but useable fauna corridor from Daandine State Forest (on the eastern side of Kumbarilla Road) to the west. Following the widening and grading of the access road, roadside verges will be revegetated to maintain the thin east-west connectivity along the current track. Where possible, this vegetation will be avoided during the clearing along the existing Forest Road track, particularly where habitat features are present.

Habitat features are elements of habitat that fauna use for basic survival, including but not limited to:

- Hollow-bearing trees;
- Arboreal / terrestrial termite mounds;
- Hollow logs;
- Large rocks;
- Dead standing trees;
- Fallen timber; and
- Leaf litter.

Appropriate speed limits will be in place throughout the site and signage installed at relevant locations (i.e., near the waterway) to remind drivers of the potential for crossing wildlife. The PV Power Station area will be fenced to prevent fauna from entering the site and becoming trapped. One-way fauna ramps and climbing poles shall be provided at regular intervals around the internal Project Area boundary to allow fauna to exit the facility should they become trapped (see Section 5.2.10 for details).

The Landscape Fragmentation and Connectivity tool (DEHP 2018) is a desktop assessment of development impacts on connectivity areas containing remnant vegetation (classified as Category B on the Regulated Vegetation Management Map). The tool is used in Queensland as a decision support tool to identify and quantify any significant impact on connectivity for an individual impact area. The tool measures the extent and arrangement of the current regulated vegetation against the extent that would remain if the prescribed activity were to occur at that impact site.

A development impact on connectivity areas is determined to be significant if either of the following tests are true:

- The change in the core remnant ecosystem extent at the local scale (post impact) is greater than a threshold determined by the level of fragmentation at the regional scale (see table below); or
- Any core area that is greater than or equal to 1 hectare is lost or reduced to patch fragments (core to non-core).

The outcomes of the Landscape Fragmentation and Connectivity (LFC v1.6) tool conclude that the Project would not have a significant impact on connectivity, as both tests were 'false'. Therefore, at a State level, connectivity offsets are not likely to be required for the Project.

It should be noted that any areas previously mapped as RE11.7.4/11.7.5 high value regrowth (HVR) were remapped as remnant RE 11.7.5 and mostly overlay the 'Category B' vegetation used as part of the connectivity tool.

Additionally, areas mapped as Category X (then HVR 11.5.1), then remapped as RE 11.5.1 AU 3, were previously mapped as Category C as per the regulated vegetation mapping and was ground-truthed as RE 11.5.1 Regrowth. A large portion of this was not considered as part of the 'Landscape Fragmentation and Connectivity Tool' as it was mapped as Category C and not Category B. The area of Category C across the Project area is approximately 60 ha. Similarly, areas mapped as Category X as per the regulated vegetation were not considered as part of the 'Landscape Fragmentation and Connectivity Tool' as it was mapped as Category X and not Category B. This area of Category X across the project area is approximately 12 ha. If these areas were however used as part of the tool, it is not expected to have resulted in a change to the two tests and a change to the outcome. They are still expected to have resulted in State Level Connectivity tests not being required.

Contiguous remnant forest will remain around the Project Area and will continue to provide habitat connectivity within this patch. Additionally, as described above, the Project is situated near State forests and are expected to provide for the ongoing protection of these landscapes. However, it is noted that substantial amounts of forest edge will be created by clearing for the PV Power Station, which will contribute to hotter, drier and windier conditions and increased stress on the vegetation along the forest edges. Additionally, forest edge effects will lead to a potential for some species to contract their local area of occupancy to avoid the forest edge, and potential to increase the prevalence of Noisy miners (*Manorina melanocephala*) in the area. This may also lead to indirect impacts on populations of small bird species due to the aggressive nature of Noisy miners (TSSC 2014).

### 4.1.2 Climate Change

Climate change effects within the Brigalow Belt South Bioregion include a potentially increased incidence of drought (Reyes et al., 2016). As a result of an increased incidence of drought, impacts may include increased stress on vegetation and potentially lead to cause for canopy tree deaths (DNPRSR, 2013), a reduced capacity for the region to support local flora and fauna, dieback from tree stress reduced surface water to support flora and fauna species that are dependent on water bodies, and reduced resilience to parasites and diseases (Queensland Government, 2019).

Impacts relating to the PV Power Station and Access Road may, at a local scale, create further stress to the periodically stressed (from drought) remaining environments in the local surrounding area. These include impacts such as:

- Reduced habitat availability;
- Increased edge effects;
- Increased pressure on the remaining habitat from potentially exceeding the carrying capacity of some species (due to increased densities from displaced individuals);



- Increased stress on and risks to displaced individuals (while they re-establish their home ranges and potentially compete with other individuals and species from the remaining habitat); and
- Reduced capacity for the surrounding environment to provide refuge during and following bushfires, floods, droughts and other stochastic events (which are predicted to increase in extremity under climate change scenarios).

These local impacts must be weighed against the broader positive impacts of the project's carbon abatement that is likely to have incremental but far-reaching benefits to the environment.

### **Drought**

It is important to note that climate models have some uncertainties, and regional variations may exist. Climate change is expected to influence regional climate patterns, including changes in temperature, precipitation, and extreme weather events. While the specific projections for the Brigalow Belt South Bioregion may vary, many climate models indicate a likelihood of increased frequency, intensity, and duration of drought events in some regions globally. The Queensland Government is currently working under the assumption that both maximum and minimum temperatures will be higher and less rainfall will occur during winter and spring within the Brigalow Belt South. Additionally, fewer frosts are expected to occur within the Bioregion, alongside more frequent, hotter days and harsher fire weather. The Queensland government concedes that changes to drought are less clear, noting it is possible the region may experience more time in drought. Working on an assumption that climate change-driven drought will impact the Brigalow Belt South bioregion, it can be anticipated this scenario can have both direct and indirect impacts that combined with habitat clearing, leading to cumulative effects.

Direct impacts as a result of drought may relate to reduced water availability, where droughts result in decreased rainfall and soil moisture, leading to water scarcity. This can directly affect vegetation, making it more vulnerable to other environmental stressors. Drought is likely to result in an increased risk of bushfires, which can lead to habitat destruction and loss of biodiversity, noting, however that Australia has a unique fire-adapted ecosystem that has evolved with and is shaped by fire. Indigenous Australians have practiced traditional burning practices for thousands of years, using fire as a tool to manage the landscape and promote biodiversity.

Indirect impacts associated with droughts can disrupt ecosystems and force wildlife to search for water and resources outside their usual habitats. This displacement can lead to habitat fragmentation and increased competition for limited resources. Weakened ecosystem resilience can be an overall result from droughts which can stress ecosystems and make them more susceptible to invasive species, pests, and diseases. This weakened resilience can further degrade habitats and hinder their ability to recover.

### **Edge Effects**

Climate change can increase the deleterious aspects of edge effects in ecosystems. As climate change can lead to shifts in temperature and precipitation patterns, and altering the distribution and composition of habitats, this can result in the fragmentation and loss of habitats, creating more edges between different habitat types. Climate change can also create more favourable conditions for the spread of invasive species. As habitats become fragmented and disrupted, invasive species can take advantage of the increased edges and encroach into native habitats, outcompeting native species. The impact of climate change may advantage invasive ruderal plant species which are adapted to harsher environments and more resilient to substantial variances in local climate patterns, thence making them more resilient in a changing climate. This can be amplified where a changing climate can affect the timing of biological events, such as flowering, breeding, and migration patterns. As different species respond differently to climate change, these shifts can disrupt the timing of species interactions, particularly at habitat edges, leading to mismatches and potential negative impacts on population dynamics.

Fragmentation and edge effects limits the movement and dispersal of species, reducing gene flow and increasing isolation. Climate change can exacerbate the negative impacts of habitat fragmentation by further stressing remaining habitats, leading to reduced carrying capacity due to decreased habitat quality and increased vulnerability to disturbances. This impact is less likely on the larger PV farm site and may be more pertinent in the surrounding gas fields where multiple well pads, access roads and gathering lines create more edges to disturbed areas in relative terms.

### Carrying Capacity

Climate change can impact upon on the maximum number of individuals that an ecosystem can sustainably support over the long term without depleting its resources (i.e., carrying capacity). A changing climate may result in altered resource availability, shifts in species distributions, increased competition and predation and as addressed in the earlier section, increase the impacts of habitat clearing and edge effects.

Disruption to precipitation patterns, temperature regimes, and nutrient cycles may lead to changes in resource availability within habitats. Reduced rainfall, increased temperatures, or changes in soil fertility can limit the availability of water, food, and suitable habitat components for species, thus reducing the carrying capacity. Shifts in the geographic ranges of species may alter as they seek more favourable conditions. This can result in the migration or displacement of certain species from cleared areas to remaining habitats, altering the species composition and potentially exceeding the carrying capacity of those habitats. Changes in species distributions and interactions can lead to increased competition for limited resources within remaining habitats. As species are forced to coexist in smaller areas, competition for food, nesting sites, and other resources intensifies, potentially reducing the carrying capacity. The arrival of new predators or the increase in predator populations due to altered ecosystem dynamics can negatively impact prey species and further influence carrying capacity.

Management of climate-related impacts can involve the following measures:

1. Develop and implement invasive species monitoring and weed control programs, focusing on areas with high edge densities.
2. Prioritize early detection and rapid response to prevent the establishment and spread of invasive species at habitat edges.
3. Use native species in restoration efforts to enhance habitat quality and competitiveness against invasives.

By implementing these strategies, it is possible to mitigate the increased impacts caused by climate change, promoting the conservation and resilience of ecosystems in the face of ongoing environmental changes, noting that the PV farm itself will help offset substantial CO<sub>2</sub> emissions, enhancing the overall environmental sustainability of the region and making it more resilient to long-term impacts of climate change.

### **4.1.3 Direct Fauna Mortality**

Direct mortality of native fauna may occur because of the Project during habitat clearing and through vehicle collisions. Mortality during clearing will be managed through the presence of a suitably qualified fauna spotter/catcher during construction. It is anticipated that vehicle collisions caused by an increase in vehicle traffic may pose a risk to native fauna. The following mitigation measures are proposed and further detailed in Table 5-3:

- The Project EMP will include measures to establish protocols for pre-clearing surveys and data collection regarding fauna incidents; and
- Prior to any vegetation disturbance a trained ecologist or other qualified environmental specialist will be on site to remove fauna (if required).

### **4.1.4 Pests and Weeds**

Pests and particularly weeds may pose a threat to flora and fauna within the Project Area. The field surveys detected several listed species although naturalised.

The transport and operation of construction vehicles and equipment has the potential to introduce pests and weeds into the Project Area. Waste has the potential to impact flora and fauna, attracting pests and vermin through the supply of artificial food sources. This may impact on natural behaviour and natural species assemblages. A range of waste minimisation strategies will be in place to reduce waste streams generated. As such, it is not anticipated that waste generated as part of the Project will have a significant impact on flora and fauna communities within the Project Area. Waste storages are not likely to have significant impacts on native fauna and flora within or adjacent to the Project Area,

as all waste produced as a result of the Project will be stored and disposed of appropriately, as per the relevant legislation.

### 4.1.5 Air Quality and Dust

Increased dust resulting from clearing and earthworks, vehicle movement, and construction of infrastructure has the potential to impact flora and fauna values within the Project Area throughout construction and operation. Increased dust can result in respiratory issues in fauna, adverse impacts on plant photosynthesis and productivity (Chaston & Doley 2006), changes in soil properties ultimately impacting plant assemblages (Farmer 1993) and mortality and / or decrease in aquatic communities from the toxicity of poor water quality. Evidence of potential impacts on entire vegetation communities is scarce. Many studies focus on specific impacts to single species. Recent research on threatened flora in a semi-arid environment in Western Australia found no significant impact on plant health as a result of a range of dust accumulation loads caused by vehicle movements (Matsuki et al. 2016).

### 4.1.6 Noise

Understanding the impact of noise on fauna is limited. There are no current government policies or guidelines that recommend thresholds or limits in relation to fauna. Noise may adversely affect wildlife by interfering with communication, masking the sound of predators and prey, causing stress or avoidance reactions, and in some cases, may lead to changes in reproductive or nesting behaviour. Excessive noise may lead some species to avoid noisy areas, potentially resulting in the fragmentation of species habitat. Radle (2007) states the consensus that terrestrial fauna will avoid any industrial plant or construction area where noise or vibration presents an annoyance to them. Additionally, many animals react to new noise initially as a potential threat, but quickly learn that the noise is not associated with a threat (Radle 2007).

Noise will be generated by the Project through the use of machinery, plant, and vehicles. The generation of construction and operational noise may be in areas which have the potential to support threatened fauna species. Individuals that occur on or near the site are expected to leave the area of impact. Project construction works and therefore potential noise impacts will be temporary. No further potential for impacts is expected following construction of the Project.

### 4.1.7 Accidental Release of Pollutants

The release of pollutants into the surrounding environment and waterways has the potential to degrade stream habitat quality near the site, degrade stream water quality and thereby impact vegetation communities and terrestrial fauna utilising these areas. Without mitigation, potential exists for contaminants to enter waterways through activities associated with the washdown and fuelling facilities, storage of lubricants and coolant, wastes and sewerage.

Surface water contaminants have the potential to impact the local catchment and vegetation communities in the surrounding areas.

### 4.1.8 Fire

The Project has the potential to result in fires as a result of construction and operational tasks. Fire management measures have been developed to reduce the potential impacts of a site fire. Bushfire setbacks will be provided around Project infrastructure and powerlines in accordance with standards and legislation. Setbacks and firebreaks will be in accordance with the Australian Standard for the Construction of Buildings in Bushfire Prone Areas - AS3959 – 2009. AS3959.

### 4.1.9 Heat Island Effect

Studies to date have indicated that PV panels convert incident solar radiation into heat, and this can alter the airflow and temperature profiles within and adjacent to the panels. Such changes and impacts on near-by populations of humans and other species have been questioned (Fthenakis & Yu, 2013).

The issue regarding heat island effect has been subject to recent consideration by a Victorian Planning Panel for PV Power Stations proposed by Neoen and X-Elio in Greater Shepparton. This is detailed in the Panel Report for the Greater Shepparton Solar Energy Facility Planning Permit Application 2017-162, 2017-274, 2017-301 and 2017-344 (Panel Report 2018). Neoen, in preparation of a response to key issues raised in objecting submissions, commissioned a Statement of Evidence by Greg Barron-Gafford from the Research Group Biography, Ecosystem Science (University of Arizona) (Barron-Gafford 2018).

Studies completed indicate that results can be contradictory due to site and project specifics. Some studies suggest that photovoltaic systems can actually cause a cooling effect on the local environment, depending on the efficiency and placement of the photovoltaic panels while others demonstrate a warming effect (Barron-Gafford et al. 2016). Other studies conclude that whilst air temperatures may increase within the solar plant itself, they rapidly decrease to the ambient temperature beyond the perimeter of the solar plant (Fthenakis & Yu, 2013).

Barron-Gafford (2018) in the Statement of Evidence (SoE) to the Victorian Planning Panel included results on the radius of the measured heat effects. This identified that the heat island effect was indistinguishable from air temperatures over native vegetation when measured at a distance of 30 m from the edge of the photovoltaic array. In the SoE it was stated that *'this pattern held true for both daytime and night-time conditions. Because the PV panels themselves trap the energy from diffuse sunlight that was able to reach the ground underneath them, air temperatures remain elevated within a PV array. As you leave this "overstorey" of PV panels, energy is able to radiate back towards the atmosphere, as it does in a natural setting, and the PVHI quickly dissipates'*.

The Victorian Planning Panel Report (Panel Report 2018) accepted that solar arrays will affect air and soil temperatures within the solar array perimeter, and that in relation to outside of the solar array perimeter a heat island effect is unlikely to occur. It identified that any temperature increase within the solar array will be marginal and recommended a 30 m setback from any neighbouring property boundary.

Research to date (Yang et al 2017; Fthenakis and Yu 2013) indicates a small potential effect on micro-climate within the solar plant site. This effect may actually enhance retention of ground cover in very cold or hot conditions onsite. Negligible impacts on adjacent properties and agricultural activities such as plant growth and health of cattle are expected to occur. It is also considered unlikely that the heat would be carried offsite by the wind. Where sensitive land use occurs adjacent to solar panels, consideration to maintaining a 30 m buffer could be made.

The surrounding land uses are not considered 'sensitive land uses'; however, a 30 m setback to neighbouring properties will be implemented wherever possible subject to detailed design constraints. The studies described above are contradictory and the actual impact from heat island effects is not clear. In accordance with standards a 10 m bushfire setback will be established from the Project boundary, within the Project area. As the areas that directly comprise solar panels will be cleared impacts to fauna are not expected to occur as a result of the heat island effects.

### 4.1.10 Potential Cumulative Impacts

The surrounding landscape has been subject to clearing and fragmentation activities related to gas field developments, including Australia Pacific LNG and Queensland Curtis LNG, which have resulted in highly fragmented forested areas to the north-east of the Project Area, including sections of Braemar State Forest and Daandine State Forest. The gas exploration permit relating to these gas fields includes part of the >1000 ha patch of generally contiguous remnant vegetation (setting aside the gas field development throughout) in which the proposed Project Area is located. This portion of the remnant patch is approximately 282 ha and partially includes a portion of the proposed PV Power Station.

A desktop analysis of Queensland Government mapping (i.e., QGlobe and GeoRes Globe) and the Western Downs Regional Council interactive mapping identified that the entire Project area and surrounds are covered by three petroleum leases, including PL 273, PL 275 and PL 466 by QGC Pty Limited, granted in September and December of 2011 (refer to Figure 2-2) (WDRC, DNRM, 2019). Additionally, Braemar State Forest, located approximately 4.2 km north of the Project area, is covered by an authority to prospect, part of which is also a mineral development licence (MDL 374) (DNRM, 2019) (refer to Figure 2-2).

## Section 4 Quantification of Impacts

As mentioned in Section 4.1.1, Beelbee Solar Farm is proposed approximately 10 km to the north of the Project PV Power Station and is located in a relatively cleared area (State of Queensland 2023; DCCEE 2023). The Federal Department of Environment and Energy determined it to not be a controlled action in 2018.

The Shell QGC Ruby Jo Field Compression Station is located directly east of the K-REP Project area. Pre-clearance surveys for Ruby Jo and surrounding areas were undertaken between 2010 and 2018. A review of these pre-clearance surveys (for the Ruby Jo, Isabella, Jen, David, Poppy, and Sean precincts) has been undertaken to understand and determine any conservation significant flora or fauna within the area, this information is presented in Section 3.3.6.9.

The southern portion of the Access Corridor has been subjected to land clearing between 2018 and 2021, with the presumption the land clearing was intended for agricultural purposes. This clearing appears to be an extension of previously cleared agricultural areas further to the south of the project area.

**Table 4-3 Potential Cumulative Impacts to MNES**

MNES	EPBC Act Status	Potential Cumulative Impacts
Yakka skink	Vulnerable	<p>The Project will require the clearing of 76.2 ha of Yakka skink habitat. Species was not recorded to occur in surrounding project field surveys (i.e., Beelbee Solar Farm or QGC pre-clearance surveys).</p> <p>Potential habitat for the Yakka skink was observed during Shell QGC pre-clearance surveys in the Isabella precinct, this habitat was located adjacent to the well in High Value Regrowth, and within the Sean precinct. Additionally, remnant vegetation in the Jennifer precinct was mapped as indicative habitat for Yakka skink. The overall quantity of species habitat within these precincts is unknown.</p> <p>The Shell QGC Anya development, located approximately 30 km west of Dalby, proposes the development of 54 ha of land for CSG infrastructure development. A total of 5.4 ha of Yakka skink habitat was observed within the Shell QGC Anya development.</p> <p><b>Potential cumulative impact.</b></p>
Five-clawed worm-skink	Vulnerable	<p>The Project will require the clearing of 2.5 ha of Five-clawed worm-skink habitat.</p> <p>Species was not recorded to occur in surrounding project field surveys (i.e., Beelbee Solar Farm or QGC pre-clearance surveys). The overall quantity of species habitat within these precincts is unknown.</p> <p><b>No cumulative impacts expected.</b></p>
Squatter pigeon (southern)	Vulnerable	<p>The Project will require the clearing of 59 ha of Squatter pigeon (southern) breeding habitat, 147 ha of foraging habitat and 1.22 ha of dispersal habitat.</p> <p>Minor clearing of the access road is required for upgrades (regrading and enlarged to a 7 m wide gravel placement on an 8 m formation). Refer to Section 2.1.4 for more details.</p> <p>Species was not recorded to occur in surrounding project field surveys (i.e., Beelbee Solar Farm or QGC pre-clearance surveys). The overall quantity of species habitat within these precincts is unknown.</p> <p><b>No cumulative impacts expected.</b></p>
Regent honeyeater	Critically Endangered	<p>There is no suitable habitat for Regent honeyeater within the Project area.</p> <p>Species was not recorded to occur in surrounding project field surveys (i.e., Beelbee Solar Farm or QGC pre-clearance surveys). The overall quantity of species habitat within these precincts is unknown.</p> <p><b>No cumulative impacts expected.</b></p>



## Section 4 Quantification of Impacts

MNES	EPBC Act Status	Potential Cumulative Impacts
Painted honeyeater	Vulnerable	<p>The Project will require the clearing of 11.3 ha of Painted honeyeater habitat. Species was not recorded to occur in surrounding project field surveys (i.e., Beelbee Solar Farm or QGC pre-clearance surveys). The overall quantity of species habitat within these precincts is unknown.</p> <p><b>No cumulative impacts expected.</b></p>
White-throated needletail	Vulnerable, Migratory	<p>The Project will require the clearing of 207.5 ha of White-throated needletail habitat; however the species is considered exclusively aerial, thus the entire Project area is considered suitable habitat.</p> <p>Species was not recorded to occur in surrounding project field surveys (i.e., Beelbee Solar Farm or QGC pre-clearance surveys). The overall quantity of species habitat within these precincts is unknown.</p> <p><b>Unlikely to result in cumulative impacts.</b></p>
Koala	Vulnerable	<p>The Project will require the clearing of 207 ha of Koala habitat.</p> <p>Species was not recorded to occur in surrounding project field surveys (i.e., Beelbee Solar Farm or QGC pre-clearance surveys).</p> <p>Potential habitat for the Koala was observed during Shell QGC pre-clearance surveys in the Isabella precinct, this habitat was located adjacent to the well in High Value Regrowth. Additionally, within the Sean precinct, habitat for the Koala was recorded in the River red gums along the watercourse (2013 surveys). The overall quantity of habitat within these precincts is unknown.</p> <p>The Shell QGC Anya development, located approximately 30 km west of Dalby, proposes the development of 54 ha of land for CSG infrastructure development. A total of 51 ha of Koala habitat was observed within the Shell QGC Anya development and was determined to result in a significant impact to the species.</p> <p><b>Potential cumulative impact.</b></p>
Greater glider (southern and central)	Vulnerable	<p>There is no suitable habitat for Greater glider (southern and central) habitat within the Project area.</p> <p>Two Greater glider (southern and central) individuals were recorded during field surveys of the Beelbee Solar Farm, located approximately 10 km north of the Project area. The Beelbee Solar Farm report noted there was no significant impact on the species and the Project was determined not to be a controlled action.</p> <p><b>No cumulative impacts expected.</b></p>
Brigalow woodland snail	Endangered	<p>The Project will require the clearing of 2.5 ha of Brigalow woodland snail habitat.</p> <p>Species was not recorded to occur in surrounding project field surveys (i.e., Beelbee Solar Farm or QGC pre-clearance surveys). The overall quantity of species habitat within these precincts is unknown.</p> <p><b>No cumulative impacts expected.</b></p>
Poplar box grassy woodland on alluvial plains (TEC)	Endangered	<p>There is no suitable habitat for Poplar box grassy woodland on alluvial plains (TEC) within the Project area.</p> <p>The Poplar box grassy woodland on alluvial plains TEC was not recorded in nearby Project surveys.</p> <p><b>No cumulative impacts expected.</b></p>

Cumulative impacts from current and future development may potentially result in any adverse impacts for some species.

## 4.2 Threatened Ecological Communities

### 4.2.1 Poplar Box Grassy Woodland on Alluvial Plains

One threatened ecological community is listed as Endangered under the EPBC Act and is considered as possibly occurring, likely or known to occur in the Project Area. Assessment of impact significance has been completed as per the Commonwealth’s Significant Impact Guidelines 1.1 (DoE 2013).

The assessment against the significant impact criteria for the TEC is provided in Table 4-4.

**Table 4-4 Assessment Against Significant Impact Criteria: Poplar Box Grassy Woodland on Alluvial Plains**

Criterion	Assessment against significance criteria (vulnerable)
<b>Poplar Box Grassy Woodland on Alluvial Plains</b>	
Reduce the extent of an ecological community.	<b>Unlikely.</b> The Project area is not located in the TEC’s likely to occur mapping extent. Although the Project area is situated within the associated landzone (landzone 3), none of the mapped and ground-truthed REs feature the Poplar Box Grassy Woodland on Alluvial Plains TEC. Therefore, it is considered unlikely that the Project will reduce the extent of the ecological community
Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines .	<b>Unlikely.</b> The Project area is not located in the TEC’s likely to occur mapping extent. Although the Project area is situated within the associated landzone (landzone 3), none of the mapped and ground-truthed REs feature the Poplar Box Grassy Woodland on Alluvial Plains TEC. Therefore, it is considered unlikely that the Project will
Adversely affect habitat critical to the survival of an ecological community.	<b>Unlikely.</b> Habitat critical to the survival of the TEC is not identified within the Project area. Therefore, it is considered unlikely that the Project will adversely affect habitat critical to the survival of an ecological community.
Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community’s survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns.	<b>Unlikely.</b> The Project area is not located in the TEC’s likely to occur mapping extent. Although the Project area is situated within the associated landzone (landzone 3), none of the mapped and ground-truthed REs feature the Poplar Box Grassy Woodland on Alluvial Plains TEC. Therefore, it is considered unlikely that the Project will modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community’s survival.
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting.	<b>Unlikely.</b> The Project area is not located in the TEC’s likely to occur mapping extent. Although the Project area is situated within the associated landzone (landzone 3), none of the mapped and ground-truthed REs feature the Poplar Box Grassy Woodland on Alluvial Plains TEC. Therefore, it is considered unlikely that the Project will cause a substantial change in the species composition of an occurrence of the ecological community.

Criterion	Assessment against significance criteria (vulnerable)
<p>Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:</p> <ul style="list-style-type: none"> <li>– Assisting invasive species, that are harmful to the listed ecological community, to become established, or</li> <li>– Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community.</li> </ul>	<p><b>Unlikely.</b> As clearing occurs, there is an increase in potential for weed and pest species to move into the adjacent retained areas of potential habitat. Invasion by non-native plants is a major threat to this TEC. These weeds include African lovegrass (<i>Eragrostis curvula</i>), Buffel grass (<i>Cenchrus ciliaris</i>), Coolatai grass (<i>Hyparrhenia hirta</i>) and Lippia (<i>Phyla canescens</i>) (DotEE, 2019). The ecological community is subject to a range of negative impacts from invasive and pest animals, including feral pigs (<i>Sus scrofa</i>), cats (<i>Felis catus</i>), dogs (<i>Canis lupus</i>), European red foxes (<i>Vulpes vulpes</i>), feral/unmanaged goats (<i>Capra hircus</i>), feral deer and feral rabbits (<i>Oryctolagus cuniculus</i>) (DotEE, 2019).</p> <p>The Project construction and operational management plans will incorporate measures to control the introduction and spread of weed and pest species and the mobilisation of contaminant loads across the Project Area. The Project is considered unlikely to cause a substantial reduction in the quality or integrity of an occurrence of the ecological community.</p>
<p>Interfere with the recovery of an ecological community.</p>	<p><b>Unlikely.</b> There is no State or Commonwealth recovery plan for this TEC and there is no recovery plan required for the TEC. With mitigation of potential impacts incorporated within the Project construction and operational management plans, any potential impact will be minor and is considered unlikely to interfere with the recovery of the TEC.</p>
<p><b>Assessment of potential for significant residual impacts</b></p>	<p><b>The Project’s activities are considered unlikely to result in significant residual impacts to the TEC.</b></p>

As per the conservation advice for the TEC, which is included in **Appendix K**, the main threats to the species are as follows:

- Clearing and fragmentation;
- Weed invasion;
- Inappropriate fire regimes;
- Inappropriate grazing regimes;
- Dieback;
- Chemical impact and spray drift;
- Hydrological changes;
- Salinisation;
- Nutrient enrichment;
- Invasive fauna; and
- Climate change.

### 4.3 Threatened Species

Six fauna species listed as Vulnerable under the EPBC Act are considered as possibly occurring, likely or known to occur in the Project Area. The area of suitable habitat within the Project Area for each species is provided in Table 4-5 with habitat figures prepared for the Project Area (refer to **Appendix L**). Current information about each listed species is summarised in the ‘key data’ tables shown in the following sections. Assessment of impact significance has been completed as per the Commonwealth’s Significant Impact Guidelines 1.1 (DoE 2013). Despite the areas of habitat listed

in Table 4-5, it is not expected clearing to these maximum values will be undertaken, as an example, clearing in the Access Corridor is not expected to be completed to the full extent of the road reserve.

The Project extent/disturbance area has been included in Table 4-5 to provide context to clearing extents for MNES listed species.

**Table 4-5 Predicted Impacts on MNES listed species habitat**

Species	EPBC Act Status	Total (Project Area) Habitat and clearing area	
		Project Extent (ha)	Disturbance Area (ha)
<b>Project extent / disturbance area</b>	<b>N/A</b>	<b>213.5</b>	<b>209.4</b>
Yakka skink	Vulnerable	76.2 ha	
Five-clawed worm-skink	Vulnerable	2.5 ha	
Squatter pigeon (southern subspecies) - breeding	Vulnerable	59 ha	
Squatter pigeon (southern subspecies) - foraging		147 ha	
Squatter pigeon (southern subspecies) - dispersal		1.22 ha	
Regent honeyeater	Critically endangered	0 ha	
Painted honeyeater	Vulnerable	11.3 ha	
White-throated needletail	Vulnerable Migratory	207.5 ha	
Koala	Vulnerable	207 ha	
Greater glider (southern and central)	Vulnerable	0 ha	
Brigalow woodland snail	Endangered	2.5 ha	

The vulnerable species assessments commence with an evaluation of the likely importance of the population, as defined within the significant impact criteria for vulnerable species.

An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- Key source populations either for breeding or dispersal;
- Populations that are necessary for maintaining genetic diversity; and/or
- Populations that are near the limit of the species range.

Given the specificity of the above definitions and the scarcity of information and records available for most listed species and populations in the region (and Australia), it is difficult to determine: 1) attributes such as breeding and dispersal behaviour and whether the population is a 'key source' and 2) the genetic diversity of individuals inhabiting a population or sub-population. Given the paucity of information available, significance of impacts to threatened species has been based on experience of the assessment team and the latest available information.

The following section addresses potential significant impacts of the Project to MNES as referenced by 'Significant impact guideline 1.1' (Department of the Environment). Table 4-1 summarises the potential impacts on the ten MNES that have been identified, where practicable.

### 4.3.1 Yakka Skink

The assessment against the significant impact criteria for the Yakka skink is provided in Table 4-6.

**Table 4-6 Assessment Against Significant Impact Criteria: Yakka skink**

Criterion	Assessment against significance criteria (vulnerable)
<b>Yakka skink</b>	
Lead to a long-term decrease in the size of an important population of the species.	<b>Potentially.</b> While the no Yakka skinks were detected during ecological surveys, suitable habitat occurs in the Project Area and the species are considered difficult to detect. Habitat within the Project Area is considered important and important habitat is used as a surrogate for the potential presence of an important population. Therefore, should the species be present within the Project Area, it would be considered to be an important population, and the Project would lead to a long-term decrease of the population.
Reduce the area of occupancy of an important population.	<b>Potentially.</b> A total of 76.2 ha of suitable Yakka skink habitat will be cleared for the Project. Habitat within the Project Area is considered important and important habitat is used as a surrogate for the potential presence of an important population. Therefore, should the species be present within the Project Area, it would be considered to be an important population, and the Project would reduce the area of occupancy of the population.
Fragment an existing important population into two or more populations.	<b>Potentially.</b> Habitat within the Project Area is considered important and important habitat is used as a surrogate for the potential presence of an important population. Therefore, should the species be present within the Project Area, it would be considered to be an important population.  The Project Area is also in contiguous intact forest and given the species' high site fidelity and limited capacity to disperse from a colony site (Brigalow Belt Reptiles Workshop 2010 as cited in DCCEEW 2023; DES 2018), the Project has the potential to fragment important populations of the species, should it be present.
Adversely affect habitat critical to the survival of the species.	<b>Unlikely.</b> Habitat critical to the survival for Yakka skink has not been defined in the species conservation advice. A total of 76.2 ha of suitable Yakka skink habitat will be cleared for the Project. Habitat within the Project Area is considered important habitat for the Yakka skink, however, is not considered to be habitat critical to the survival of the species. Therefore, it is unlikely the Project will adversely affect habitat critical to the survival of the species
Disrupt the breeding cycle of an important population.	<b>Potentially.</b> An important population of the Yakka skink has the potential to exist within the Project Area and its breeding season is unknown (Queensland Government 2022). A qualified fauna spotter will carry out a thorough survey for the species prior to any clearing. Therefore, there is potential to disrupt the breeding cycle of an important population of this species.
Modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that the species is likely to decline.	<b>Unlikely.</b> Although the Project will clear 76.2 ha of important habitat, it is unlikely that this will decrease the availability of important habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat.	<b>Unlikely.</b> The Project construction and operational management plans will incorporate measures to control the introduction and spread of weed and pest species across the Project Area. The Project is considered unlikely to result in invasive species becoming established in this species' habitat.
Introduce disease that may cause the species to decline.	<b>Unlikely.</b> This species is susceptible to predation by introduced predators, such as cats and foxes. The Project construction and operational management plans will incorporate the management of invasive species which will assist in the prevention of pest plant introduction and associated diseases resulting from Project activities.
Interfere substantially with the recovery of the species.	<b>Unlikely.</b> There is no State or Commonwealth recovery plan for this species and there is no recovery plan required for the species. With mitigation of potential impacts incorporated within the Project construction and operational management plans, any potential impact on Yakka skink will be minor and is considered unlikely to interfere with the recovery of the species.



Criterion	Assessment against significance criteria (vulnerable)
Assessment of potential for significant residual impacts	There have been no recent records within 10km of the Project Area, however, important habitat is present and indicates that an important population of Yakka skinks may be present and gone undetected. The Project's activities are considered to potentially significantly impact the species. A residual risk assessment has been completed for this species in Section 4.4 to confirm.

As per the conservation advice for the Yakka skink, which is included in **Appendix K**, the main threats to the species are as follows:

- Continued legacy of past broadscale land clearing and habitat degradation.
- Inappropriate roadside management;
- Removal of wood debris and rock microhabitat features; and
- Ripping of rabbit warrens and predation by feral animals.

### 4.3.2 Five-clawed Worm-skink

The assessment against the significant impact criteria for the Five-clawed worm-skink is provided in Table 4-7.

**Table 4-7 Assessment Against Significant Impact Criteria: Five-clawed worm-skink**

Criterion	Assessment against significance criteria (vulnerable)
<b>Five-clawed worm-skink</b>	
Lead to a long-term decrease in the size of an important population of the species.	<b>Unlikely.</b> No 'important population' has been identified within the Project Area.
Reduce the area of occupancy of an important population.	<b>Unlikely.</b> No 'important population' has been identified within the Project Area.
Fragment an existing important population into two or more populations.	<b>Unlikely.</b> No 'important population' has been identified within the Project Area.
Adversely affect habitat critical to the survival of the species.	<b>Unlikely.</b> There is no indication the Project Area comprises habitat critical to the survival of the species. Therefore, the Project is not considered likely to affect the availability or quality of habitat to the extent that the species is likely to decline.
Disrupt the breeding cycle of an important population.	<b>Unlikely.</b> No 'important population' has been identified within the Project Area. A qualified fauna spotter will carry out a thorough survey for the species prior to any clearing. Therefore, the Project is not considered likely to disrupt the breeding cycle of an important population.
Modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that the species is likely to decline.	<b>Unlikely.</b> There is no indication the Project Area comprises habitat critical to the survival of the species. Therefore, the Project is not considered likely to affect the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat.	<b>Unlikely.</b> Five-clawed worm-skink are known to be predated on by European red foxes ( <i>Vulpes vulpes</i> ) and feral cats ( <i>Felis catus</i> ). As such, management measures have been developed and incorporated into the Project CEMP, OEMP and MNES MP to minimise the risk of the introduction of invasive animals within the Project area. With the appropriate management measures in place, it is unlikely the Project will result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat.
Introduce disease that may cause the species to decline.	<b>Unlikely.</b> There are currently no known diseases to impact the Five-clawed worm-skink. The Project construction and operational management plans will incorporate the management of invasive species which will assist in the prevention of pest plant introduction and associated diseases resulting from Project activities.
Interfere substantially with the recovery of the species.	<b>Unlikely.</b> There is no State or Commonwealth recovery plan for this species and there is no recovery plan required for the species. With mitigation of potential impacts incorporated within the Project construction and operational management plans, any potential impact on Five-clawed worm-skink will be minor and is considered unlikely to interfere with the recovery of the species.
<b>Assessment of potential for significant residual impacts</b>	<b>The Project's activities are considered unlikely to result in significant residual impacts to the species.</b>

As per the conservation advice for the Five-clawed worm-skink, which is included in **Appendix K**, the main threats to the species are as follows:

- Clearing and fragmentation of habitat for agriculture and development;
- Habitat degradation from overgrazing;
- Removal of refuge sites and litter;
- Predation by feral cats and foxes; and

- Soil and water pollution.

### 4.3.3 Squatter Pigeon (Southern)

The assessment against the significant impact criteria for the Squatter pigeon (southern) is provided in Table 4-8.

**Table 4-8 Assessment Against Significant Impact Criteria: Squatter Pigeon (Southern)**

Criterion	Assessment against significance criteria (vulnerable)
<b>Squatter pigeon (southern)</b>	
Lead to a long-term decrease in the size of an important population of the species.	<b>Unlikely.</b> While an 'important population' has been identified within the greater region, the Project Area possesses marginally suited habitat. No sightings were made during field surveys and it is uncertain whether or how many individuals may be using those areas of habitat, but it is assumed to be low numbers if at all.
Reduce the area of occupancy of an important population.	<b>Unlikely.</b> While an 'important population' has been identified within the greater region, the Project Area possesses only marginally suited habitat and no sightings were made during field surveys. The Project Area comprises areas of marginal potential habitat that will be impacted.
Fragment an existing important population into two or more populations.	<b>Unlikely.</b> While an 'important population' has been identified within the greater region, the Project Area possesses only marginally suited habitat and no sightings were made during field surveys. While the subspecies is considered sedentary where food and water resources are reliable in the local region, it may disperse along vegetated corridors to access permanent water sources elsewhere in the region. Habitat connectivity has been considered in the design of the Project (see Section 4.1.1). The uniformity of the vegetation and landscape in the vicinity of the Project allows for connectivity around the Project and the impact at a regional and local scale is expected to be minimal.
Adversely affect habitat critical to the survival of the species.	<b>Unlikely.</b> Although no Squatter pigeons (southern) were observed during surveys they are present in the region and the Project Area represents approximately 147 ha of foraging habitat, 59 ha of breeding habitat (i.e. defined as any area within 1 km of a permanent waterbody and land within Landzone 5 and 7), and 1.22 ha dispersal habitat. Therefore, the Project Area comprises habitat critical to the survival of the species. The species occurs in grassy woodlands which remains abundant across much of its range including the local area surrounding the Project Area. Squatter pigeon (southern) may also occur in disturbed areas partially cleared for cattle grazing. It is plausible that Squatter pigeons (southern) may utilize the solar farm for foraging resources. The open spaces and cleared land typically found in solar farms can resemble the natural habitat of these ground-feeding pigeons, providing potential opportunities for them to find food sources such as seeds and grasses. Squatter pigeons typically build their nests on the ground. They construct simple nests using twigs, grass, and leaves, often in locations with sparse vegetation or open ground. The nests are usually situated in areas that provide some cover or protection, such as under shrubs, in clumps of grass, or within the shelter of rocks or other natural features. It is possible that the constructed solar farm may continue to provide breeding habitat for the Squatter pigeon (southern). These ground nests are designed to blend in with the surrounding environment, providing camouflage and protection for the eggs and chicks. The choice of nesting sites may vary depending on the specific habitat and availability of suitable locations within their range. Further, security fencing around the solar farm may provide protection for breeding animals from feral predators such as feral cats, foxes, and wild dogs. The bushfire asset protection system may also shelter breeding birds from wildfires. The uniformity of the vegetation and landscape in the vicinity of the Project allows for connectivity around the Project and the impact at a regional and local scale is expected to be minimal. The Project is unlikely to adversely affect habitat critical to the survival of the species.
Disrupt the breeding cycle of an important population.	<b>Unlikely.</b> While an 'important population' has been identified within the greater region, the Project Area possesses marginally suitable breeding habitat. No sightings were made during field surveys and it is uncertain whether or how many individuals may be using those areas of habitat.

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Criterion	Assessment against significance criteria (vulnerable)
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	<b>Unlikely.</b> The species occurs across a broad swathe of eastern Queensland from Townsville to the New South Wales border. The species preferred habitat is grassy woodlands which occurs widely across this area. No sightings were made of this species during field surveys, and it is uncertain whether or how many individuals may be using the area, but it is assumed to be low numbers if at all. Given the uniformity of the vegetation and landscape in the vicinity of the Project the Project is considered unlikely to decrease the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat.	<b>Unlikely.</b> The Project construction and operational management plans will incorporate measures to control the introduction and spread of weed and pest species across the Project Area. The Project is considered unlikely to result in invasive species becoming established in this species' habitat.
Introduce disease that may cause the species to decline.	<b>Unlikely.</b> The Project construction and operational management plans will incorporate the management of invasive species which will assist in the prevention of pest plant introduction and associated diseases resulting from Project activities.
Interfere substantially with the recovery of the species.	<b>Unlikely.</b> There is no State or Commonwealth recovery plan for this species. With mitigation of potential impacts incorporated within the Project construction and operational management plans, any potential impact on Squatter pigeon (southern), will be minor and is considered unlikely to interfere with the recovery of the species.
<b>Assessment of potential for significant residual impacts</b>	<b>While an 'important population' has been identified within the greater region and the Project Area possesses breeding habitat and suitable foraging habitat, no sightings were recorded. As the species is able to forage and breed in on-ground environments and the Project fencing ultimately will provide protection to nests, the Project's activities are considered unlikely to result in significant residual impacts to the species.</b>

As per the conservation advice for the Squatter pigeon (southern), which is included in **Appendix K**, the main threats to the species are as follows:

- Ongoing vegetation clearance and fragmentation;
- Overgrazing of habitat by livestock and feral herbivores such as rabbits;
- Introduction of weeds;
- Inappropriate fire regimes;
- Thickening of understorey vegetation;
- Predation by feral cats and foxes;
- Trampling of nests by domestic stock; and
- Illegal shooting.



### 4.3.4 Regent Honeyeater

The assessment against the significant impact criteria for the Regent honeyeater is provided in Table 4-9.

**Table 4-9 Assessment Against Significant Impact Criteria: Regent honeyeater**

Criterion	Assessment against significance criteria (critically endangered)
<b>Regent honeyeater</b>	
Lead to a long-term decrease in the size of a population of the species.	<b>Unlikely.</b> As per habitat assessments, the impact site is not considered to provide suitable habitat for the Regent honeyeater and no individuals have been recorded within 32 km of the Project area. Therefore, it is unlikely the Project will lead to a long-term decrease in the size of a population of the species.
Reduce the area of occupancy of the species.	<b>Unlikely.</b> As per habitat assessments, the impact site is not considered to provide suitable habitat for the Regent honeyeater and no individuals have been recorded within 32 km of the Project area. Therefore, it is unlikely the Project will reduce the area of occupancy of the species.
Fragment an existing population into two or more populations.	<b>Unlikely.</b> As per habitat assessments, the impact site is not considered to provide suitable habitat for the Regent honeyeater and no individuals have been recorded within 32 km of the Project area. Therefore, it is unlikely the Project will fragment an existing population into two or more populations.
Adversely affect habitat critical to the survival of the species.	<b>Unlikely.</b> There is no indication the Project Area comprises habitat critical to the survival of the species. Therefore, the Project is not considered likely to affect the availability or quality of habitat to the extent that the species is likely to decline.
Disrupt the breeding cycle of a population.	<b>Unlikely.</b> As per habitat assessments, the impact site is not considered to provide suitable habitat for the Regent honeyeater and no individuals have been recorded within 32 km of the Project area. Therefore, it is unlikely the Project will disrupt the breeding cycle of a population.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	<b>Unlikely.</b> As per habitat assessments, the impact site is not considered to provide suitable habitat for the Regent honeyeater and no individuals have been recorded within 32 km of the Project area. As such, it is unlikely the Project will modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the critically endangered or endangered species habitat.	<b>Unlikely.</b> The Project construction and operational management plans will incorporate the management of invasive species which will assist in the prevention of pest plant introduction and associated diseases resulting from Project activities. Species specific management measures are outlined in the MNES MP regarding Noisy miners.
Introduce disease that may cause the species to decline.	<b>Unlikely.</b> The Project construction and operational management plans will incorporate the management of invasive species which will assist in the prevention of pest plant introduction and associated diseases resulting from Project activities.
Interfere substantially with the recovery of the species.	<b>Unlikely.</b> Although a recovery plan exists for the Regent honeyeater, the impact site is not considered to provide suitable habitat for the species and no individuals have been recorded within 32 km of the Project area. Therefore, it is unlikely the Project will interfere substantially with the recovery of the species.
<b>Assessment of potential for significant residual impacts</b>	<b>The Project's activities are considered unlikely to result in significant residual impacts to the species.</b>

As per the conservation advice for the Regent honeyeater, which is included in **Appendix K**, the main threats to the species are as follows:

- Habitat clearing, fragmentation and degradation;
- Competition for resources with nectivorous and non-nectivorous birds; and

- Increased predation by native nest predators, including pied currawongs (*Strepera graculina*).

### 4.3.5 Painted Honeyeater

The assessment against the significant impact criteria for the Painted honeyeater is provided in Table 4-10.

**Table 4-10 Assessment Against Significant Impact Criteria: Painted honeyeater**

Criterion	Assessment against significance criteria (vulnerable)
<b>Painted honeyeater</b>	
Lead to a long-term decrease in the size of an important population of the species.	<b>Unlikely.</b> No 'important population' has been identified within the Project Area. Habitat assessments and BioCondition surveys concluded that a large portion of the impact site is not considered to provide suitable habitat for the Painted Honeyeater due to the lack of large mature trees and absence of Amyema mistletoe species. However, due to the presence of some larger mature trees within the Access Corridor which provide both suitable nectar flow and mistletoe, 11.3 ha has been mapped as potential habitat for the species. The species was not recorded during field surveys, despite these being targeted. Therefore, it is considered unlikely the Project will lead to a long-term decrease in the size of an important population of the species.
Reduce the area of occupancy of an important population.	<b>Unlikely.</b> No 'important population' has been identified within the Project Area. Habitat assessments and BioCondition surveys concluded that a large portion of the impact site is not considered to provide suitable habitat for the Painted Honeyeater due to the lack of large mature trees and absence of Amyema mistletoe species. However, due to the presence of some larger mature trees within the Access Corridor which provide both suitable nectar flow and mistletoe, 11.3 ha has been mapped as potential habitat for the species. The species was not recorded during field surveys, despite these being targeted. Therefore, it is considered unlikely the Project will reduce the area of occupancy of an important population.
Fragment an existing important population into two or more populations.	<b>Unlikely.</b> No 'important population' has been identified within the Project Area. Habitat assessments and BioCondition surveys concluded that a large portion of the impact site is not considered to provide suitable habitat for the Painted Honeyeater due to the lack of large mature trees and absence of Amyema mistletoe species. However, due to the presence of some larger mature trees within the Access Corridor which provide both suitable nectar flow and mistletoe, 11.3 ha has been mapped as potential habitat for the species. The species was not recorded during field surveys, despite these being targeted. Therefore, it is considered unlikely the Project will fragment an existing important population into two or more populations.
Adversely affect habitat critical to the survival of the species.	<b>Unlikely.</b> There is no indication the Project Area comprises habitat critical to the survival of the species. Habitat assessments and BioCondition surveys concluded that a large portion of the impact site is not considered to provide suitable habitat for the Painted Honeyeater due to the lack of large mature trees and absence of Amyema mistletoe species. However, due to the presence of some larger mature trees within the Access Corridor which provide both suitable nectar flow and mistletoe, 11.3 ha has been mapped as potential habitat for the species. The species was not recorded during field surveys, despite these being targeted. Therefore, it is considered unlikely the Project will adversely affect habitat critical to the survival of the species.
Disrupt the breeding cycle of an important population.	<b>Unlikely.</b> No 'important population' has been identified within the Project Area. Therefore, it is considered unlikely the Project will disrupt the breeding cycle of an important population.

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Criterion	Assessment against significance criteria (vulnerable)
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	<b>Unlikely.</b> Habitat assessments and BioCondition surveys concluded that a large portion of the impact site is not considered to provide suitable habitat for the Painted Honeyeater due to the lack of large mature trees and absence of Amyema mistletoe species. However, due to the presence of some larger mature trees within the Access Corridor which provide both suitable nectar flow and mistletoe, 11.3 ha has been mapped as potential habitat for the species. The species was not recorded during field surveys, despite these being targeted. Therefore, the Project is not considered likely to affect the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat.	<b>Unlikely.</b> The Project construction and operational management plans will incorporate measures to control the introduction and spread of weed and pest species across the Project Area. Species specific management measures are outlined in the MNES MP regarding Noisy miners. The Project is considered unlikely to result in invasive species becoming established in this species' habitat.
Introduce disease that may cause the species to decline.	<b>Unlikely.</b> The Project construction and operational management plans will incorporate the management of invasive species which will assist in the prevention of pest plant introduction and associated diseases resulting from Project activities.
Interfere substantially with the recovery of the species.	<b>Unlikely.</b> Although a recovery plan exists for the Painted honeyeater, the PV Power Station impact site is not considered to provide suitable habitat for the species. However, due to the presence of some larger mature trees within the Access Corridor which provide both suitable nectar flow and mistletoe, 11.3 ha has been mapped as potential habitat for the species. The species was not recorded during field surveys, despite these being targeted. Therefore, it is unlikely the Project will interfere substantially with the recovery of the species.
<b>Assessment of potential for significant residual impacts</b>	<b>There is only one record of this species within 10 km of the Project Area. The Project's activities are considered unlikely to result in significant residual impacts to the species.</b>

As per the conservation advice for the Painted honeyeater, which is included in **Appendix K**, the main threats to the species are as follows:

- Habitat loss and grazing;
- Competition with the aggressive noisy miner;
- Predation by invasive species (e.g., black rats);
- Deliberate destruction of mistletoe in production forests;
- Exacerbation of tree decline through pasture improvement activities;
- Collision with road vehicles; and
- Nest predation by over-abundant pied currawongs, pied and grey butcherbirds and crows and ravens.

### 4.3.6 White-throated Needletail

The assessment against the significant impact criteria for the White-throated needletail is provided in Table 4-11.

**Table 4-11 Assessment Against Significant Impact Criteria: White-throated needletail**

Criterion	Assessment against significance criteria (vulnerable)
<b>White-throated needletail</b>	
Lead to a long-term decrease in the size of an important population of the species.	<b>Unlikely.</b> No 'important population' has been identified within the Project Area.
Reduce the area of occupancy of an important population.	<b>Unlikely.</b> No 'important population' has been identified within the Project Area.
Fragment an existing important population into two or more populations.	<b>Unlikely.</b> No 'important population' has been identified within the Project Area.
Adversely affect habitat critical to the survival of the species.	<b>Unlikely.</b> The species roosts among dense canopy foliage and in tree hollows in forests and woodland but may also roost aerially. While tree hollows on site could be used as roosting sites, there is a lack of dense canopy foliage. Although the Project area comprises 207.5 ha of suitable habitat for the species, they are considered almost exclusively aerial over the Project area. As such, there is no indication the Project Area comprises habitat critical to the survival of the species.
Disrupt the breeding cycle of an important population.	<b>Unlikely.</b> No 'important population' has been identified within the Project Area. The species does not breed in Australia.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	<b>Unlikely.</b> There is no indication the Project Area comprises habitat critical to the survival of the large-eared pied bat and therefore the Project is not considered likely to affect the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat.	<b>Unlikely.</b> The Project construction and operational management plans will incorporate measures to control the introduction and spread of weed and pest species across the Project Area. The Project is considered unlikely to result in invasive species becoming established in this species' habitat.
Introduce disease that may cause the species to decline.	<b>Unlikely.</b> The Project construction and operational management plans will incorporate the management of invasive species which will assist in the prevention of pest plant introduction and associated diseases resulting from Project activities.
Interfere substantially with the recovery of the species.	<b>Unlikely.</b> There is no State or Commonwealth recovery plan for this species. With mitigation of potential impacts incorporated within the Project construction and operational management plans, any potential impact on White-throated needletail will be minor and is considered unlikely to interfere with the recovery of the species.
<b>Assessment of potential for significant residual impacts</b>	<b>Only two records of the species within 10km buffer of Project Area exist. The project's activities are considered unlikely to result in significant residual impacts to the species. This is a wide-ranging aerial species that migrates from the northern hemisphere to eastern Australia.</b>

As per the conservation advice for the White-throated needletail, which is included in **Appendix K**, the main threats to the species are as follows:

- Habitat loss and fragmentation;
- Direct mortality from wind turbines and overhead wires; and
- Poisoning.



### 4.3.7 Koala

The assessment against the significant impact criteria for the Koala is provided in Table 4-12.

**Table 4-12 Assessment Against Significant Impact Criteria: Koala**

Criterion	Assessment against significance criteria (vulnerable <sup>3</sup> )
<b>Koala</b>	
Lead to a long-term decrease in the size of an important population of the species.	<b>Unlikely.</b> No 'important population' has been identified within the Project Area and no individuals have been observed during site surveys. Two koala skulls were identified in the PV Power Station area. Habitat that may be considered as 'critical to the survival of Koala' occurs within the Project Area. The impact areas provide 207 ha of suitable habitat for an important population of Koala, with the exception of the cleared road reserve.  The Project has the potential to lead to an increase in Koala road deaths along the Access Corridor although traffic will be minimal once construction is completed. Mitigation actions such as signage will be incorporated into the access road design. It is considered unlikely the Project will lead to a long-term decrease in the size of an important population of Koala.
Reduce the area of occupancy of an important population.	<b>Unlikely.</b> No 'important population' has been identified within the Project Area although the species is known to occur. Habitat that may be considered as 'critical to the survival of Koala' occurs within the Project Area. The Project requires clearing 207 ha of this habitat. However, the Project Area remains contiguous with abundant similar habitat in the wider surrounds. It is considered unlikely the Project will reduce the area of occupancy of an important population of Koala in the area.
Fragment an existing important population into two or more populations.	<b>Unlikely.</b> No 'important population' has been identified within the Project Area although the species is known to occur. Habitat connectivity has been considered in the design of the Project (see Section 4.1.1)). The uniformity of the vegetation and landscape in the vicinity of the Project allows for connectivity around the Project and the impact at a regional and local scale is expected to be minimal. It is considered unlikely the Project will fragment an existing 'important population' into two or more populations.
Adversely affect habitat critical to the survival of the species.	<b>Potentially.</b> Koala habitat is present throughout the study area. Koala habitat assessments against the EPBC Koala Habitat Assessment Tool identified the Project Area as being habitat critical to the survival of the species. The Project requires clearing of 207 ha this habitat. This vegetation clearing will adversely impact dispersal habitat critical to the survival of the species.
Disrupt the breeding cycle of an important population.	<b>Unlikely.</b> No 'important population' has been identified within the Project Area. Where possible, clearing activities will take place outside the breeding season for Koala (October-May). A qualified fauna spotter will carry out a thorough survey for the species prior to any clearing of potential Koala habitat taking place. It is considered unlikely the Project will disrupt the breeding cycle of an important population.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	<b>Unlikely.</b> There is suitable woodland habitat for the species in the Project Area. However, there is abundant suitable habitat for the species in the area surrounding the Project. It is considered unlikely the Project will impact the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat.	<b>Unlikely.</b> The Project construction and operational management plans will incorporate measures to control the introduction and spread of weed and pest species across the Project Area. The Project is considered unlikely to result in invasive species becoming established in this species' habitat.

<sup>3</sup> Koala is considered Vulnerable as part of this assessment process and for offsetting requirements despite listing change on 12 February 2022 (refer to Section 1.7.1.1 for additional information).

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Criterion	Assessment against significance criteria (vulnerable <sup>3</sup> )
Introduce disease that may cause the species to decline.	<b>Unlikely.</b> The Project construction and operational management plans will incorporate the management of invasive species which will assist in the prevention of pest plant introduction and associated diseases resulting from Project activities.
Interfere substantially with the recovery of the species.	<b>Unlikely.</b> There is no State or Commonwealth recovery plan for this species. The Approved Conservation Advice for Koala (TSSC 2012) outlines the management actions intended to aid the recovery of the species. With mitigation of potential impacts incorporated within the Project construction and operational management plans, an environmental offsets program, any potential impact on Koala will be minor and is considered unlikely to interfere with the recovery of the species or any of the actions outlined in the Approved Conservation Advice.
<b>Assessment of potential for significant residual impacts</b>	<p><b>The species has been detected in the Project Area. There is suitable habitat for this species within the Project Area. Suitable habitat will be impacted by clearing activities including up to 207 ha of known dispersal habitat. It is unlikely the habitat will retain the necessary characteristics to locally support the species following the completion of construction activities and vegetation rehabilitation activities. There is a low potential for construction to impact the breeding cycle or for operational activities to impact the species with the proposed mitigation measures in place.</b></p> <p><b>It is considered that the Project is likely to be a controlled action requiring assessment under the EPBC Act due to potential impacts upon koalas.</b></p>

As per the conservation advice for the Koala, which is included in **Appendix K**, the main threats to the species are as follows:

- Loss of climatically suitable habitat;
- Increased intensity/frequency of drought;
- Increased intensity/frequency of heatwaves;
- Increased intensity/frequency of bushfire;
- Declining nutritional value of foliage;
- Clearing and degradation of koala habitat;
- Encounter mortality with vehicles and dogs; and
- Disease - Koala retrovirus (KoRV) and Chlamydia (*Chlamydia pecorum*).

### 4.3.8 Greater Glider (southern and central)

The assessment against the significant impact criteria for the Greater glider (southern and central) is provided in Table 4-13.

**Table 4-13 Assessment Against Significant Impact Criteria: Greater glider (southern and central)**

Criterion	Assessment against significance criteria (vulnerable)
<b>Greater glider (southern and central)</b>	
Lead to a long-term decrease in the size of an important population of the species.	<b>Unlikely.</b> No 'important population' has been identified within the Project Area. No sightings were made during field surveys, and it is uncertain whether or how many individuals may be using those areas of habitat, but it is assumed to be low numbers if at all.
Reduce the area of occupancy of an important population.	<b>Unlikely.</b> No 'important population' has been identified within the Project Area. The species has not been recorded within the Project Area. It is highly unlikely that the Project are provides a large contiguous patch of suitable foraging and denning habitat for the Greater glider (southern and central) as there are only two small areas that provide marginal, isolated habitat quality for the species.
Fragment an existing important population into two or more populations.	<b>Unlikely.</b> No 'important population' has been identified within the Project Area. The uniformity of the vegetation and landscape in the vicinity of the Project allows for connectivity around the Project and the impact at a regional and local scale is expected to be minimal. It is considered unlikely the Project will fragment an existing 'important population' into two or more populations.
Adversely affect habitat critical to the survival of the species.	<b>Unlikely.</b> There is no indication the Project Area comprises habitat critical to the survival of the Greater glider (southern and central). It is highly unlikely that the Project are provides a large contiguous patch of suitable foraging and denning habitat for the Greater glider (southern and central) as there are only two small areas that provide marginal, isolated habitat quality for the species.
Disrupt the breeding cycle of an important population.	<b>Unlikely.</b> No 'important population' has been identified within the Project Area. A qualified fauna spotter will carry out a thorough survey for the species prior to any clearing of potential habitat taking place. It is considered unlikely the Project will disrupt the breeding cycle of an important population.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	<b>Unlikely.</b> Only a small amount of suitable habitat was identified on site. It is highly unlikely that the Project are provides a large contiguous patch of suitable foraging and denning habitat for the Greater glider (southern and central) as there are only two small areas that provide marginal, isolated habitat quality for the species. It is not considered that this area is of sufficient size to impact the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat.	<b>Unlikely.</b> The Project construction and operational management plans will incorporate measures to control the introduction and spread of weed and pest species across the Project Area. The Project is considered unlikely to result in invasive species becoming established in this species' habitat.
Introduce disease that may cause the species to decline.	<b>Unlikely.</b> There are currently no known diseases to affect the Greater glider (southern and central).
Interfere substantially with the recovery of the species.	<b>Unlikely.</b> There is no State or Commonwealth recovery plan for this species. With mitigation of potential impacts incorporated within the Project construction and operational management plans, any potential impact on Greater glider (southern and central), should it occur within the Project Area, will be minor and is considered unlikely to interfere with the recovery of the species or any of the actions outlined in the Approved Conservation Advice.
<b>Assessment of potential for significant residual impacts</b>	<b>Only one record of this species has been recorded within 10km buffer of Project Area. The Project's activities are considered unlikely to result in significant residual impacts to the species.</b>

As per the conservation advice for the Greater glider (southern and central), which is included in **Appendix K**, the main threats to the species are as follows:

- Habitat loss (through clearing, clear-fell logging and the destruction of senescent trees due to prescribed burning) and fragmentation;
- Fire;
- Timber production;
- Climate change;
- Barbed wire fencing (entanglement);
- Hyper predation by owls;
- Competition from sulphur-crested cockatoos; and
- *Phytophthora sojae* disease.

### 4.3.9 Brigalow Woodland Snail

The assessment against the significant impact criteria for the Brigalow woodland snail is provided in Table 4-14.

**Table 4-14 Assessment Against Significant Impact Criteria: Brigalow woodland snail**

Criterion	Assessment against significance criteria (endangered)
<b>Brigalow woodland snail</b>	
Lead to a long-term decrease in the size of a population of the species.	<b>Unlikely.</b> No 'important population' has been identified within the Project Area. The species was not recorded during field surveys, with the closest record 26 km north-east and east of the Project area. There is only marginal habitat (2.5 ha) suitable to the Brigalow woodland snail nearing the waterways of the Access Corridor. As suitable habitat is marginal, and the species was not recorded, it is considered unlikely the Project will lead to a long-term decrease in the size of a population of the species.
Reduce the area of occupancy of the species.	<b>Unlikely.</b> No 'important population' has been identified within the Project Area. Although habitat characteristics in the form of leaf litter and logs are present, moisture within the environment, and therefore food sources, is lacking. The PV Power Station impact area is not considered conducive of suitable habitat for the Brigalow Woodland Snail, however portions along the Access Corridor nearing the permanent waterway provides potential habitat in ideal conditions (2.5ha). The species was not recorded during field surveys, with the closest record 26 km north-east and east of the Project area.
Fragment an existing population into two or more populations.	<b>Unlikely.</b> No 'important population' has been identified within the Project Area. The species was not recorded during field surveys, with the closest record 26 km north-east and east of the Project area. There is only marginal habitat (2.5 ha) suitable to the Brigalow woodland snail nearing the waterways of the Access Corridor. As suitable habitat is marginal, and the species was not recorded, it is considered unlikely the Project will lead to a long-term decrease in the size of a population of the species.
Adversely affect habitat critical to the survival of the species.	<b>Unlikely.</b> No 'important population' has been identified within the Project Area. The species was not recorded during field surveys, with the closest record 26 km north-east and east of the Project area. There is only marginal habitat (2.5 ha) suitable to the Brigalow woodland snail nearing the waterways of the Access Corridor. As suitable habitat is marginal, and the species was not recorded, it is considered unlikely the Project will lead to a long-term decrease in the size of a population of the species.
Disrupt the breeding cycle of a population.	<b>Unlikely.</b> No 'important population' has been identified within the Project Area. A qualified fauna spotter will carry out a thorough survey for the species prior to any clearing. It is considered unlikely the Project will disrupt the breeding cycle of an important population.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	<b>Unlikely.</b> Although habitat characteristics in the form of leaf litter and logs are present, moisture within the environment, and therefore food sources, is lacking. The PV Power Station impact area is not considered conducive of suitable habitat for the Brigalow Woodland Snail, however portions along the Access Corridor nearing the permanent waterway provides potential habitat in ideal conditions (2.5ha). The species was not recorded during field surveys, with the closest record 26 km north-east and east of the Project area. It is considered unlikely the Project will modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the critically endangered or endangered species habitat.	<b>Unlikely.</b> The Project construction and operational management plans will incorporate measures to control the introduction and spread of weed and pest species across the Project Area. The Project is considered unlikely to result in invasive species becoming established in this species' habitat.

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Criterion	Assessment against significance criteria (endangered)
Introduce disease that may cause the species to decline.	<b>Unlikely.</b> There are currently no known diseases to affect the Brigalow woodland snail.
Interfere substantially with the recovery of the species.	<b>Unlikely.</b> There is no State or Commonwealth recovery plan for this species. With mitigation of potential impacts incorporated within the Project construction and operational management plans, any potential impact on Brigalow woodland snail, should it occur within the Project Area, will be minor and is considered unlikely to interfere with the recovery of the species or any of the actions outlined in the Approved Conservation Advice.
<b>Assessment of potential for significant residual impacts</b>	<b>The Project's activities are considered unlikely to result in significant residual impacts to the species.</b>

As per the conservation advice for the Brigalow woodland snail, which is included in **Appendix K**, the main threats to the species are as follows:

- Land clearing;
- Habitat disturbance;
- Predation by rats (*Rattus spp.*), mice (*Mus musculus*) and feral pigs (*Sus scrofa*);
- Invasion of Buffel grass;
- Trampling by cattle and horses; and
- Fire.



## 4.4 Overall MNES Risk Assessment

### 4.4.1 Risk Assessment Methodology

The Commonwealth Government Environmental Assessment Manual (DSEWPaC 2012) (the manual) provides guidance to assessing officers on how to consider referred and controlled actions under Chapter 4 of the EBPC Act. While it is acknowledged the manual should not be relied upon by any other persons, the manual provides an effective logic for proponents to consider potential impacts to MNES in parity with that of the DAWE. As such the manual has been supplemental to this risk assessment. Though Section 2G of the manual relates to referrals, it provides guidance on considering whether a proponent has provided effective means of avoiding or reducing potential impacts to MNES, below the significant impact threshold. This consideration of management and mitigation measures on potential project impacts is further addressed in Section 3 of the manual. Where possible, the approach of a proponent should be to reduce the probability of an impact occurring to 'unlikely' and/or reduce the consequence of a potential impact to 'not significant' (DSEWPaC 2012). Plate 4-1 provides a diagram of that approach, extracted from the manual.

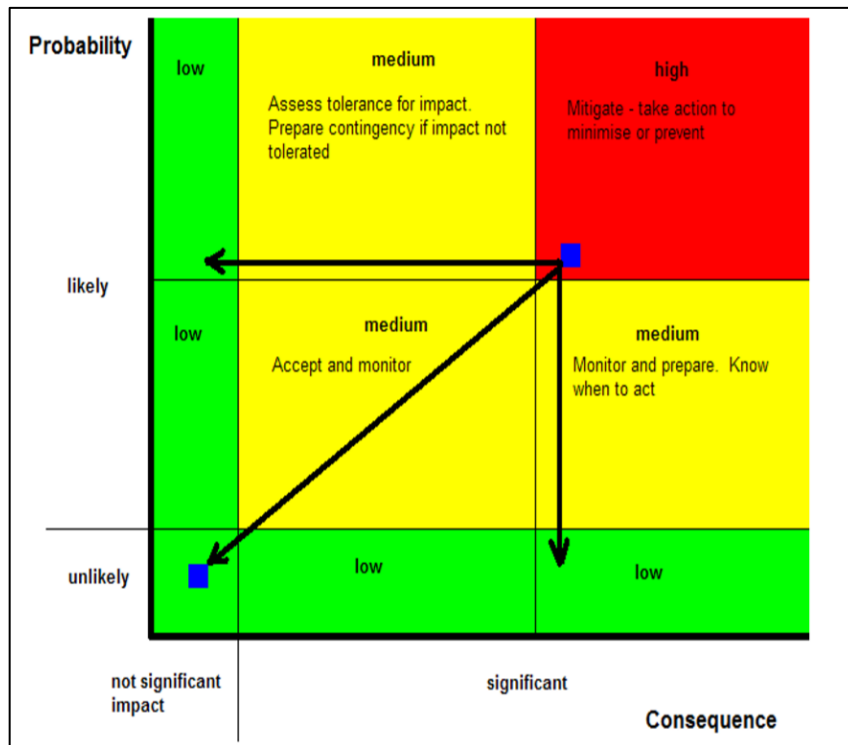


Plate 4-1 Approach to Considering Significance of Impacts Accounting for Probability of Consequence (DSEWPaC 2012)

Section 3 of the manual states the aim of the assessment process includes both confirming the nature of potential impacts and establishing the effectiveness of the proposed management measures. Section 4.3 of this Preliminary Documentation Report provide an assessment of the relevant MNES against significant impact criteria from the Significant Impact Guidelines (DoE 2013). However, this overall risk assessment has been prepared to clarify which management and mitigation measures apply to potential impacts and provide a consideration of risk in a format similar to the manual (DSEWPaC 2012). To quantify the potential for an aspect of the action to cause a significant impact to MNES, a risk analysis was undertaken using the ISO 3100:2018 criteria.

The risk assessment defines the risk of any adverse outcome and considers the elements within the analysis including the identified hazards, consequence and the probability. This risk assessment identifies the consequence and probability rating and applies a risk matrix to prescribe a risk. The risk assessment process was undertaken on unmitigated risks and residual (mitigated) risks using the potential impacts (risks) discussed in Section 4.1 and Section 4.3. Mitigated risks are those with controls to minimise the probability and consequence of a detrimental impact occurring and utilise the measures detailed in Section 5. These controls include:

- Alternative technology or processes;
- Alternative locations for activities or infrastructure;
- Reduction in onsite storage of dangerous goods;
- Modification of process and storage conditions;
- Early detection, control and clean-up of any releases;
- Containment and collections systems;
- Improvements in plant operability; and
- Operational and organisational safeguards (including training).

The risk assessment criteria in ISO 31000:2018 establishes a method for identifying risk profiles through combining a probability rating of a hazard or impact occurring with a consequence rating of a hazard or impact occurring. Definitions applicable to the risk assessment process as described in this chapter are outlined in Table 4-15. A description of the ratings used for probability and consequence has been provided in Table 4-16 and Table 4-17, respectively.

**Table 4-15 Definitions for Assessment of Hazard and Risk**

Term	Definition
Hazard	Something with the potential to significantly impact MNES. This can include hazardous substances, plant and equipment, work processes or other aspects of the surrounding environment.
Probability	The chance or likelihood of an event resulting in a significant impact to MNES occurring.
Consequence	The significance of the impact, how much of an MNES species, community or its habitat could be harmed and the duration of that harm.
Unmitigated Risk	The probability that a significant impact/consequence to the MNES might result when exposed to the hazard without implementation of the proposed mitigation measures.
Residual Risk	The probability that a significant impact/consequence to the MNES might result when exposed to the hazard with the effective implementation of the proposed mitigation measures.

### 4.4.2 Probability Assessment

A qualitative assessment of the possible event frequency was undertaken to assess the probability of an impact occurring and rated based on the ratings included in Table 4-16.

**Table 4-16 Ratings for Probability of Occurrence**

Probability Rating	Probability	Description
1	Almost certain	Will almost certainly occur. Has a 95% or greater chance of occurring within any 12 month period.
2	Likely	Probably will occur. Has a 70% to 95% chance of occurring any 12 month period.
3	Possible	May possibly occur. Has a 30% to 70% chance of occurring any 12 month period.
4	Unlikely	Could possibly occur. Has a 5% to 30% chance of occurring any 12 month period.
5	Rare	Only likely to occur in exceptional circumstances. Has a 5% or less chance of occurring any 12 month period.

### 4.4.3 Consequence Assessment

The potential level of consequence of an impact was rated in accordance with the definitions shown in Table 4-17. Each outcome has been individually assessed where an incident may have multiple impacts.

**Table 4-17 Consequence Ratings**

Score	Maximum Potential Consequence (Realistic)	
	Description	Interpretation <sup>1</sup>
1	Catastrophic	Extensive detrimental long-term or permanent decrease or fragmentation in size of population(s) or habitat critical to the MNES. Long-term or permanent disruption of MNES breeding cycles, introduction of diseases and invasive species to MNES or its habitat. Long-term or permanent interference with recovery of the MNES or its habitat.
2	Major	Widespread medium to long-term decrease or fragmentation in size of population(s) or habitat critical to the MNES. Medium to long-term disruption of MNES breeding cycles, introduction of diseases and invasive species to MNES or its habitat. Medium to long-term interference with recovery of the MNES or its habitat.
3	Moderate	Localised medium-term decrease or fragmentation in size of population(s) or habitat critical to the MNES. Medium-term disruption of MNES breeding cycles, introduction of diseases and invasive species to MNES or its habitat. Medium-term interference with recovery of the MNES or its habitat.
4	Minor	On-site short to medium-term decrease or fragmentation in size of population(s) or habitat critical to the MNES. Short to medium-term disruption of MNES breeding cycles, introduction of diseases and invasive species to MNES or its habitat. Short to medium-term interference with recovery of the MNES or its habitat.
5	Insignificant	Limited or unobservable impact to an on-site area. No lasting effects (i.e. temporary) on MNES or its habitat.

1 – The interpretation is based on the significant impact criteria for MNES provided in the Significant Impact Guidelines 1.1 – Matters of National Environmental Significance (DoE 2013).

For the purpose of the consequence ratings the extents are interpreted as:

- Extensive – Impact may occur at bioregional or catchment level or at a scale encompassing the entire known population or habitat for the MNES species;
- Widespread – Impact may occur over a large portion of the Project Area and may extend well beyond these defined areas;
- Localised – Impact is largely confined within the Project Area and may extend beyond, but generally not far from, this defined areas; and
- On-site – Impact is limited to discrete areas within the Project Area.

For the purpose of the consequence ratings the duration categorisation is interpreted as:

- Permanent – Impact on the MNES or its habitat is observable continuously or intermittently beyond the life of the Project;
- Long-term – Impact to the MNES or its habitat is observable continuously or intermittently for the life of the Project but cease at completion of the Project;
- Medium-term – Impact to the MNES or its habitat is observable continuously or intermittently for a period of >1 to 15 years;
- Short-term – Impact to the MNES or its habitat is observable continuously or intermittently for a period of >1 month to 1 year (typically limited to the construction period); and
- Temporary – Impact to the MNES or its habitat is observable for a very short continuous duration (up to 1 month) or occurs as a rare intermittent event.

#### 4.4.4 Risk Matrix

The risk matrix adopted for the assessment is included in Table 4-18. The colour shading refers to the qualitative bands of risk level. The risk assessment tables are structured to show the results of the unmitigated risk profile and residual risk profile. The table presents the results in the following order:

- The location that the risk occurs (e.g., within the Project Area);
- The phase in which the hazard occurs (e.g., construction, operation or decommissioning);
- The aspect or activity of the Project the hazard stems from;
- A description of the potential impacts to MNES that could occur from the activity;
- The relevant criterion from the Significant Impact Guidelines (DoE 2013);
- The probability, consequence and existing (unmitigated) risk to the MNES from the hazard;
- The management and mitigation measures to be implemented to reduce risk to MNES from the activity (referencing the collated management and mitigation measures from **Appendix M**); and
- The probability, consequence and residual (mitigated) risk to the MNES from the hazard.

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For the purposes of this risk assessment, risk levels are defined as follows:

- Extreme – The activity or works must not proceed until suitable mitigation measures have been adopted to minimise the risk to MNES or its habitat;
- High – The activity or works should not proceed without consideration of alternative options or additional controls to minimise the risk to MNES or its habitat. A documented action plan is required;
- Medium – Acceptable with formal review. A documented action plan is required; and
- Low – Acceptable with review.

**Table 4-18 Risk Assessment Matrix**

Probability	Consequence				
	Catastrophic 1	Major 2	Moderate 3	Minor 4	Insignificant 5
Almost Certain 1	Extreme	Extreme	Extreme	High	Medium
Likely 2	Extreme	Extreme	High	Medium	Medium
Possible 3	Extreme	High	High	Medium	Low
Unlikely 4	High	High	Medium	Low	Low
Rare 5	Medium	Medium	Low	Low	Low

The risk assessment is tailored to consider potential probability and consequence of Project activities impacting MNES as per the criteria from the Significant Impact Guidelines (DoE 2013). While the criteria define consequence and duration categories, and the analysis provided in the Preliminary Documentation provides context to existing and residual risk levels, the assessment is largely qualitative and has relied on the technical expertise of the consultants who have completed the impact assessment analysis. To check accuracy of the applied ratings, the risk assessment was technically reviewed by a Principal Environmental Scientist with experience with similar risk assessments. Table 4-19 provides the qualitative risk assessment of potential impacts to MNES.

Management and mitigation measures identified in Table 4-19 correlate with those identified in Section 5 and **Appendix M**.

It should be noted that only three species have been included in the qualitative risk assessment (refer to Table 4-19), including the Koala and Yakka skink as these resulted in a significant impact in their respective sections within Section 4.3. Any species that did not result in a significant impact due to the Project were not required to be assessed for residual impacts.

**Table 4-19 Qualitative Risk Assessment of Potential Impacts to MNES**

Location	Phase	Aspect	Potential Impacts	Relevant Significant Impact Criteria	Probability	Consequence	Existing Risk	Management and Mitigation Measures <sup>4</sup>	Probability	Consequence	Residual Risk
<b>Koala (QLD, NSW and ACT Populations) (Vulnerable)</b>											
Project Area	Construction	Clearing of Habitat	<p>The following potential impacts derived as per the conservation advice (refer to <b>Appendix K</b>) are as follows:</p> <ul style="list-style-type: none"> <li>▪ Clearing eucalypt woodland, forest habitat and associated vegetation;</li> <li>▪ Degradation of habitat and adverse effect on ecosystem supporting the Koala; and</li> <li>▪ Erosion impacts to Koala habitat.</li> </ul> <p>Given the records from recent surveys across the Project it is likely the species may occur infrequently and in low densities. The overall Project Area contains 207 ha of known habitat for Koala.</p>	<ul style="list-style-type: none"> <li>▪ Habitat fragmentation</li> <li>▪ Habitat degradation</li> <li>▪ Invasive species introduction</li> <li>▪ Disease introduction</li> </ul>	1	2	<b>Extreme</b>	HC3, HC14, HC17, K2, K3, K4, K15	1	4	<b>High</b>

<sup>4</sup> Refer to **Appendix M** for the consolidated list of management and mitigations with corresponding identification numbers.



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Location	Phase	Aspect	Potential Impacts	Relevant Significant Impact Criteria	Probability	Consequence	Existing Risk	Management and Mitigation Measures <sup>4</sup>	Probability	Consequence	Residual Risk
Project Area	Construction and Operation	Fauna Mortality	<p>The following potential impacts partly derived as per the conservation advice (refer to <b>Appendix K</b>) are per below.</p> <ul style="list-style-type: none"> <li>Direct mortality as a result of construction through habitat clearing, earthworks activities and vehicle collision;</li> <li>Mortality may also occur because of the Koala becoming trapped and exposed to inclement weather and predation during construction; and</li> <li>Operational vehicles may also result in vehicle collision.</li> </ul> <p>As previously noted, given the relatively few records from recent surveys across the Project Area it is likely the species occurs in low densities.</p>	<ul style="list-style-type: none"> <li>Habitat fragmentation</li> <li>Habitat degradation</li> </ul>	4	4	Low	HC4, HC6, HC7, HC8, HC10, HC11, HC13, HC14, HC15, HC16, HC17, HIE1 – HIE3, K1, K7 – K12, K16, K17, K19.	5	4	Low
Project Area and	Construction and Operation	Habitat Degradation	<p>Habitat degradation may occur to Koala as a result of:</p> <ul style="list-style-type: none"> <li>Accidental release of pollutants;</li> <li>Introduction of invasive species;</li> <li>Increased fire risk from Project;</li> <li>Erosion; and</li> <li>Flood inundation changes.</li> </ul> <p>As previously noted, given the relatively few records from recent surveys across the Project Area, it is likely the species occurs in low densities.</p>	<ul style="list-style-type: none"> <li>Habitat fragmentation</li> <li>Habitat degradation</li> <li>Invasive species introduction</li> </ul>	4	4	Low	HC2, HC9, HC20, PW1-PW6, A1-A14, RP1-RP5, F1-F12.	4	5	Low
<p><b>Summary: Koala</b> Considering the assessment undertaken in Section 4.3.7 and risk assessment undertaken in this table, the Project is likely to result in significant residual impacts to the Koala.</p>											

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Location	Phase	Aspect	Potential Impacts	Relevant Significant Impact Criteria	Probability	Consequence	Existing Risk	Management and Mitigation Measures <sup>4</sup>	Probability	Consequence	Residual Risk
<b>Yakka skink (Vulnerable)</b>											
Project Area	Construction	Clearing of Habitat	<p>The following potential impacts partly derived as per the conservation advice (refer to <b>Appendix K</b>) are per below.</p> <ul style="list-style-type: none"> <li>Clearing potential habitat and associated vegetation;</li> <li>Alteration of landscape and hydrology environments;</li> <li>Bank instability and associated resultant sedimentation.</li> </ul> <p>The Project area encompasses 76.2 ha of potential habitat for the Yakka skink.</p> <p>There is one QGC record of Yakka skink within the Braemar State Forest, approximately 2 km north of the Project Area (QGC 2020) and only two ALA records within 100 km of the Project Area.</p>	<ul style="list-style-type: none"> <li>Habitat fragmentation</li> <li>Habitat degradation</li> <li>Reduced area of occupancy</li> <li>Invasive species introduction</li> <li>Disease introduction</li> </ul>	4	3	Medium	HC3, HC14, HC17, HC19, K2, K3, K4	4	4	Low
Project Area	Construction, Operation and Decommissioning	Fauna Mortality	<p>The following potential impacts, partly derived as per the conservation advice (refer to <b>Appendix K</b>) are per below.</p> <ul style="list-style-type: none"> <li>Direct mortality because of construction through habitat clearing, earthworks activities and vehicle collision.</li> <li>Mortality may also occur because of the Yakka skink becoming trapped and exposed to inclement weather and predation during construction and decommissioning.</li> </ul> <p>Operational vehicles may also result in vehicle collision.</p> <p>There is one QGC record of Yakka skink within the Braemar State Forest, approximately 2 km north of the Project Area (QGC 2020) and only two ALA records within 100 km of the Project Area.</p>	<ul style="list-style-type: none"> <li>Habitat fragmentation</li> <li>Habitat degradation</li> <li>Reduced area of occupancy</li> </ul>	4	4	Low	HC4, HC6, HC7, HC8, HC10, HC11, HC13, HC14, HC15, HC16, HC17, HIE1 – HIE3, K8, K16, K19.	5	4	Low

## Section 4 Quantification of Impacts

Location	Phase	Aspect	Potential Impacts	Relevant Significant Impact Criteria	Probability	Consequence	Existing Risk	Management and Mitigation Measures <sup>4</sup>	Probability	Consequence	Residual Risk
Project Area	Construction, Operation and Decommissioning	Habitat Degradation	<p>Habitat degradation may occur to Yakka skink habitat as a result of:</p> <ul style="list-style-type: none"> <li>Accidental release of pollutants;</li> <li>Introduction of invasive species;</li> <li>Increased fire risk from Project;</li> <li>Erosion from Project; and</li> <li>Flood inundation changes.</li> </ul>	<ul style="list-style-type: none"> <li>Habitat fragmentation</li> <li>Habitat degradation</li> <li>Reduced area of occupancy</li> <li>Invasive species introduction</li> </ul>	4	4	Low	HC2, HC9, HC19, HC20, PW1-PW6, A1-A14, RP1-RP5, F1-F12.	5	4	Low
<p><b>Summary: Yakka skink</b>            Considering the assessment undertaken in Section 4.3.1 and risk assessment undertaken in this table, the Project is unlikely to result in significant residual impacts to the Yakka skink.</p>											

### 4.5 Potential Residual Impacts and Offsets

The EPBC Act Environmental Offsets Policy 2012 (Offsets Policy) defines offsets as measures that compensate for the residual adverse impacts of an action on the environment. Avoidance and mitigation measures are the primary strategies for managing the potential significant impacts of a project. Offsets are not intended to reduce the likely impacts of the Project but are implemented to compensate any residual (after mitigation) significant impacts.

The Offsets Policy outlines the approach to environmental offsets under the EPBC Act. The policy applies to offsetting requirements in terrestrial and aquatic (including marine) environments and applies to projects assessed under the EPBC Act. Under the Offsets Policy, offsets act as a compensation mechanism for impacts (direct and indirect) to all protected matters under the EPBC Act including two relevant MNES for this Project: Listed threatened species and ecological communities. Offsets under Commonwealth legislation are only required where residual impacts are considered significant as defined under the detailed significance criteria.

The current Project footprint and design have been planned to avoid significant environmental impacts, where possible or practicable, however, potential residual environmental impacts may be unavoidable.

Ground-truthed MNES within the overall Project referral footprint include:

- Known habitat for Koala; and
- Potential habitat for Yakka skink, Five-clawed worm-skink, Squatter pigeon (southern), Painted honeyeater, White-throated needletail, Brigalow woodland snail and Grey snake.

As per risk assessment undertaken in Section 4.4 and individual assessments for Yakka skink (Section 4.3.1) and Squatter pigeon (southern) (Section 4.3.2), the Project is unlikely to result in significant residual impacts to these species.

Habitat within the Project Area surrounding the Project Area contains suitable habitat for the Koala to occur. As per the residual impacts likely to require referral stipulated in Section 8 of the Referral Guidelines for the Vulnerable Koala, the Project has the potential to result in significant residual impacts to the Koala. The clearing of vegetation and habitat for the Koala is expected to result in the loss of habitat. With the mitigation measures proposed, the Project is not expected to result in significantly fewer impacts and **is therefore likely to result in a significant residual impact for the Koala.**

### Section 5 Avoidance and Mitigation

Mitigation measures have been developed to minimise impacts associated with construction and operation of the Project. Mitigation strategies have been developed based on the following hierarchical criteria:

- Avoid potential impacts where possible;
- Minimise the severity and/or duration of the impact; and
- Offset unavoidable impacts.

Future survey(s) such as pre-clearance surveys are proposed to occur prior to construction. The potential impacts to MNES, including threatened fauna and flora because of the activities, and suggested mitigation measures are outlined in the following sections.

A pre-lodgement meeting took place with the DES on 15 July 2021 where discussions regarding the avoidance and mitigation measures/options were had. During this meeting, it was decided to avoid any direct disturbance to threatened plants with clearing to occur within 100 m of the outermost plants. Due to this, a clearing permit (protected plants) was required. An Impact Management Plan (IMP) for this population of Kogan waxflower has been prepared and submitted in support of a clearing permit (protected plants) application in accordance with Section 87 of the Nature Conservation (Plants) Regulation 2020. This application was submitted on 04 November 2021.

#### 5.1 Relevant Guidance Material

The guidance material for the management measures included consider:

- Recovery Plans,
- Threat Abatement Plans; and
- Conservation Advice.

These are identified in the relevant species in Section 3.4. Relevant measures were considered and if relevant included in tables included in 5.2 and **Appendix M**.

#### 5.2 Mitigation Measures and Sub Plans

Each measure listed in sections below identifies the following:

- Action;
- Responsible party;
- Environmental outcomes to be achieved;
- Millstones / performance / completion criteria; and
- Proposed monitoring and evaluation program.

The following management plans are expected to be prepared:

- Project Construction Environmental Management Plan (CEMP);
- Rehabilitation Management Plan (RMP);
- Operational Management Plan (OMP);
- Salinity Management Plan;
- Erosion and Sediment Control Plan (ESCP); and
- MNES Management Plan.

## Section 5 Avoidance and Mitigation

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If required, other plans not identified above will be prepared for the Project. For the purposes of this assessment three (3) management plans listed above have been drafted which incorporate mitigation measures outlined in this document. A Project CEMP, OEMP and an MNES Management Plan are included as **Appendix Q**.



### 5.2.1 General

A list of general management measures has been developed regarding the Project as a whole. These management measures may relate to any of the following:

- Habitat clearing and connectivity;
- Direct fauna mortality;
- Pest and weeds;
- Air quality and dust;
- Heat island effect;
- Noise;
- Accidental release of pollutants;
- Bushfire and fire; and/or
- Koala habitat.

The general mitigation measures that are proposed in Table 5-1 will be implemented.

**Table 5-1 General Project Mitigation Measures**

No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Triggers for Remedial Actions	Effectiveness
G1	Environmental awareness training aimed at ecological issues as part of site induction.	During construction and operation	Site Supervisor	Environmental harm caused to fauna is minimised. Preservation of vegetation and limiting unnecessary clearing.	To be completed as part of induction training prior to construction and operation for all staff.	To be enforced as part of CEMP and OMP. To be communicated to all staff during pre-start / inductions.	Not applicable	<b>High</b> This is a repeatable management measure which can be enforced simply.
G2	Ensure all vehicles are strictly controlled and do not operate in areas outside the needs of the Project construction.	During construction and operation	All Personnel	Environmental harm caused to fauna is minimised. Unnecessary damage to vegetation is minimised	Completed daily during construction at relevant work areas.	Works to be undertaken in accordance with the proposed CEMP. To be communicated to all staff during pre-start / inductions.	Trigger: Vehicles operate outside areas of construction. Action: Monitor vehicle movements and induct staff on no-go areas.	<b>Medium</b> This management measure depends on the enforcement at the site.
G3	Ensure all vehicles comply with designated speed limits whilst traversing site.	During construction and operation	All Personnel	Environmental harm caused to fauna is minimised.	To be enforced daily.	To be communicated to all staff during pre-start / inductions. To be enforced as part of CEMP and OMP.	Not applicable	<b>High</b> This is a repeatable management measure. Speed limits are routinely enforced across various Projects of this type.

## Section 5 Avoidance and Mitigation

No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Triggers for Remedial Actions	Effectiveness
G4	Minimise the occurrence of off-road vehicle movements.	During construction and operation	All Personnel	Environmental harm caused to fauna is minimised. Unnecessary damage to vegetation is minimised.	Completed daily during construction at relevant work areas.	Works to be undertaken in accordance with the proposed CEMP.	Not applicable	<b>Medium</b> This management measure depends on the enforcement at the site.
G5	Provide timely, ongoing communication and consultation with all directly impacted landowners and other stakeholders.	At all times during clearing, construction and operation	Environmental Representative	No adverse impacts from air pollution and dust during construction and operation.	Ensure checks are completed with landholders prior to any activities which may result in impacts to landholders and other stakeholders.	To be enforced through construction and operation procedures.	Not Applicable	<b>Medium</b> Landholder and stakeholder consultation is often overlooked. Will require the site representative to correctly carry out timely notifications.

5.2.2 Habitat Clearing and Connectivity

The objective of management measures relevant to habitat clearing and connectivity include:

- Compliance with legal and other requirements e.g., permits, licences and approval condition;
- Environmental harm is minimised;
- Environmental performance and compliance is monitored; and
- Ensure all staff are aware of the environmentally sensitive features on site.

The mitigation measures are proposed in Table 5-2 will be implemented.

Table 5-2 Habitat Clearing and Connectivity Objectives and Management Measures

No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Triggers for Remedial Actions	Effectiveness
HC1	Vegetation located adjacent to the Project construction works to be appropriately marked to avoid unnecessary clearing/vegetation damage.	Pre-clearing, clearing and construction	Environmental Representative / Environmental Engineer	Preservation of vegetation and limiting unnecessary clearing.	Completed daily during construction at relevant work areas.	Monitoring to be included in the proposed CEMP. To be communicated to all staff during pre-start / inductions.	Trigger: Vegetation is cleared outside the required area. Action: Revegetate	<b>High</b> This is a repeatable measure which provides clear direction. This is a proven measure suitable for limiting disturbance.
HC2	Revegetation works to be undertaken in areas where land has been disturbed but is not required for operations, using hydromulch and native grass to minimise erosion (as per Section 5.5.3)	Subsequent to construction works.	Environmental Representative	Returning of disturbed land that is not required in operations to previous quality.	Completed upon finish of construction works.	To be evaluated in accordance with the proposed RMP.	Trigger: Erosion, revegetation is unsuccessful via site inspection. Action: Revegetate and re-mulch	<b>Medium</b> This management measure depends on the quality of revegetation

## Section 5 Avoidance and Mitigation

No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Triggers for Remedial Actions	Effectiveness
								works undertaken.
HC3	Survey and pegged disturbance footprint, prior to clearing to avoid unnecessary clearing of vegetation beyond that detailed during the design phase.	During pre-clearing, clearing and construction.	Environmental Representative / Contractors	Preservation of vegetation and limiting unnecessary clearing.	Completed daily during construction at relevant work areas.	Monitoring to be included in the proposed CEMP. To be recorded in detailed design documentation. To be communicated to all staff during pre-start / inductions	Trigger: Vegetation clearance extends beyond survey peg. Action: Revegetate and rehabilitate	<b>High</b> This is a repeatable measure which provides clear direction. This is a proven measure suitable for limiting disturbance.
HC4	Prior to any vegetation disturbance, a suitably qualified fauna spotter catcher is to be onsite to inspect and remove fauna (if required). All fauna recorded during pre-clearing surveys will be recorded on a dedicated fauna register. Construction areas that pose a risk to fauna to be fenced off where practical.	During pre-clearing and clearing.	Environmental Representative	Environmental harm caused to fauna is minimised.	Completed daily during construction at relevant work areas.	Works to be undertaken in accordance with the proposed CEMP.	Trigger: Fauna not removed, incorrect fencing of fauna. Action: Remove fauna, replace fencing	<b>High</b> Presence of a trained ecologist during pre-clearance surveys is a proven measure to prevent any impacts to fauna.
HC5	All fauna and flora, including fauna habitat (i.e., hollows, fallen logs, cracking soils etc) and weed species must be recorded in a detailed register during pre-clearing surveys. All fauna recorded during the pre-clearing, clearing, construction and operation will be recorded on a dedicated fauna register. Environmental	During pre-clearing works, clearing, construction and operation.	All staff and contractors / Environmental representative	Environmental harm caused to fauna is minimised	Completed during pre-clearance surveys and daily during clearing and construction at relevant work areas.	Works to be undertaken in accordance with the proposed CEMP.	Trigger: Fauna / fauna habitat not recorded properly. Action: Assess fauna records regularly for detail requirements.	<b>High</b> Presence of a trained ecologist during pre-clearance surveys is a proven measure to prevent any

## Section 5 Avoidance and Mitigation

No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Triggers for Remedial Actions	Effectiveness
	representative is to manage all records of threatened species and upload data to a public mapping register (e.g., ALA or Wildlife Online databases).							impacts to fauna.
<b>G1</b>	Ensuring all vehicles are strictly controlled and do not operate in areas outside the needs of the Project construction.	During all project phases.	Environmental Representative / Contractors	Environmental harm caused to fauna is minimised. Unnecessary damage to vegetation is minimised	Completed daily during construction at relevant work areas.	Works to be undertaken in accordance with the proposed CEMP.	Trigger: Vehicles operate outside areas of construction. Action: Monitor vehicle movements and induct staff on no-go areas.	<b>Medium</b> This management measure depends on the enforcement at the site.
<b>G4</b>	Minimise the occurrence of off-road vehicle movements.	During all project phases.	All Staff and Contractors	Environmental harm caused to fauna is minimised. Unnecessary damage to vegetation is minimised.	Completed daily during construction at relevant work areas.	Works to be undertaken in accordance with the proposed CEMP.	Not applicable	<b>Medium</b> This management measure depends on the enforcement at the site.
<b>HC6</b>	Design and construction of fencing/infrastructure to direct fauna towards safe passage and around construction area.	During the design, clearing and construction phases.	Environmental Representative / Environmental Engineer	Preservation of vegetation and limiting unnecessary clearing. Environmental harm caused to fauna is minimised.	To be undertaken during detailed design process. To be monitored during operation.	To be recorded in detailed design documentation. Success to be documented in the OMP.	Trigger: Fauna movements in unsafe areas. Action: Fencing is to be regularly checked and any fauna in unsafe areas are recorded.	<b>Medium</b> This management measure depends on the detailed design process.



## Section 5 Avoidance and Mitigation

No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Triggers for Remedial Actions	Effectiveness
HC7	Vehicle washdown procedures. Wash-down areas will be clearly marked to prevent contaminated water from leaching into soils or flowing into nearby watercourses.	During clearing, construction and operation.	Environmental Representative	Preservation of vegetation and limiting unnecessary clearing. Environmental harm caused to fauna is minimised.	To be enforced daily.	To be enforced as part of CEMP and OMP.	Trigger: Contamination leaching into soils and watercourses. Action: Vehicle washdown areas are regularly inspected for contaminants.	<b>High</b> This is a repeatable management measure. Vehicle washdown implemented across various Projects of this type.
HC8	Appropriate speed limits should be in place throughout the site and all contractors will be educated on the risks to local fauna and reduce increase in dust emissions when driving.	During clearing, construction and operation.	Environmental Representative	Environmental harm caused to fauna is minimised.	To be enforced daily.	To be enforced as part of CEMP and OMP.	Not applicable	<b>High</b> This is a repeatable management measure. Speed limits are routinely enforced across various Projects of this type.
HC9	To reduce the risk of mortality to native wildlife, no domestic animals are permitted onsite.	During all project phases.	All Staff and Contractors	Environmental harm caused to fauna is minimised.	To be enforced daily.	To be enforced as part of CEMP and OMP.	Trigger: Fauna mortality from domesticated animals Action: Any domestic animal brought to site is immediately removed and the incident is reported.	<b>High</b> This is a repeatable management measure which can be enforced simply.

## Section 5 Avoidance and Mitigation

No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Triggers for Remedial Actions	Effectiveness
<b>G1</b>	Environmental awareness training aimed at ecological issues as part of site induction.	During all project phases.	Environmental Representative / Contractors	Environmental harm caused to fauna is minimised. Preservation of vegetation and limiting unnecessary clearing.	To be completed as part of induction training prior to construction and operation for all staff.	To be enforced as part of CEMP and OMP.	Not applicable	<b>High</b> This is a repeatable management measure which can be enforced simply.
<b>HC10</b>	Avoid clearing trees with obvious hollows. If trees are required to be removed the proponent shall engage the services of a licensed, qualified Spotter Catcher to complete pre-clearing checks and be present during removal. They should also inspect the clearing limits. If hollow bearing trees do require removal, they should first be inspected using an elevated work platform to determine if fauna are present. If fauna is detected, they would be safety removed prior to tree felling.	During pre-clearing works, clearing and construction.	Environmental Representative / Contractors	Environmental harm caused to fauna is minimised.	To be enforced during construction.	To be enforced as part of CEMP.	Trigger: Trees with hollows are cleared. Action: A fauna spotter catcher is to advise which trees are not permitted for removal.	<b>Medium</b> This measure requires a spotter catcher to enforce. Potential for trees with hollows may be missed.
<b>HC11</b>	Habitat trees must only be cleared once there are no animals present within the tree.	During clearing and construction.	All staff and contractors	Environmental harm caused to fauna is minimised.	To be enforced during clearing and construction.	To be enforced as part of CEMP.	Trigger: Fauna injuries due to clearing. Action: A fauna spotter catcher is to inspect hollows and advise when it is safe to remove trees.	<b>Medium</b> This measure requires a spotter catcher to enforce.

## Section 5 Avoidance and Mitigation

No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Triggers for Remedial Actions	Effectiveness
HC12	<p>Tree hollow preparation and clearing must be undertaken through the following steps:</p> <ul style="list-style-type: none"> <li>Clearly mark the HBT to be removed and/or retained by differentiating with coloured flagging tape;</li> <li>Remove all non-hollow bearing vegetation prior to the removal of hollow bearing trees;</li> <li>Following the clearing of non-hollow bearing vegetation, there must be 12 hours between clearing works prior to clearing hollow bearing trees;</li> <li>Hollows must be checked again and gently tapped along tree trunk using an excavator or loader to scare fauna from hollows;</li> <li>Re-check hollows after felling to ensure no fauna have become trapped or injured during the clearing works;</li> <li>If taking the hollow-bearing trees down in stages, the non-hollow-bearing branches should be removed using a cherry picker before the hollow-bearing branches are removed;</li> <li>Fell trees into the zone of disturbance to avoid damaging adjacent vegetation;</li> <li>Any logs from the felled trees should be distributed into areas of</li> </ul>	During clearing and construction.	Environmental Representative / All staff and contractors	Environmental harm caused to fauna is minimised.	To be enforced during clearing and construction.	To be enforced as part of CEMP.	<p>Trigger: Tree hollows to be retained are removed. Fauna injuries occur during tree hollow removal.</p> <p>Action: A fauna spotter catcher is to advise which trees are not permitted for removal. A fauna spotter catcher is to inspect hollows and advise when it is safe to remove trees.</p>	<p><b>Medium</b> This management measure requires a spotter catcher to enforce onsite.</p>

## Section 5 Avoidance and Mitigation

No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Triggers for Remedial Actions	Effectiveness
	<p>vegetation to be retained where it would not be considered a fire hazard; and</p> <p>Any stockpiles of vegetation that are left for 12 hours must be re-checked before removal or mulching.</p>							
HC13	<p>Any hollows that are removed are to be stored and transported safely by a fauna spotter catcher as per the Guideline for the Relocation of Large Tree Hollows (Central Coast Council, 2016):</p> <p><b>Hollow Removal:</b></p> <ul style="list-style-type: none"> <li>• A fauna spotter catcher is required to inspect tree hollows for resident fauna before removal procedure;</li> <li>• Any unnecessary limbs should be removed using a chainsaw and trunk above the hollow should be cut using a chainsaw before cutting the lower section, a cloth sling should be attached to the section.</li> <li>• The cutting point of the hollow is to be selected, if the hollow is to include the compete chamber, the cut should be positioned low enough to conserve enough termite mud (Central Coast Council, 2016);</li> <li>• The cut hollow section is to be lowered carefully to prevent damage (potentially using friction drum or crane, this is dependent on the decision of tree arborist, based on</li> </ul>	During clearing and construction.	Environmental Representative	Environmental harm caused to fauna is minimised.	To be enforced during clearing and construction.	To be enforced as part of CEMP.	<p>Trigger:</p> <p>Fauna injuries occur during tree hollow removal.</p> <p>Tree hollows are damaged during removal/relocation process.</p> <p>Action:</p> <p>A fauna spotter catcher is to inspect hollows and advise when it is safe to remove trees.</p> <p>Tree hollow removal and relocation are undertaken as per the Guideline for the Relocation of Large Tree Hollows</p>	<p><b>Medium</b></p> <p>This management measure requires a spotter catcher to enforce onsite.</p>

## Section 5 Avoidance and Mitigation

No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Triggers for Remedial Actions	Effectiveness
	<p>size and weight of the hollow section).</p> <p><b>Storage:</b></p> <ul style="list-style-type: none"> <li>If the hollow sections are stored on the ground temporarily, the hollow must be re-inspected before relocation and installation.</li> </ul> <p><b>Relocation/Transportation:</b></p> <ul style="list-style-type: none"> <li>Relocation of a hollow must be undertaken subsequent to submission of the relevant approvals and permissions;</li> <li>A fauna spotter catcher is required to inspect tree hollows for resident fauna and collect any evidence samples of tree hollow use (i.e., feathers, pellets etc.);</li> <li>A fauna spotter catcher is to assess the recipient tree with suitability for roosting habitat, and located in an ideal location (i.e., away from noise and lighting);</li> <li>An arborist is to inspect the recipient tree for structural integrity and whether tree is suitable for hollows to be placed 10-15 m high; and</li> <li>The hollow section is to be transported carefully to prevent damage, using a cloth swing and crane.</li> </ul> <p><b>Installation in recipient tree:</b></p>							

## Section 5 Avoidance and Mitigation

No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Triggers for Remedial Actions	Effectiveness
	<ul style="list-style-type: none"> <li>Termite mud is to be used at the base of the hollow, with a minimum thickness of 100 mm;</li> <li>The hollow section is to be lifted carefully to prevent damage, using a cloth swing and crane. Tree arborists are to guide the placement of the hollow sections onto the supporting branch;</li> </ul> <p>All fasteners and hardware used to affix the section to the recipient tree are to be suitable for external use. (e.g., galvanised, stainless steel, brass).</p>							
HC14	<p>All clearing and construction staff and fauna spotter/catchers onsite must have a two-way radio on hand at all times to effectively communicate the observation of fauna or potential risks and/or injuries.</p>	During clearing and construction.	All staff and contractors	Environmental harm caused to fauna is minimised.	To be enforced during clearing and construction.	To be enforced as part of CEMP.	<p>Trigger: Injuries to personnel/fauna occur due to inadequate communication.</p> <p>Action: All staff collect a two-way radio at the site office daily.</p>	<p><b>Medium</b></p> <p>This management measure depends on the enforcement at the site.</p>
HC15	<p>Any native bee nests identified during pre-clearance, clearing on construction works must be safely relocated using the following procedure:</p> <ul style="list-style-type: none"> <li>Nest entrances to be blocked using cloth at dusk;</li> </ul> <p>Nests are to be removed the following day by a fauna spotter / catcher, via</p>	During clearing and construction.	All staff and contractors	Environmental harm caused to fauna is minimised.	To be enforced during clearing and construction.	To be enforced as part of CEMP.	<p>Trigger: Damage to bee nests or incorrect relocation</p> <p>Action: A fauna spotter catcher is to relocate bee nests to an appropriate location.</p>	<p><b>Medium</b></p> <p>This management measure requires a fauna spotter catcher and depends on</p>



## Section 5 Avoidance and Mitigation

No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Triggers for Remedial Actions	Effectiveness
	appropriate hollow removal methods (i.e., cherry picker) and are to be relocated more than 2 km from the site.							the enforcement at the site.
HC16	Following the widening and grading of the access road, road verges will be revegetated to maintain and enhance the narrow east-west connectivity along the current Forest Road track, particularly where it runs through otherwise cleared pasture.	Post clearing and construction	Environmental Representative	Environmental harm caused to fauna is minimised.	To be enforced following clearing and construction.	To be enforced as part of CEMP.	Not Applicable	<b>High</b> This is a repeatable measure which provides clear direction. This is a proven measure suitable for limiting disturbance.
HC17	Habitat clearing activities should be undertaken during 'quiet' periods for the relevant species (i.e., no clearing is to be undertaken during breeding periods when fauna is most active/mobile) where practicable.	During clearing and construction.	Environmental Representative	Environmental harm caused to fauna is minimised.	To be enforced during clearing and construction.	To be enforced as part of CEMP and MNES MP.	Trigger: Fauna death/injuries occur during habitat clearing.  Action: A fauna spotter catcher is to advise when it is safe to remove trees.	<b>High</b> This is a proven measure suitable for limiting fauna stress and mortality
HC18	Pre-emergent herbicides must be applied following vegetation clearing before the weed seeds germinate and are to be irrigated into the soil. Potential pre-emergent herbicides can include dimethphenamid-d, flumioxazin, indaziflam, isoxaben, napropamide, oryzalin, oxadiazon, oxyfluorfen,	During clearing and construction.	Environmental Representative	Prevention of weeds within the disturbed / cleared environment.	To be enforced during clearing and construction.	To be enforced as part of CEMP.	Trigger: Weeds are established in the cleared environment.  Action:	<b>Medium</b> This management measure depends on the enforcement at the site.

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No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Triggers for Remedial Actions	Effectiveness
	<p>pendimethalin, prodiamine, and trifluralin.</p> <p>A secondary layer of pre-emergent herbicide will be required 7 to 10 days after initial application and irrigated into the soil.</p>						Herbicides are to be used to eradicate weeds.	

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### 5.2.2.1 Fauna Fencing

Fauna proof fencing to be established along the PV Power Station area should follow specifications in the Department of Transport and Main Roads Standard Drawing 1603 (DTMR 2021) and at a minimum will:

- Be a minimum 1.8m high;
- Be 3 m from any retained trees or plantings (excluding grasses) on the habitat side of the fence and be clear of all overhanging branches and vines;
- Have a minimum 50 cm wide scratch panelling installed along the top of the length of the habitat side of the fence (refer to TMR Standard Drawing 1603 for design details to provide a smooth top edge of the fence to avoid snagging of entrapped Koalas and other arboreal fauna); and
- Be dug into the ground to a depth of at least 150 mm along the length of the fence (excluding access gates).

Inclusion of fauna escape mechanisms along the PV Power Station fencing is to include escape climbing poles and fauna escape (one-way) ramps. These escape mechanisms are to be installed alternately at 125 m intervals (i.e., intervals between escape mechanisms of the same type will be 250 m) (DES 2022b) along the PV Power Station side of the fence. These will involve the following:

- Koala escape poles will be made from salvaged tree trunks or retained trees (where possible) to encourage the use by entrapped Koalas and be a minimum of 125 mm in diameter;
- Koala escape poles will have a “climb down” pole that has 50 cm wide scratch panelling installed around the base to prevent Koalas and other arboreal fauna from breaching the fence via the pole (as shown in Figure 5-1);
- Additional scratch panelling will be installed on the fence in line with the “climb down” pole, covering the entire height of the fence (as shown in Figure 5-1);
- Koala escape poles will be within 300 mm of the fencing;
- Shrubs will be planted around the base of escape poles (on the PV Power Station side of the fence) to provide cover and refuge for entrapped fauna and encourage the use of escape poles by entrapped Koalas and other arboreal fauna; and
- Fauna escape ramps should be designed as specified in Figure 5-2 and at a height of 1.2 - 1.5 m, so as to maximise the opportunity for animals to find and use the ramps for their intended purpose and minimise potential for animals to enter the PV Power Station via the ramps.

A fully-funded agreement will be put in place with a relevant organisation or authority for the maintenance and monitoring of the fencing and fauna escape mechanisms in perpetuity. This will include the maintenance of the 3 m clearance from trees and shrubs on the habitat side of the fence and removal of all overhanging branches, vines, and other vegetation.

## Section 5 Avoidance and Mitigation



Figure H1 Escape pole attached to tree near fauna-exclusion fence line

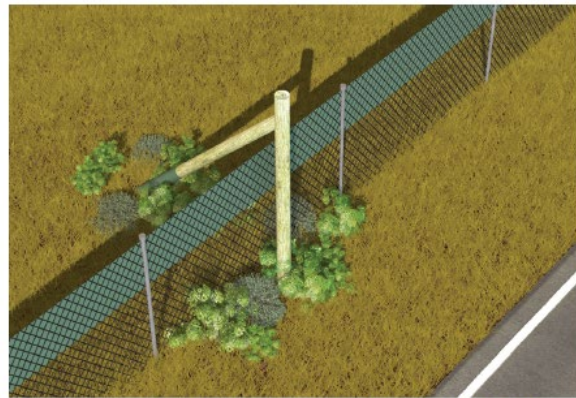


Figure H2 Escape pole along fauna-exclusion fence shown here with plantings offering temporary safe refuge



Figure H3 Escape pole with H-shaped design offering resting bar and safe refuge from the ground. This design was trialled during this study



Figure H4 Escape pole with an alternative design to the H-shaped escape pole

**Figure 5-1 Concept Drawings of Recommended Design Options of Koala Escape Poles (Source: Jones et al. 2012)**

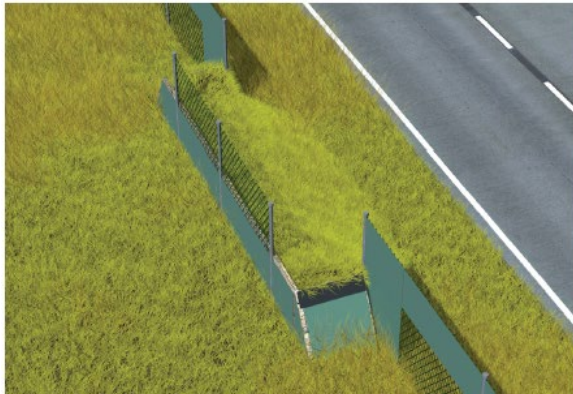


Figure H5 (a) Back view of large escape ramp designed to allow animals trapped on the roadway to re access roadside bushland habitat. The panelling on the escape ramp was designed to deter animals from climbing the structure and entering the roadway.

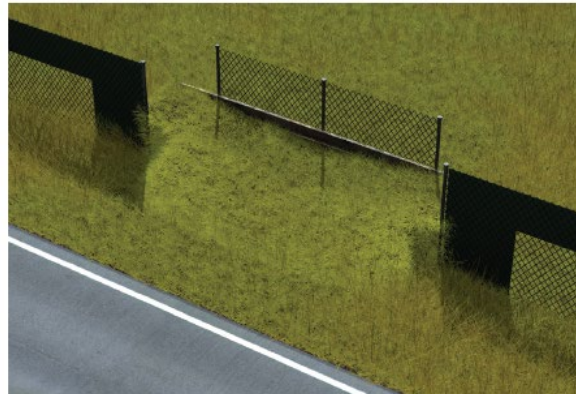


Figure H5 (b) Front view of large escape ramp as seen in Fig. H5 (a) showing how the animal can access desired habitat from the roadway.

**Figure 5-2 Concept Drawings of the Recommended Design of Fauna Escape Ramps (Source: Jones et al. 2012)**

5.2.3 Direct Fauna Mortality

The objective of management measures relevant to direct fauna mortality include:

- Compliance with legal and other requirements e.g., permits, licences and approval condition;
- Environmental harm is minimised;
- Environmental performance and compliance are monitored; and
- Ensure all staff are aware of the environmentally sensitive features on site.

The following mitigation measures are proposed and further detailed in Table 5-3:

- The Project CEMP will include measures to establish protocols for pre-clearing surveys and data collection regarding fauna incidents; and
- Prior to any vegetation disturbance a trained ecologist or other qualified environmental specialist will be on site to remove fauna (if required).

Table 5-3 Direct Fauna Mortality Objectives and Management Measures

No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Triggers for Remedial Action	Effectiveness
HC1	Vegetation located adjacent to the Project construction works to be appropriately marked to avoid unnecessary clearing/vegetation damage.	During pre-clearing, clearing and construction.	Environmental Representative / Environmental Engineer	Preservation of vegetation and limiting unnecessary clearing.	Completed daily during construction at relevant work areas.	Monitoring to be included in the proposed CEMP.	Trigger: Cleared outside the area. Action: Revegetate	<b>High</b> This is a repeatable measure which provides clear direction. This is a proven measure suitable for limiting disturbance.



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No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Triggers for Remedial Action	Effectiveness
HC4	Prior to any vegetation disturbance, a trained ecologist or other qualified environmental specialist to be onsite to inspect and remove fauna (if required). All fauna recorded during pre-clearing surveys will be recorded on a dedicated fauna register. Construction areas that pose a risk to fauna to be fenced off where practical.	During pre-clearing and clearing.	Environmental Representative	Environmental harm caused to fauna is minimised.	Completed daily during construction at relevant work areas.	Works to be undertaken in accordance with the proposed CEMP.	Trigger: Fauna not removed, incorrect fencing of fauna. Action: Remove fauna, replace fencing	<b>High</b> Presence of a trained ecologist during pre-clearance surveys is a proven measure to prevent any impacts to fauna.
G2	Ensuring all vehicles are strictly controlled and do not operate in areas outside the needs of the Project construction.	During all project phases.	Environmental Representative / Contractors	Environmental harm caused to fauna is minimised. Unnecessary damage to vegetation is minimised	Completed daily during construction at relevant work areas.	Works to be undertaken in accordance with the proposed CEMP.	Trigger: Vehicles operate outside areas of construction. Action: Monitor vehicle movements and induct staff on no-go areas.	<b>Medium</b> This management measure depends on the enforcement at the site.
G4	Minimise the occurrence of off-road vehicle movements.	During all project phases.	All Staff and Contractors	Environmental harm caused to fauna is minimised. Unnecessary damage to vegetation is minimised.	Completed daily during construction at relevant work areas.	Works to be undertaken in accordance with the proposed CEMP.	Not applicable	<b>Medium</b> This management measure depends on the enforcement at the site.



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No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Triggers for Remedial Action	Effectiveness
HC8	Appropriate speed limits should be in place throughout the site and all contractors will be educated on the risks to local fauna and reduce increase in dust emissions when driving.	During all project phases.	Environmental Representative	Environmental harm caused to fauna is minimised.	To be enforced daily.	To be enforced as part of CEMP and OMP.	Not applicable	<b>High</b> This is a repeatable management measure. Speed limits are routinely enforced across various Projects of this type.
HC9	To reduce the risk of mortality to native wildlife, no domestic animals are permitted onsite.	During all project phases.	All Staff and Contractors	Environmental harm caused to fauna is minimised.	To be enforced daily.	To be enforced as part of CEMP and OMP.	Trigger: Fauna mortality from domesticated animals Action: Any domestic animal brought to site is immediately removed and the incident is reported.	<b>High</b> This is a repeatable management measure which can be enforced simply.
G1	Environmental awareness training aimed at ecological issues as part of site induction.	During all project phases.	Environmental Representative / Contractors	Environmental harm caused to fauna is minimised. Preservation of vegetation and limiting unnecessary clearing.	To be completed as part of induction training prior to construction and operation for all staff.	To be enforced as part of CEMP and OMP.	Not applicable	<b>High</b> This is a repeatable management measure which can be enforced simply.

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No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Triggers for Remedial Action	Effectiveness
HC10	Avoid clearing trees with obvious hollows. If trees are required to be removed the proponent shall engage the services of a licensed, qualified Spotter Catcher to complete pre-clearing checks and be present during removal. They should also inspect the clearing limits. If hollow bearing trees do require removal, they should first be inspected using an elevated work platform to determine if fauna are present. If fauna is detected, they would be safety removed prior to tree felling.	During pre-clearing works, clearing and construction.	Environmental Representative / Contractors	Environmental harm caused to fauna is minimised.	To be enforced during construction.	To be enforced as part of CEMP.	Trigger: Trees with hollows are cleared. Action: A fauna spotter catcher is to advise which trees are not permitted for removal.	<b>Medium</b> This measure requires a spotter catcher to enforce. Potential for trees with hollows may be missed.
HC11	Habitat trees must only be cleared once there are no animals present within the tree.	During clearing and construction.	All staff and contractors	Environmental harm caused to fauna is minimised.	To be enforced during clearing and construction.	To be enforced as part of CEMP.	Trigger: Fauna injuries due to clearing. Action: A fauna spotter catcher is to inspect hollows and advise when it is safe to remove trees.	<b>Medium</b> This measure requires a spotter catcher to enforce

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No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Triggers for Remedial Action	Effectiveness
HC14	All clearing and construction staff and fauna spotter/catchers onsite must have a two-way radio on hand at all times to effectively communicate the observation of fauna or potential risks and/or injuries.	During clearing and construction.	All staff and contractors	Environmental harm caused to fauna is minimised.	To be enforced during clearing and construction.	To be enforced as part of CEMP.	Trigger: Injuries to personnel/fauna occur due to inadequate communication. Action: All staff collect a two-way radio at the site office daily.	<b>Medium</b> This management measure depends on the enforcement at the site.
HC15	Any native bee nests identified during pre-clearance, clearing on construction works must be safely relocated using the following procedure: <ul style="list-style-type: none"> <li>Nest entrances to be blocked using cloth at dusk;</li> </ul> Nests are to be removed the following day by a fauna spotter / catcher, via appropriate hollow removal methods (i.e., cherry picker) and are to be relocated more than 2 km from the site.	During clearing and construction.	All staff and contractors	Environmental harm caused to fauna is minimised.	To be enforced during clearing and construction.	To be enforced as part of CEMP.	Trigger: Damage to bee nests or incorrect relocation Action: A fauna spotter catcher is to relocate bee nests to an appropriate location.	<b>Medium</b> This management measure requires a fauna spotter catcher and depends on the enforcement at the site.

5.2.4 Pest and Weeds

The objective of management measures relevant to pest and weeds include:

- Compliance with legal and other requirements e.g., permits, licences and approval condition;
- Environmental harm is minimised;
- Environmental performance and compliance are monitored; and
- To prevent the introduction or spread of new declared weeds into construction area and control existing pest species within construction work areas during construction and operation.

Weed and pest management will be an important and integral part of proposed site management activities and will be detailed in specific weed and pest management protocols to be developed for the site. Proposed protocols and management measures are included in Table 5-4.

Table 5-4 Pests and Weeds Objectives and Management Measures

No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
HC6	Ensuring all vehicles are strictly controlled and do not operate in areas outside the needs of the Project construction.	During all project phases.	Environmental Representative / Contractors	Environmental harm caused to fauna is minimised. Unnecessary damage to vegetation is minimised	Completed daily during construction at relevant work areas.	Works to be undertaken in accordance with the proposed CEMP.	Trigger: Vehicles operate outside areas of construction. Action: Monitor vehicle movements and induct staff on no-go areas.	<b>Medium</b> This management measure depends on the enforcement at the site.

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No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
HC7	Minimise the occurrence of off-road vehicle movements.	During all project phases.	All Staff and Contractors	Environmental harm caused to fauna is minimised. Unnecessary damage to vegetation is minimised.	Completed daily during construction at relevant work areas.	Works to be undertaken in accordance with the proposed CEMP.	Not applicable	<b>Medium</b> This management measure depends on the enforcement at the site.
HC8	Design and construction of fencing/infrastructure to direct fauna towards safe passage and around construction area.	During the design, clearing and construction phases.	Environmental Representative / Environmental Engineer	Preservation of vegetation and limiting unnecessary clearing. Environmental harm caused to fauna is minimised.	To be undertaken during detailed design process. To be monitored during operation.	To be recorded in detailed design documentation. Success to be documented in the OMP.	Trigger: Fauna movements in unsafe areas. Action: Fencing is to be regularly checked and any fauna in unsafe areas are recorded.	<b>Medium</b> This management measure depends on the detailed design process.
HC11	To reduce the risk of mortality to native wildlife, no domestic animals are permitted onsite.	During all project phases.	All Staff and Contractors	Environmental harm caused to fauna is minimised.	To be enforced daily.	To be enforced as part of CEMP and OMP.	Trigger: Fauna mortality from domesticated animals Action: Any domestic animal brought to site is immediately removed and the incident is reported.	<b>High</b> This is a repeatable management measure which can be enforced simply.

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No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
HC12	Environmental awareness training aimed at ecological issues as part of site induction.	During all project phases.	Environmental Representative / Contractors	Environmental harm caused to fauna is minimised. Preservation of vegetation and limiting unnecessary clearing.	To be completed as part of induction training prior to construction and operation for all staff.	To be enforced as part of CEMP and OMP.	Not applicable	<b>High</b> This is a repeatable management measure which can be enforced simply.
PW1	Implementation of sediment control mechanisms to minimise the risk of weed seed washing into drainage channels.	During clearing and construction.	Environmental Representative / Environmental Engineer	Prevent the introduction or spread weeds.	Sediment control mechanisms to be inspected weekly during construction and operation.	To be included in ESCP.	Not applicable	<b>Medium</b> The effectiveness of this management measure depends on the implementation and type of sediment control mechanisms employed.
PW2	Implement control strategies outlined in the Department of Agriculture and Fisheries (DAF) weed and pest animal fact sheets and other relevant government biosecurity management strategies.	During all Project phases.	Environmental Representative	Prevent the introduction or spread weeds. Control pest species.	Control strategies to be inspected as required and will be subject to specific documentation and performance metrics.	To be enforced as part of CEMP and OMP.	Not applicable	<b>High</b> This management measure involves inclusion of strategies identified in proven material.



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No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
PW3	Onsite waste disposal strategies (particularly for food wastes) to be employed that will not encourage the presence of pest fauna	During clearing, construction and operation.	All Staff and Contractors	Control pest species and limit the potential for pest species to occur.	Limit the potential for pest species to occur.	Weekly monitoring during construction and monthly during operations. To be enforced as part of CEMP and OMP.	Trigger: Presence of pest fauna onsite due to waste Action: Waste management strategies as per council guidelines	<b>Medium</b> The effectiveness of this management measure relies on enforcement at the site level.
PW4	Monitoring and weed inspections particularly in response to reported outbreaks or complaints from adjacent property owners	During all Project phases.	Environmental Representative / Contractors	Prevent the introduction or spread weeds.	Limit the outbreaks based on a robust monitoring scheme.	Weekly monitoring during construction and monthly during operations. To be enforced as part of CEMP and OMP.	Trigger: Weed infestations occur onsite. Action: Environmental representative is to inspect the site weekly during construction and monthly during operations and record any weeds before eradication methods are applied.	<b>Medium</b> The effectiveness of this management measure relies on enforcement at the site level and receiving information from the adjacent property owners which may not always be forthcoming.

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No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
PW5	Regular onsite inspections of site infrastructure / equipment for resident pest fauna and establishment of a register for pest sightings	During all Project phases.	Environmental Representative / Contractors	Control pest species.	Identifying pest fauna will help ensure no further impacts occur.	Weekly monitoring during construction and monthly during operations. To be enforced as part of CEMP and OMP.	Trigger: An increase of pest fauna onsite. Action: Weekly monitoring during construction and monthly during operations.	<b>Medium</b> The effectiveness of this management measure relies on enforcement at the site level through inspections.
PW6	Weed management during and following rehabilitation to prevent habitat degradation and potential increased fire risk.	During construction and operation.	Environmental Representative	No adverse impacts from air pollution and dust during construction and operation No adverse impacts from fire during construction and operation. Prevent the introduction or spread weeds.	Identification and reporting of weed management effectiveness.	To be enforced as part of CEMP and OMP but requires enforcement at the site.	Trigger: Increased fire risks Action: Weekly monitoring of weeds during construction and monthly during operations.	<b>Medium</b> The effectiveness of this management measure relies on enforcement at the site level through inspections.

5.2.5 Air Quality and Dust

The objective of management measures relevant to dust is no adverse impacts from air pollution and dust during construction and operation.

Dust is not anticipated to significantly impact terrestrial or aquatic habitats in the Project or surrounding areas. However, regular inspections for dust accumulation impacts on riparian vegetation located adjacent to the Project will be implemented as part of standard operating protocols for the Project. The following measures in Table 5-5 have been developed to ensure dust levels resulting from the Project are kept to a minimum.

Table 5-5 Air Objectives and Management Measures

No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
HC8	Appropriate speed limits should be in place throughout the site and all contractors will be educated on the risks to local fauna and reduce increase in dust emissions when driving.	During all project phases.	Environmental Representative	Environmental harm caused to fauna is minimised.	To be enforced daily.	To be enforced as part of CEMP and OMP.	Not applicable	<b>High</b> This is a repeatable management measure. Speed limits are routinely enforced across various Projects of this type.

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No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
A1	<p>Implementation of dust suppression measures, if dust is visible or when wind conditions become adverse, including:</p> <ul style="list-style-type: none"> <li>Watering of exposed areas; and</li> <li>Physical barriers (e.g., covering of exposed soil piles).</li> </ul> <p>The aim of measures is to prevent an increase of particulates (PM<sup>10</sup> and PM<sup>2.5</sup>) above the current baseline conditions.</p>	At all times during clearing and construction	Environmental Representative	No adverse impacts from air pollution and dust during construction and operation	Minimal to no offsite impacts.	To be enforced as part of CEMP.	<p>Trigger:</p> <p>Increase of particulates (PM<sup>10</sup> and PM<sup>2.5</sup>) above the current baseline conditions</p> <p>Action:</p> <p>Dust suppression measures are inspected and reviewed for adequacy weekly during construction and monthly during operations.</p>	<p><b>Medium</b></p> <p>Dust suppression is a common management measure with proven success and effectiveness.</p>
A2	<p>Trigger points for management decisions based on any or all of the following:</p> <ul style="list-style-type: none"> <li>Real-time measurements of wind conditions;</li> <li>Wind conditions as forecast by predictive numerical weather systems; and</li> <li>Dust monitoring at sensitive receptors when complaints are received.</li> </ul>	At all times during clearing and construction	Environmental Representative	No adverse impacts from air pollution and dust during construction and operation	Minimal to no offsite impacts.	To be enforced as part of CEMP and OMP.	Not Applicable	<p><b>Medium</b></p> <p>Relies on an effective real-time mechanism and appropriate trigger points to guide site personnel.</p>

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No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
A3	Suspension of earthworks during high wind conditions and change in operations during worst-case conditions (e.g., implementation of stricter dust controls).	At all times during clearing and construction	All Staff and Contractors	No adverse impacts from air pollution and dust during construction and operation	Minimal to no offsite impacts.	To be enforced as part of CEMP.	Trigger:  Action:	<b>High</b> Suspension of earthworks and change to operations will alleviate any potential impacts.
A4	Monitor dust control measures regularly for effectiveness.	At all times during clearing and construction	Environmental Representative	No adverse impacts from air pollution and dust during construction and operation	Regular monitoring.	Regular monitoring of dust control measures during adverse weather conditions. To be enforced as part of CEMP and OMP.	Trigger: Dust controls are ineffective. Action: Regular monitoring of dust control measures during adverse weather conditions.	<b>Medium</b> Relies on regulator monitoring during adverse weather conditions.
A5	If required, vehicles carrying loads with the potential to produce dust will be covered when moving within or outside the construction-site.	At all times during clearing and construction	All Staff and Contractors	No adverse impacts from air pollution and dust during construction and operation	This measure will be implemented throughout construction and operational phases.	To be enforced as part of CEMP.	Trigger: Increased dust during loaded vehicle movements Action: All vehicles carrying loads must be inspected for before leaving site.	<b>High</b> Covering of loads is a regulated in Queensland. This will be enforced onsite.

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No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
A6	Minimise extended engine idling and queuing adjacent to sensitive receptors.	At all times during clearing, construction and operation	All Staff and Contractors	No adverse impacts from air pollution and dust during construction and operation	This measure will be implemented throughout construction and operational phases.	To be enforced as part of CEMP and OMP but requires enforcement at the site. Inclusion in site induction material.	Trigger: Increased noise and fire risk Action: Included in site induction material.	<b>Low</b> This measure is dependent on the type of machinery or equipment used. This is a readily used management measure which is hard to enforce.
A7	Onsite burning of any material will not be undertaken without a valid permit from the relevant QFES Fire Warden.	During all Project phases.	Environmental Representative	No adverse impacts from air pollution and dust during construction and operation No adverse impacts from fire during construction and operation.	This measure will be implemented throughout construction and operational phases.	To be enforced as part of CEMP and OMP but requires enforcement at the site.	Trigger: Out of control fires Action: A permit must be obtained prior to onsite burning. Inclusion in site induction material	<b>High</b> This measure is effective in ensuring the strict no burning unless permitted.
A8	Ensure onsite fire-fighting equipment is regularly maintained and adequate staff training is implemented.	During all Project phases.	Environmental Representative	No adverse impacts from air pollution and dust during construction and operation. No adverse impacts from fire during construction and operation.	Equipment is regularly maintained and there are no breaches.	To be enforced as part of CEMP and OMP but requires enforcement at the site.	Trigger: Out of control fires Action: Fire equipment is maintained during construction and operations. Inclusion in site induction material	<b>High</b> This measure will ensure equipment is working and appropriate should it be required. This measure is readily implemented across various projects.



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No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
A9	Regular cleaning of machinery and vehicle tyres to prevent wheel entrained dust emissions.	At all times during clearing, construction and operation	Environmental Representative	No adverse impacts from air pollution and dust during construction and operation.	Equipment is regularly maintained and there are no breaches.	Enforce equipment and vehicle maintenance schedule.	Trigger: Dirty vehicle at prestart Action: Clean equipment	<b>Low</b> Will require the site representative to correctly carry out maintenance procedures. Effectiveness is generally limited.
A10	Areas stripped of topsoil for Project construction will be rehabilitated as soon as practicable where not required during operations.	During construction and operation	Environmental Representative	No adverse impacts from air pollution and dust during construction and operation. No adverse impacts from fire during construction and operation.	Ensure topsoil is not left standing for long period of time.	To be enforced as part of CEMP and OMP but requires enforcement at the site.	Not Applicable	<b>High</b> This is an effective and commonly used management measures.
A11	All plant and equipment (e.g., haulage trucks) are to be maintained and operated in accordance with Australian Design Rules and manufacturer's specification.	At all times during construction and operation	Site supervisor	No adverse impacts from air pollution and dust during construction and operation. No adverse impacts from fire during construction and operation.	Equipment is regularly maintained and there are no breaches.	Enforce equipment and vehicle maintenance schedule.	Trigger: Equipment fails pre-start / mechanical inspections. Action: Repair equipment.	<b>Low</b> Will require the site representative to correctly carry out maintenance procedures. Effectiveness is generally limited.

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No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
A12	Report any malfunctioning equipment to the Site Supervisor	At all times during construction and operation	All staff and contractors	No adverse impacts from air pollution and dust during construction and operation. No adverse impacts from fire during construction and operation.	Equipment is regularly maintained and there are no breaches.	Enforce equipment and vehicle maintenance schedule.	Not Applicable	<b>Low</b> Will require the site representative to correctly carry out maintenance procedures. Effectiveness is generally limited.
A13	Visually inspect the Project area and operations for smoke, fumes and dust	At all times during construction and operation	All staff and contractors	No adverse impacts from air pollution and dust during construction and operation. No adverse impacts from fire during construction and operation.	Regular monitoring.	Regular monitoring of dust control measures during adverse weather conditions. To be enforced as part of CEMP and OMP.	Trigger: Increased smoke, fumes and dust onsite Action: Regular monitoring of dust control measures during adverse weather conditions.	<b>Medium</b> Relies on regulator monitoring during adverse weather conditions.

5.2.6 Heat Island Effect

Although contradictory, solar arrays have potential to affect air and soil temperatures within the solar array perimeter, however in relation to outside of the solar array perimeter a heat island effect is unlikely to occur. Studies on heat island effect are contradictory and the actual impact from heat island effects is not clear. As the areas that directly comprise solar panels will be cleared impacts to fauna are not expected to occur as a result of the heat island effects.

Relevant objectives and management measures for the operational phase of the Project are outlined in Table 5-6.

Table 5-6 Heat Island Effect Objectives and Management Measures

No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
HIE1	Fencing around the solar array perimeter is to be checked and maintained regularly to minimise fauna within the solar array perimeter and minimise potential impacts from the heat island effect.	During construction and operation	Environmental Representative / Contractors	Environmental harm caused to fauna is minimised. Unnecessary damage to vegetation is minimised	Completed daily during construction at relevant work areas.	Works to be undertaken in accordance with the proposed CEMP.	Trigger: Fauna is recorded within solar array perimeter Action: Fencing is checked daily, and fauna is removed from solar array and relocated to appropriate habitat by fauna spotter catcher	<b>Medium</b> This management measure depends on the enforcement at the site.

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No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
HIE2	<p>Fauna proof fencing will be established along the PV Power Station area and will:</p> <ul style="list-style-type: none"> <li>• Be a minimum 1.8m high;</li> <li>• Be 3 m from any retained trees (excluding grasses) on the habitat side of the fence or plantings and be clear of all overhanging branches and vines;</li> <li>• Have a minimum 50 cm wide scratch panelling installed along the top of the length of the habitat side of the fence; and</li> <li>• Be dug into the ground to a depth of at least 150 mm.</li> </ul>	During construction and operation	Environmental Representative / Engineering Representative	<p>No significant impacts to fauna as a result of construction and operation and heat island effect.</p> <p>Protection of Koala.</p>	No death or injury from construction, operation or heat island effect.	<p>To be implemented as part of detailed designed.</p> <p>To be enforced as part of CEMP, OEMP and MNES MP.</p>	Not Applicable	<p><b>High</b></p> <p>Management measure is identified in the design guidelines for fauna with its effectiveness identified as high.</p>
HIE3	<p>Inclusion of fauna and Koala escape mechanisms along the PV Power Station side of the fencing i.e., escape climbing poles and fauna escape ramps will be implemented. These will involve the following:</p>	During construction and operation	Environmental Representative / Environmental Engineer	<p>No significant impacts to fauna as a result of construction and operation and heat island effect.</p> <p>Protection of Koala.</p>	No death or injury from construction, operation or heat island effect.	<p>To be implemented as part of detailed designed.</p> <p>To be enforced as part of CEMP, OEMP and MNES MP.</p>	<p>Trigger:</p> <p>Fauna is trapped within solar array perimeter.</p> <p>Action:</p> <p>Fencing is checked daily, and fauna is removed from solar array and relocated</p>	<p><b>High</b></p> <p>Management measure is identified in the design guidelines for fauna with its effectiveness identified as high.</p>

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No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
	<ul style="list-style-type: none"> <li>• Koala escape poles will be made from salvaged tree trunks (where possible) to encourage the use by entrapped Koalas and be a minimum of 125 mm in diameter;</li> <li>• Koala escape poles will be installed within 300 mm of the fencing;</li> <li>• Shrubs will be planted around the base of escape poles to provide cover and refuge for entrapped fauna and encourage the use of escape poles by entrapped Koalas; and</li> <li>• Fauna escape ramps will be designed as specified in the Preliminary Documentation.</li> </ul> <p>Refer to Section 5.2.5 of the Preliminary Documentation for further details.</p>						to appropriate habitat by fauna spotter catcher	

## Section 5 Avoidance and Mitigation

No.	Action	Applicable Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
HIE4	A fully funded agreement will be put in place with a relevant organisation or authority for the maintenance and monitoring of the fencing and fauna escape mechanisms in perpetuity.	During construction and operation	Environmental Representative / Environmental Engineer	No significant impacts to fauna as a result of construction and operation and heat island effect. Protection of Koala.	No death or injury from construction, operation or heat island effect.	To be implemented as part of detailed designed. To be enforced as part of CEMP, OEMP and MNES MP.	Not Applicable	<b>High</b> Management measure is identified in the design guidelines for fauna with its effectiveness identified as high.
HIE5	Solar panels will be made of non-reflective glass to minimise the amount of glare	Design stage	Environmental Representative / Environmental Engineer	Minimise the amount of glare and therefore the potential impacts to people and fauna.	No impacts from glare.	To be implemented as part of detailed designed.	Not Applicable	<b>High</b> Management measure is identified in the design guidelines.
HIE6	Any glare or external lighting identified as hazardous to be modified if requested by the Civil Aviation Authority.	As required during construction and operation	All staff and contractors	Modifications to solar panels are made as requested to minimise hazards to aviation.	No impacts from glare to aviation.	As required/requested	Not Applicable	<b>Medium</b> Management measure is applicable if issues arise and will be managed accordingly.



5.2.7 Noise

The objective of management measures relevant to minimise any potential nuisance or loss of amenity due to construction and operation activities of the Project in accordance with planning, environmental and other approvals.

The measures in Table 5-7 will be implemented to reduce any impacts which may result from construction and operational noise.

Table 5-7 Noise Objectives and Management Measures

No.	Action	Applicable phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
G2	Ensuring all vehicles are strictly controlled and do not operate in areas outside the needs of the Project construction.	During all project phases.	Environmental Representative / Contractors	Environmental harm caused to fauna is minimised. Unnecessary damage to vegetation is minimised	Completed daily during construction at relevant work areas.	Works to be undertaken in accordance with the proposed CEMP.	Trigger: Vehicles operate outside areas of construction. Action: Monitor vehicle movements and induct staff on no-go areas.	Medium This management measure depends on the enforcement at the site.
HC8	Appropriate speed limits should be in place throughout the site and all contractors will be educated on the risks to local fauna and reduce increase in dust emissions when driving.	During all project phases.	Environmental Representative	Environmental harm caused to fauna is minimised.	To be enforced daily.	To be enforced as part of CEMP and OMP.	Not applicable	High This is a repeatable management measure. Speed limits are routinely enforced across various Projects of this type.

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No.	Action	Applicable phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
G5	Provide timely, ongoing communication and consultation with all directly impacted landowners and other stakeholders.	At all times during clearing, construction and operation	Environmental Representative	No adverse impacts from air pollution and dust during construction and operation.	Ensure checks are completed with landholders prior to any activities which may result in impacts to landholders and other stakeholders.	To be enforced through construction and operation procedures.	Not Applicable	<b>Medium</b> Landholder and stakeholder consultation is often overlooked. Will require the site representative to correctly carry out timely notifications.
N1	Work hours are restricted to 6.30 am to 6.30 pm Monday to Sunday (noise generating activities). If work required outside of normal hours consultation to be undertaken with Environmental Representative.	During clearing and construction.	All Staff and Contractors	No adverse impacts from noise during construction and operation.	Ensure noise generative activities are completed within these hours.	To be enforced through construction and operation procedures and as part of CEMP and OMP.	Not Applicable	<b>High</b> Setting a time-based management measure is able to be easily enforced. Any exceedance is likely to be reported by neighbouring landholders and stakeholders.
N2	Use of horns, bells, beepers, and other audible signals will be minimised as much as practicable without contravening safe work procedures.	During clearing, construction and operation.	All Staff and Contractors	No adverse impacts from noise during construction and operation.	Ensure noise generative activities are generally limited.	Enforced but governed by per safe work procedures.	Not Applicable	<b>Low</b> A number of safe work procedures require such audible signals, therefore limiting the effectiveness.

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No.	Action	Applicable phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
N3	Plant and equipment will be switched off when not required.	During clearing, construction and operation.	All Staff and Contractors	No adverse impacts from noise during construction and operation.	Ensure noise generative activities are generally limited.	To be enforced through construction and operation procedures and as part of CEMP and OMP. Potential to be governed by per safe work procedures.	Trigger: Plant and equipment are left running Action: Plant and equipment are inspected daily and turned off before/at COB.	<b>Medium</b> Requires onsite enforcement. Regularly implemented measure.
N4	In cases where noise or vibration levels are identified as being too high, modification or substitution of work methods will be considered and undertaken where possible.	During clearing, construction and operation.	Environmental Representative	No adverse impacts from noise during construction and operation.	Ensure noise generative activities are generally limited.	To be enforced through construction and operation procedures and as part of CEMP and OMP. Potential to be governed by per safe work procedures.	Trigger: High noise and vibration levels Action: Work method will be modified/substituted where possible.	<b>Medium</b> Effective in limiting noise impacts. However, work methods may be governed by safe work procedures therefore limiting modification or substitution.

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No.	Action	Applicable phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
N5	Noise to be mitigated by properly maintaining all equipment used onsite in accordance with manufacturers specifications. Where in accordance with manufactures specifications, equipment will be fitted with noise suppression equipment.	During clearing, construction and operation.	Environmental Representative	No adverse impacts from noise during construction and operation.	Ensure noise generative activities are generally limited.	To be enforced through construction and operation procedures and as part of CEMP and OMP.  Potential to be governed by per safe work procedures.	Trigger: Noisy equipment Action: Fit equipment with noise suppression equipment	<b>Medium</b> Effective in limiting noise impacts. However, work methods may be governed by safe work procedures therefore limiting modification or substitution.
N6	Designated access routes, unloading areas and parking areas.	During clearing, construction and operation.	All Staff and Contractors	No adverse impacts from noise during construction and operation.	Proper designation of these routes and areas.	To be identified during detailed design.	Not Applicable	<b>Low</b> Designation of these areas is important to limit offsite noise impacts.
N7	Sensitive receptors located in proximity to the proposed works will be consulted with and given advance warning of any out of hours or high noise work activities.	During clearing, construction and operation.	Environmental Representative	No adverse impacts from noise during construction and operation.	Ensure checks are completed with landholders prior to any activities which may result in impacts to landholders and other stakeholders.	To be enforced through construction and operation procedures.	Trigger: Complaints as a result of construction. Action: Consultation with nearby sensitive receptors	<b>Medium</b> Landholder and stakeholder consultation is often overlooked. Will require the site representative to correctly carry out timely notifications.

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No.	Action	Applicable phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
N8	Minimise the drop heights of materials.	During clearing, construction and operation.	All Staff and Contractors	No adverse impacts from noise during construction and operation.	Minimal to no complaints as a result of construction.	Implement as part of construction procedures, including in the CEMP.	Not Applicable	<b>Medium</b> Effective management measure to limit noise impacts offsite. Requires enforcement by site personnel.
N9	Enforcing speed limits to ensure that all operations are operating at the lowest operable noise level to minimise the impacts of noise and vibration upon wildlife; and	During clearing, construction and operation.	Environmental Representative	No adverse impacts from noise during construction and operation.	Minimal to no complaints as a result of construction.	Implement as part of construction procedures, including in the CEMP.	Trigger: Speeding onsite Action: Induct staff on speed limits across site	<b>Medium</b> Effective management measure to limit noise impacts offsite. Requires enforcement by site personnel.

5.2.8 Accidental Release of Pollutants

The objective of management measures relevant to accidental release of pollutants is to minimise any potential pollution nuisance or damage to the surrounding environment due to construction activities of the Project in accordance with planning, environmental and other approvals.

The following measures in Table 5-8 will be implemented to reduce any impacts which may result from accidental release of pollutants.

Table 5-8 Accidental Release of Pollutants Objectives and Management Measures

No.	Action	Applicable Project Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
HC7	Vehicle washdown procedures. Wash-down areas will be clearly marked to prevent contaminated water from leaching into soils or flowing into nearby watercourses.	During clearing, construction and operation.	Environmental Representative	Preservation of vegetation and limiting unnecessary clearing. Environmental harm caused to fauna is minimised.	To be enforced daily.	To be enforced as part of CEMP and OMP.	Trigger: Contamination leaching into soils and watercourses. Action: Vehicle washdown areas are regularly inspected for contaminants.	High This is a repeatable management measure. Vehicle washdown implemented across various Projects of this type.
RP1	All refuelling activities and the storage and handling of oil and chemicals will comply with relevant Australian Standards.	During clearing, construction and operation.	All Staff and Contractors	No adverse impacts from accidental release of pollutants during construction and operation.	To be enforced during construction and operation.	To be enforced as part of CEMP and OMP. Regular checks to be completed.	Trigger: Inappropriate refuelling practices Action: Staff to be inducted on refuelling techniques	High This is an effective management measure which ensures such chemicals are effectively stored.



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No.	Action	Applicable Project Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
RP2	Bunding of chemical storage facilities and appropriate storage of chemicals according to AS 1940 'The storage and handling of flammable and combustible liquids'.	During construction and operation.	All Staff and Contractors	No adverse impacts from accidental release of pollutants during construction and operation.	To be enforced during construction and operation.	To be enforced as part of CEMP and OMP. Regular checks to be completed.	Trigger: Unsafe chemical storage Action: Staff to be inducted on safe storage of chemicals	<b>High</b> This is an effective management measure which ensures such chemicals are effectively stored.
RP3	Appropriate spill control materials including booms and absorbent materials will be onsite at refuelling facilities at all times. These will be used for mitigating and managing events where a substance is spilled into surrounding waters.	During clearing, construction and operation.	All Staff and Contractors	No adverse impacts from accidental release of pollutants during construction and operation.	To be enforced during construction and operation.	To be enforced as part of CEMP and OMP. Regular checks to be completed.	Trigger: Uncontrolled spillages Action: Staff to be inducted on spill control techniques	<b>Medium</b> This management measure is reactive but effective in ensuring impacts should spills occur are limited.
RP4	Locate and design roads and other built infrastructure so that minimal runoff to waterways occurs.	During design and construction.	Environmental Representative	No adverse impacts from accidental release of pollutants during construction and operation.	Proper environmental design of roads and built infrastructure.	To be identified during detailed design.	Not Applicable	<b>Medium</b> Design of roads and other built infrastructure is important to limit onsite and offsite runoff impacts.
RP5	Drainage design that allows for the retention of mine affected water prior to any discharge into the aquatic environment.	During design and construction.	Environmental Representative	No adverse impacts from accidental release of pollutants during construction and operation.	Proper environmental design of roads and built infrastructure.	To be identified during detailed design.	Not Applicable	<b>Medium</b> Design of drainage is important to limit onsite and offsite runoff impacts.

5.2.9 Bushfire and Fire

The objective of management measures relevant to fire is no adverse impacts from fire during construction and operation.

Fire management measures have been developed to reduce the potential impacts of a site fire. Bushfire setbacks will be provided around Project infrastructure and powerlines in accordance with standards and legislation. Setbacks and firebreaks will be in accordance with the Australian Standard for the Construction of Buildings in Bushfire Prone Areas - AS3959 – 2009. AS3959. The following measures in Table 5-9 will be implemented to reduce any impacts which may result from fires.

Table 5-9 Fire Objectives and Management Measures

No.	Action	Applicable Project Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
PW6	Weed management during and following rehabilitation to prevent habitat degradation and potential increased fire risk.	During construction and operation.	Environmental Representative	No adverse impacts from air pollution and dust during construction and operation No adverse impacts from fire during construction and operation. Prevent the introduction or spread weeds.	Identification and reporting of weed management effectiveness.	To be enforced as part of CEMP and OMP but requires enforcement at the site.	Trigger: Increased fire risks Action: Weekly monitoring of weeds during construction and monthly during operations.	<b>Medium</b> The effectiveness of this management measure relies on enforcement at the site level through inspections.

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No.	Action	Applicable Project Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
<b>A7</b>	Onsite burning of any material will not be undertaken without a valid permit from the relevant QFES Fire Warden.	During all Project phases.	Environmental Representative	No adverse impacts from air pollution and dust during construction and operation No adverse impacts from fire during construction and operation.	This measure will be implemented throughout construction and operational phases.	To be enforced as part of CEMP and OMP but requires enforcement at the site.	Trigger: Out of control fires Action: A permit must be obtained prior to onsite burning. Inclusion in site induction material	<b>High</b> This measure is effective in ensuring the strict no burning unless permitted.
<b>A8</b>	Ensure onsite fire-fighting equipment is regularly maintained and adequate staff training is implemented.	During all Project phases.	Environmental Representative	No adverse impacts from air pollution and dust during construction and operation No adverse impacts from fire during construction and operation.	Equipment is regularly maintained and there are no breaches.	To be enforced as part of CEMP and OMP but requires enforcement at the site.	Trigger: Out of control fires Action: Fire equipment is maintained during construction and operations. Inclusion in site induction material	<b>High</b> This measure will ensure equipment is working and appropriate should it be required. This measure is readily implemented across various projects.
<b>BF1</b>	Protocols outlining the fire management measures for the Project will be developed and implemented prior to the commencement of Project operations.	Prior to operations. During clearing and construction.	Environmental Representative	No adverse impacts from fire during construction and operation.	Inclusion and enforcement of management measures.	Inclusion and enforcement of management measures.	Trigger: Out of control fires Action: Enforcement of management measures.	<b>High</b> Protocols to be developed by a suitably qualified person.

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No.	Action	Applicable Project Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
<b>BF2</b>	A qualified person will be appointed as Site Safety Advisor and will have on-site a set of safety data sheets (SDS) for hazardous and dangerous materials.	During clearing, construction and operations.	Environmental Representative	No adverse impacts from fire during construction and operation.	Regular checklists.	To be enforced as part of CEMP and OMP.	Not Applicable	<b>High</b> Effective management of fuel loads greatly decreasing the risk and impacts of fire.
<b>BF3</b>	A Bushfire Management Plan (BMP) will be prepared for Project operations, informed by consultation with the Queensland Fire and Emergency Service (QFES).	Prior to construction.	Environmental Representative	No adverse impacts from fire during construction and operation.	Implementation of a Bushfire Management Plan. Enforcement onsite.	To be enforced as part of BMP.	Trigger: Out of control fires Action: Enforcement of management measures.	<b>High</b> Bushfire Management Plan to be developed by a suitably qualified person. This measure is readily implemented across various projects.
<b>BF4</b>	If works are undertaken during the bushfire season, the fire danger rating will be monitored daily through the QFES website.	During clearing, construction and operations.	Environmental representative	No adverse impacts from fire during construction and operation.	This measure will be implemented throughout construction and operational phases.	To be enforced as part of CEMP and OMP.	Trigger: Unplanned fires Action: Daily monitoring of fire ratings.	<b>High</b> This measure ensures no risk of out-of-control fires or adverse impacts to the environment
<b>BF5</b>	Open fires, including open barbeques, billy fires and brush burning will not be permitted on site.	During clearing, construction and operations.	All staff and contractors	No adverse impacts from fire during construction and operation.	This measure will be implemented throughout construction and operational phases.	To be enforced as part of CEMP and OMP but requires enforcement at the site.	Trigger: Unplanned fires Action: Staff made aware during staff induction	<b>High</b> This measure is effective in ensuring the strict no burning unless permitted.

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No.	Action	Applicable Project Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
BF6	Hot works activities will only be undertaken during a declared Total Fire Ban where an exemption has been issued by QFES.	During clearing, construction and operations.	Site Supervisor	No adverse impacts from fire during construction and operation.	This measure will be implemented throughout construction and operational phases.	To be enforced as part of CEMP and OMP.	Trigger: Unplanned fires Action: Staff made aware during staff induction	<b>High</b> This measure ensures no risk of out-of-control fires or adverse impacts to the environment
BF7	The following precautions will be taken to minimise the possibility of fire due to hot work activities: <ul style="list-style-type: none"> <li>The area over which hot work will take place will be maintained free of combustible material;</li> <li>Firefighting equipment, including a validated portable fire extinguisher, and trained personnel will be available during all hot work operations; and</li> </ul> Water trucks will be available to respond to fire.	During clearing, construction and operations.	Site Supervisor	No adverse impacts from fire during construction and operation.	Equipment is regularly maintained and there are no breaches.	To be enforced as part of CEMP and OMP but requires enforcement at the site.	Trigger: Unplanned fires Action: Fire equipment is maintained during construction and operations. Inclusion in site induction material	<b>High</b> This measure will ensure equipment is working and appropriate should it be required. This measure is readily implemented across various projects.

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No.	Action	Applicable Project Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
<b>BF8</b>	Vehicles may not idle or be parked in areas of long grass.	During clearing, construction and operations.	All staff and contractors	No adverse impacts from fire during construction and operation.	This measure will be implemented throughout construction and operational phases.	To be enforced as part of CEMP and OMP.	Trigger: Unplanned fires Action: Staff made aware during staff induction	<b>High</b> This measure ensures no risk of out-of-control fires or adverse impacts to the environment
<b>BF9</b>	Smoking is not permitted on site aside from in a designated safe zone.	During clearing, construction and operations.	All staff and contractors	No adverse impacts from fire during construction and operation.	This measure will be implemented throughout construction and operational phases.	To be enforced as part of CEMP and OMP.	Trigger: Unplanned fires Action: Staff made aware during staff induction	<b>High</b> Designation of onsite smoking areas will greatly limit the potential for impacts associated with fire.
<b>BF10</b>	In accordance with solar array standards a 10 m bushfire setback will be established from the Project boundary, within the Project area.	During construction and operations.	Environmental representative	No adverse impacts from fire during construction and operation.	This measure will be implemented throughout construction and operational phases.	To be enforced as part of CEMP and OMP.	Not Applicable	<b>High</b> This measure ensures no risk of out-of-control fires or adverse impacts to the environment
<b>BF11</b>	Vegetation within the site will be regularly inspected and managed for fuel loads.	During clearing, construction and operations.	Environmental representative	No adverse impacts from fire during construction and operation.	Vegetation is free of fuel loads and does not pose a risk of fire.	To be enforced as part of CEMP and OMP but requires enforcement at the site.	Trigger: Unplanned fires due to fuel loads Action: Environmental representative to inspect vegetation weekly during construction.	<b>High</b> This measure ensures no risk of out-of-control fires or adverse impacts to the environment.



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No.	Action	Applicable Project Phase	Responsibility	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
BF12	Fire management should be undertaken in accordance with the Bushfire Management Plan.	During clearing, construction and operations.	Environmental representative	No adverse impacts from fire during construction and operation.	Implementation of a Bushfire Management Plan. Enforcement onsite.	To be enforced as part of BMP.	Not Applicable	<p><b>High</b></p> <p>Bushfire Management Plan to be developed by a suitably qualified person.</p> <p>This measure is readily implemented across various projects.</p>

5.2.10 Koala Habitat

The objective of management measures relevant to Koalas is no significant impacts to Koalas as a result of construction and operation. A number of mitigation measures are proposed, these are included in Table 5-10.

Table 5-10 Koala Habitat Objectives and Management Measures

No.	Action	Responsibility	Applicable Project Phase	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
K1	Site inductions and pre-start meetings are conducted prior to construction works to raise awareness of koalas on site and protocols relating to the protection of koalas and their habitat	Environmental Representative	During pre-clearing works, clearing, construction and operation.	No significant impacts to Koalas as a result of construction and operation. Protection of Koala.	Completed prior to construction at relevant work areas.	To be enforced as part of CEMP, OEMP and MNES MP.	Not applicable	<b>High</b> This is a repeatable measure which provides clear direction. This is a proven measure suitable for limiting disturbance.
K2	Any retained habitat is to be clearly demarcated with temporary fencing, tape and/or other visible markers, and access to this habitat is restricted to reduce the degradation and loss of habitat.	Environmental Representative	During pre-clearing works, clearing and construction.	No significant impacts to Koalas as a result of construction and operation. Protection of Koala.	Retention of vegetation as much as possible within Project Area and in particular along the Access Corridor.	To be implemented as part of detailed designed. To be enforced as part of CEMP, OEMP and MNES MP.	Trigger: Vegetation clearance extends beyond survey peg. Action: Revegetate and rehabilitate	<b>High</b> Management measure is identified in the EPBC Act referral guidelines for the vulnerable koala with its effectiveness identified as high.

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No.	Action	Responsibility	Applicable Project Phase	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
K3	Clearing of vegetation should be staged and timed to provide a minimum of 12 hours between clearing events including between non-habitat and habitat trees.	Environmental Representative / Environmental Engineer	During clearing.	No significant impacts to Koalas as a result of construction and operation. Protection of Koala.	No death, stress or injury from construction activities.	To be implemented as part of detailed designed. To be enforced as part of CEMP and OMP.	Trigger: Vegetation is cleared outside permitted times. Action: Fauna spotter catcher to advise when clearing is permitted	<b>High</b> Management measure is identified in the design guidelines for the vulnerable koala with its effectiveness identified as high.
K4	Any appropriate habitat links, or trees retained as stepping stones, are maintained from the clearing site to adjacent habitat areas.	Environmental Representative	During clearing and construction.	No significant impacts to Koalas as a result of construction and operation. Protection of Koala.	Retention of vegetation as much as possible within Project Area and in particular along the Access Corridor.	To be implemented as part of detailed designed. To be enforced as part of CEMP, OEMP and MNES MP.	Not applicable	<b>High</b> Management measure is identified in the EPBC Act referral guidelines for the vulnerable koala with its effectiveness identified as high.
K5	Trees are to be thinned out on the site prior to bulk clearing to encourage resident koalas to establish new home ranges.	Environmental Representative / Environmental Engineer	During clearing.	No significant impacts to Koalas as a result of construction and operation. Protection of Koala.	No death, stress or injury from construction activities.	To be implemented as part of detailed designed. To be enforced as part of CEMP, OEMP and MNES MP.	Not applicable	<b>High</b> Management measure is identified in the design guidelines for the vulnerable koala with its effectiveness identified as high.

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No.	Action	Responsibility	Applicable Project Phase	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
K6	Trees are to be felled in a controlled manner using a vertical tree grab on an excavator.	Environmental Representative / Environmental Engineer	During clearing.	No significant impacts to Koalas as a result of construction and operation. Protection of Koala.	No death, stress or injury from construction activities.	To be implemented as part of detailed designed. To be enforced as part of CEMP, OEMP and MNES MP.	Trigger: Incorrect felling techniques Action: Fauna spotter catcher is to inspect felling techniques daily. Felling is to be undertaken by a qualified contractor only	<b>High</b> Management measure is identified in the design guidelines for the vulnerable koala with its effectiveness identified as high.
K7	Trees with koalas are clearly flagged with a specific colour or design of flagging tape and the on-site fauna spotter is alerted.	Environmental Representative / Environmental Engineer	During pre-clearing, clearing and construction.	No significant impacts to Koalas as a result of construction and operation. Protection of Koala.	No death, stress or injury from construction activities.	To be implemented as part of detailed designed. To be enforced as part of CEMP, OEMP and MNES MP.	Trigger: Clearing of trees with Koalas present Action: Fauna spotter catcher to advise when clearing is permitted	<b>High</b> Management measure is identified in the design guidelines for the vulnerable koala with its effectiveness identified as high.
K8	A 60 km/h speed limit on the Access Corridor between dusk and dawn with appropriate signage recommendation will be put forward to Council. As part of site inductions, staff will be reminded to adhere to this recommendation to not exceed 60 km/h.	Environmental Representative / Environmental Engineer	During pre-clearing, clearing, construction and operation.	No significant impacts to Koalas as a result of construction and operation. Protection of Koala.	No death or injury from vehicle strike.	Design and configuration to be implemented as part of detailed designed. To be enforced as part of CEMP, OEMP and MNES MP.	Trigger: Speeding onsite Action: Induct staff on speed limits across site	<b>Low</b> Management measure is identified in the EPBC Act referral guidelines for the vulnerable koala with its effectiveness identified as low.

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No.	Action	Responsibility	Applicable Project Phase	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
K9	Road signage to be used to alert drivers of potential koala movement across the road.	Environmental Representative / Environmental Engineer	During all project phases.	No significant impacts to Koalas as a result of construction and operation. Protection of Koala.	No death or injury from vehicle strike.	Design and configuration to be implemented as part of detailed designed. To be enforced as part of CEMP, OEMP and MNES MP.	Not applicable	<b>Low</b> Management measure is identified in the EPBC Act referral guidelines for the vulnerable koala with its effectiveness identified as low.
K10	Night-time vehicle movements on site and travelling to and from the site is restricted when koalas are most active between 6pm to 6am.	All staff and contractors	During pre-clearing, clearing, construction and operation.	No significant impacts to Koalas as a result of construction and operation. Protection of Koala.	No death or injury from vehicle strike.	Design and configuration to be implemented as part of detailed designed. To be enforced as part of CEMP, OEMP and MNES MP.	Trigger: Night time driving. Action: Staff are to be made aware of movement restrictions during induction periods	<b>Medium</b> Management measure is identified in the design guidelines for the vulnerable koala with its effectiveness identified as medium.
K11	In the event of a person recording a sick, injured or dead Koalas located in the Project Area, all work must cease immediately, and the koala is reported to RSPCA on 1300 ANIMAL (1300 264 625).	All staff and contractors	During pre-clearing, clearing, construction and operation.	Protection of Koala.	No death or injury from construction activities.	To be enforced as part of CEMP, OEMP and MNES MP.	Trigger: Injury to fauna / Koala Action: RSPCA is alerted and work is to cease until animal has been removed by RSPCA / fauna spotter catcher	<b>Medium</b> Such procedures are expected to be effective and repeatable.

## Section 5 Avoidance and Mitigation

No.	Action	Responsibility	Applicable Project Phase	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
K12	Fauna spotter/catchers are to be aware of appropriate quarantine and biosecurity procedures for koalas found to be affected by disease	Environmental Representative	During all project phases.	No significant impacts to Koalas as a result of construction and operation. Protection of Koala.	No death or injury from construction activities, vehicle strike or dog attacks.	To be enforced as part of CEMP, OEMP and MNES MP.	Trigger: Disease outbreaks in Koalas  Action: Fauna spotter catchers to be inducted on biosecurity measures.	<b>Medium</b> Such a measure is reliant on the capability of the fauna spotter/catcher and are expected to be effective and repeatable.
K13	Hygiene and biosecurity measures to minimise the of introduction and/or spread of myrtle rust (caused by the fungus <i>Austropuccinia psidii</i> ) in the Project area are enforced through vehicle washdown procedures.  Wash down areas will be clearly marked to prevent vehicles entering the site that may carry vegetation pathogens known to affect koala food trees (e.g., myrtle rust).	Environmental Representative	During all project phases.	No significant impacts to Koalas as a result of construction and operation. Protection of Koala.	No disease, illness or death from pathogens as a result of construction and operation.	To be enforced as part of CEMP, OEMP and MNES MP.	Trigger: Spread of myrtle rust within Project area  Action: Vehicle washdown areas are regularly inspected for myrtle rust.  Project area is inspected for myrtle rust weekly during construction.	<b>High</b> Management measure is identified in the EPBC Act referral guidelines for the vulnerable koala with its effectiveness identified as high.



## Section 5 Avoidance and Mitigation

No.	Action	Responsibility	Applicable Project Phase	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
K14	Visual monitoring of adjacent habitat by site personnel to record and notify RSPCA of any koalas and potential disease occurrence.	Environmental Representative	During all project phases.	No significant impacts to Koalas as a result of construction and operation. Protection of Koala.	No disease, illness or death from pathogens as a result of construction and operation.	To be enforced as part of CEMP, OEMP and MNES MP.	Trigger: Increase in diseases in Koalas. Action: RSPCA are to be notified of any koalas and potential disease occurrence	<b>High</b> Management measure is identified in the EPBC Act referral guidelines for the vulnerable koala with its effectiveness identified as high.
K15	Fauna egress infrastructure installed along fencing to prevent entrapment (refer to <b>Section 5.2.2.1</b> ).	Environmental Representative / Environmental Engineer	During design, construction and operation.	No significant impacts to Koalas as a result of construction and operation. Protection of Koala.	No death or injury from construction activities, vehicle strike or dog attacks.	To be enforced as part of CEMP, OEMP and MNES MP.	Trigger: Fauna trapped within fencing boundaries. Action: Remove trapped fauna	<b>High</b> Management measure associated with koala furniture to allow koalas to escape is identified in the EPBC Act referral guidelines for the vulnerable koala with its effectiveness identified as high.

## Section 5 Avoidance and Mitigation

No.	Action	Responsibility	Applicable Project Phase	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
K16	In the event a Koala is observed at the Project Area, all work must cease immediately within the surrounding area until the Koala has moved on from the area.	All Staff and Contractors	During pre-clearing, clearing and construction.	No significant impacts to Koalas as a result of construction and operation. Protection of Koala.	No death or injury from construction activities or vehicle strikes.	To be enforced as part of CEMP and MNES MP.	Trigger: Koala injury due to construction vehicles Action: Fauna spotter catcher to advise when works can commence	<b>High</b> Management measure is identified in the EPBC Act referral guidelines for the vulnerable koala with its effectiveness identified as high.
K17	In the event that a tree within the Myrtaceae family is left within the disturbance footprint boundaries, the trees are to be monitored on a regular basis for the presence of myrtle rust. If myrtle rust is detected on the trees, they are to be treated in accordance with appropriate disease control measures.	Environmental Representative	During all project phases.	No significant impacts to Koalas as a result of construction and operation. Protection of Koala.	No impacts to Koalas recorded. No trees are infested with myrtle rust.	To be enforced as part of CEMP, OEMP and MNES MP.	Trigger: Spread of myrtle rust within Project area Action: Project area is inspected for myrtle rust weekly during construction.	<b>Medium</b> Such a measure is reliant on the capability of the personnel and are expected to be effective and repeatable

## Section 5 Avoidance and Mitigation

No.	Action	Responsibility	Applicable Project Phase	Environmental Outcome to be achieved	Performance / Completion Criteria	Proposed Monitoring and Evaluation Program	Trigger for Remedial Action	Effectiveness
K18	Domesticated dogs are not permitted onsite.	All staff and contractors	During all project phases.	No significant impacts to Koalas as a result of construction and operation. Protection of Koala.	No death or injury from dog attacks.	To be enforced as part of CEMP, OEMP and MNES MP.	Trigger: Fauna mortality from domesticated animals Action: Any domestic animal brought to site is immediately removed and the incident is reported.	<b>High</b> Management measure is identified in the EPBC Act referral guidelines for the vulnerable koala with its effectiveness identified as high.
K19	Clearing of Koala habitat trees should be undertaken during the non-breeding season only. Therefore, clearing should only be undertaken between April – July.	Environmental representative / All staff and contractors	During clearing and construction.	No significant impacts to Koalas as a result of construction and operation. Protection of Koala.	No death, stress or injury from construction activities.	To be enforced as part of CEMP and MNES MP.	Trigger: Clearing of koala habitat during peak koala season Action: Do not clear during peak koala season. Clearing to be undertaken between April – July. Staff are to be made aware of clearing restrictions during induction periods	<b>High</b> Management measure is identified in the EPBC Act referral guidelines for the vulnerable koala with its effectiveness identified as high.

### 5.3 Pre-clearance and Clearance Procedures

#### 5.3.1 Pre-clearing

Preclearance surveys will be conducted by a qualified fauna spotter/ecologist prior to any disturbance on site. Handling of fauna should be limited to a suitably qualified and experienced fauna handler that holds a DMP for the removal and relocation of wildlife. Any animals encountered will be recorded on a dedicated register held by the Environmental Representative.

During the pre-clearance survey, the qualified fauna spotter/ecologist will comprehensively traverse the Project footprint on foot in search of protected flora and fauna. Where protected and threatened flora or fauna species is detected, the botanist/ecologist will notify the construction contractors and an exclusion zone will be clearly demarcated using coloured flagging tape or bunting.

The precise location (including accuracy of recorded location) of all observed protected flora and fauna species will be recorded with a GPS for future reference and for notification to relevant parties (e.g. Queensland Herbarium) and for inclusion on site plans.

Supplementary information regarding the occurrence of the protected flora and fauna species is to be recorded including a description of the supporting habitat, the size and maturity of individuals, the presence of reproductive output, and any observations on health and condition.

#### 5.3.2 Clearing

A fauna spotter/ecologist will be present during clearing activities for all fauna handling and to provide guidance to the Environmental Representative. Any fauna encountered will only be handled by the fauna spotter/ecologist. Vegetation clearing will be done in a sequential manner to ensure wildlife is directed towards adjacent habitat and not into areas of threat (road or earthworks).

Construction areas that pose a risk to fauna to be fenced off where practicable and where possible, any active breeding places identified will be avoided. Where this is not possible, the nest is to be relocated to adjacent undisturbed habitat and monitor the active nest to determine a return by breeding individuals. If required, young or eggs will be removed and placed into care of a wildlife carer. Individuals to be released within proximity of their original point of capture. Any injured animals must be taken to the nearest wildlife facility or vet.

Where clearing of preferred habitat for the Squatter pigeon (southern) is unavoidable the following procedure will be applied during the clearing process:

- Briefings regarding the significance of the habitat for this species will be provided during toolbox meetings involving construction, field operations and environmental staff. This will include the preparation of toolbox meeting sheets which clearly identify the relevant species and its habitat requirements;
- Habitat to be avoided will be flagged;
- Documentation of amounts of identified preferred habitat to be cleared or – disturbed;
- Documentation of any incidents where Squatter Pigeon (southern) are impacted by construction activities;
- Due to the location of nests (predominately on the ground) and the ground dwelling nature of the birds, all vehicles and pedestrians are to remain within the designated access tracks and construction footprint; and
- Vehicle and machinery speed limits will be restricted to 20km/hr within key nominated areas with appropriate signage erected, due to the tendency of the Squatter Pigeon (southern) to utilise disturbed areas (such as access tracks and grasslands).

All construction activities will be carried out in accordance with relevant EMPs. Compliance with industry standards will minimise adverse impacts on receiving environments by construction activities. Weeds will be managed in accordance

with the Biosecurity Management Plan for the Project. Vertebrate pests, particularly foxes and cats will be managed in accordance with feral animal management guidelines through the EMP for the Project.

### 5.4 Rehabilitation Measures

All disturbed land caused by the construction and operation must be rehabilitated to meet desirable final acceptance criteria following completion of construction, decommissioning and/or abandonment for any reason. The following acceptance criteria may be expanded as a RMP is finalised:

- Any contaminated land (e.g., contaminated soils) is remediated and rehabilitated;
- For land within the final Project footprint:
  - Groundcover, that is not a declared pest species is established and self-sustaining and/or
  - Vegetation of similar species richness and diversity to pre-existing sites is established and self-sustaining.
- For land disturbed and outside the final Project, groundcover, that is not a declared pest species is established and self-sustaining.

To ensure rehabilitation will be undertaken successfully, the 'rehabilitation lifecycle' will need to be implemented for the duration of the Project. Refer to below for the specific rehabilitation procedures to be undertaken for the Project:

- **Rehabilitation Plan Preparation:**

As mentioned above, an RMP for all disturbed areas associated with the Project will be prepared by a suitably qualified person prior to operations.

- **Stage 1 Stabilisation Rehabilitation:**

Stabilisation and rehabilitation works will be completed during construction and post-construction within construction footprints and other impacted areas. Progressive rehabilitation of clearance areas will be undertaken as the Project is being constructed. This will ensure areas are stabilised to enable safe and effective operation and minimise the risk of on-going environmental issues such as erosion, soil loss and weed invasion.

The measures used to ensure rehabilitation success would depend on the issue. For areas where site stability is an issue, these would be repaired or regraded with appropriate scale equipment and stabilised with additional surface stabilisation materials. These could include use of biodegradable organic matting in problem areas.

- **Post Construction Monitoring:**

As a part of the rehabilitation monitoring, the rehabilitation success will be determined. If the monitoring program indicates that rehabilitation progress is poor, or if re-profiled areas become unstable, action would be taken to ensure rehabilitation success.

As part of the final rehabilitation plan, a monitoring program will be undertaken for a period of 12 months following rehabilitation to ensure successful establishment and health of the vegetation. This may include but is not limited to:

- Watering;
- Weed species control;
- Stock control (unlikely); and
- Vehicle access restrictions.

- **Decommissioning and Handover Plan Preparation:**

The Proponent will prepare and implement a decommissioning and handover plan in consultation with landholders and government.

The focus of rehabilitation for Squatter pigeon (southern) will be the management of any new weed infestations within preferred habitats which have established following Project construction. All worksites sited upstream of receiving habitats will be revegetated and stabilised to prevent sedimentation of receiving wetlands. Natural regeneration will be used to rehabilitate the habitat of fauna species of conservation significance where soil is not removed. Direct seeding or tree planting with native tree and shrub species representative of the RE and habitat will also be undertaken.

### 5.5 Decommissioning and Restoration

Solar farms are typically operational for 20 to 30 years, after which the solar farm infrastructure may be decommissioned and removed from the site the land rehabilitated. Alternatively, the asset life may be extended by the refurbishment of existing infrastructure, considering potential new solar technology. It may be the case that solar arrays are replaced with more efficient panels that provide more output for any given area, mid-way through the standard operational life. Research and development to improved renewable energy technology is constant, and Elecseed are party to this advancement, by undertaking its own R&D into better ways to produce clean energy.

In the event of planned decommissioning of the asset, a detailed decommissioning plan shall be prepared in consultation with the following stakeholders:

- Local council: Engagement with the local council is required to determine which permit conditions need to be discharged, or whether new development permits are required (in the event the Project life is extended). Engagement with the local council may also be required for input in the solar farm's decommissioning plan.
- Landowners: In the event the Project life is extended, lease agreements are required between the Proponent and landowners. However, if the Project is to be decommissioned at the end of operational life, a decommissioning and rehabilitation plan will need to be provided.
- Community: Engagement with the local community is required in the decommissioning plan for the Project as the community supports ongoing social and economic sustainability.

The decommissioning environmental management plan is to outline the following information (as a minimum):

- Decommissioning Work Method Statements (or similar) for key decommissioning activities;
- Community & Stakeholder Consultation;
- Waste Management;
- Stormwater management;
- Soil Management;
- Noise Management;
- Dust management;
- Traffic Management;
- Vegetation management; and
- Water and contamination management.

#### 5.5.1 Refurbishment of the Solar Farm

In the event the solar farm is to be refurbished during or at the end of the Project lifecycle, the following activities are required to be undertaken:

- Installation of new technology, including upgraded PV modules; and
- Recycling of old PV modules.



### 5.5.2 Decommissioning

In the event the solar farm is to be decommissioned at the end of standard operational life (i.e., 30 years), the site is to be returned to its pre-construction state using the following methodology:

- Notification of the Distributed Network Service Provider (DNSP) of proposed de-energisation;
  - Notification of the de-energisation intent is to be made 12 months prior to decommissioning; and
  - It is expected that Elecseed will remove service mains. It is not expected that an Australian Energy Market Operator (AEMO) notification is required.
- Notification of the Western Downs Regional Council of the proposed decommissioning and removal of assets from site.:
  - Any permits and approvals are to be obtained from Western Downs Regional Council and relevant regulatory authorities before commencement of decommissioning works.
- Deployment of all mobile plant and equipment required for decommissioning:
  - All mobile plant and equipment required during the decommissioning works are to be brought to site, including (but not limited to) excavators, loaders, mobile cranes, skid steers, rollers/compactors, pile drivers, telehandlers, skip bins, water carts, temporary shipping containers for storage, site office/staff amenities, and site ablution block.
- Disconnection from the grid and de-energisation of the solar plant and isolation of all electrical and data circuits:
  - The service main cables will be disconnected appropriately to isolate the solar farm's grid connection permanently;
  - All electrical aspects of the solar farm are switched off as per the system's operation manual, to ensure a safe working environment for decommissioning personnel. The alternating current (AC) high voltage will be the first aspect to be de-energised before progressively working through each protection circuit until all AC circuits are isolated;
  - The breakers in the ring main unit (RMU) will be disconnected to isolate the inverters and batteries before the DC isolators can be switched off and fuses removed; and
  - Each solar panel will be disconnected, and all monitoring and data circuits will be removed.
- Disconnection of the inverters/battery from site assets:
  - Subsequent to the isolation of the RMU, all electrical wiring between the inverter, battery and direct current combiners will be isolated and removed using a crane and semi-trailer for transportation to a disposal site (recycling and/or scrapping). In the instance the transformer and economics are in relatively good condition, these may be re-furbished and re-purposed for additional service life elsewhere.
- Removal of Photovoltaic (PV) modules and de-construction of mounting mechanicals/piles:
  - Subsequent to isolation, all PV modules will be removed from site in a reverse order of which they were installed. All PV modules will be stored on a semi-trailer prior and during transport to a suitable PV module recycling plant.
  - Similarly, all torque tubes, operating motors and structural supports will be dismantled in a reverse order of which they were installed, using huck tooling. Any steel piles will be removed by either using an excavator or hydraulic pile pull-out machine for safe removal before being transported to a suitable scrap metal recycling facility.
- Removal of electrical wiring:

- All existing trenches will be excavated up to allow the safe removal of underground electrical wiring. This process is to use the as-built diagrams to prevent damage to any surrounding vegetation. All electrical wiring can be coiled and recycled.
- Any cable covers will be disposed of in skip bins located onsite during decommissioning works and disposed of at a licenced disposal facility.
- All excavated trenches will be backfilled with the same soils and the ground will be levelled using earth-moving equipment.
- Remediation of land:
  - Restoration of the disturbed areas within the Development Footprint will include removal of all above ground structures and footings and capping of services, including any concrete pad foundations laid for the purpose of the Project prior to remediation and revegetation works.
  - All constructed access roads/tracks will be ripped and rehabilitated.
  - All hardstand laydown areas will be ripped and rehabilitated.
  - Existing topsoil stockpiled on site is to be reused for the rehabilitation of hardstand and access tracks.
  - Refer to **Section 5.5.3** for additional restoration activities.
- Solar array fencing:
  - Consultation with the landowner will be undertaken to determine the removal or re-use of the steel fencing surrounding the solar array. In the instance the fencing is to be reused, it will be retained onsite for the landowner. However, in the instance it is to be removed, the fence will be dismantled and recycled at a scrap metal facility.
- Demobilisation of plant and equipment:
  - All plant and equipment brought to site for the decommissioning works will be removed subsequent to the site handover in its pre-construction state.

The activities outlined in this decommissioning summary are currently with the methodology, procedures and technology at the date of this report. At the time of decommissioning, it is likely new methodology, procedures and technology are available in the safe and successful decommissioning of solar farms. As such, any new methods and/or technology will be considered and compared to the above, in the decommissioning of the Project.

### 5.5.3 Restoration Strategy

#### 5.5.3.1 Revegetation

After decommissioning of the solar farm (in the instance the Project life is not extended), a restoration strategy is to be developed and implemented to outline the broad restoration goals and outcomes for the disturbed footprint. The restoration strategy will include the proposed vegetation used in the rehabilitation of the disturbed area; this vegetation should include vegetation applicable to the regional ecosystems that were naturally occurring prior to development.

#### *Cover Crop*

All areas to be rehabilitated shall be sown with a cover crop, native pasture or improved pasture seed mix following reinstatement. Where areas are treeless during operations (i.e., within the setbacks of PV arrays or within the clearing profile of distribution powerlines) the area will be seeded with native groundcover species only (refer to the following section – Hydro-mulching).

Cover crop is recommended in areas where there is a high erosion risk, particularly in the stabilisation of batter slopes, watercourse banks and soil stockpiles. Long-term successive rehabilitation will require seed mixes that provide primary,

secondary and where required, tertiary cover. Primary cover seed mixes are required to provide early protection to the soil surface and supply mulch for the secondary and tertiary covers. Fast growing

Additionally, fast growing cereal crops provide rapid germination and establishment for initial cover and ultimately die off at the end of its growing season (i.e., summer or winter) allowing secondary and tertiary covers to grow through the protective mulch layer provided by the primary cover.

### Hydro-mulching

Site preparation will be undertaken prior to revegetation works, through the following steps:

- Revegetation is to be undertaken by a suitably qualified and experienced contractor;
- All existing weeds are to be eradicated prior to undertaken revegetation and hydro-mulching activities;
- Soil testing must be undertaken prior to hydro-mulching activities to determine soil characteristics and imbalances that may affect vegetation growth (i.e., pH balance, microbial organisms etc.);
- Calculate required materials for rehabilitation in advance of revegetation work commencing;
- Contact nursery/seed providers to ascertain the availability of seed for use in revegetation works; and
- Nursery/seed providers must provide proof of 'local provenance' for all material. A record of provenance will be maintained by the contractor undertaking the work.
- Hydro-mulch seeding will include native grasses only, of which have been previously recorded onsite.

During revegetation works, the hydro-mulch mix is to be applied as follows:

- Hydro-mulching material is to be applied to revegetation areas (100% cover on all areas to be revegetated) at the minimum application rate as per the nominated product requirements; and
- Hydro-mulch must not be applied under the following conditions:
  - Temperatures higher than 35°C;
  - Winds exceeding 15 km/hour;
  - Where surface is too wet (in discretion of superintendent); and
  - During rain periods of when rain appears imminent.

**Table 5-11 Assessment of Rehabilitation Activity Predicted Effectiveness**

Rehabilitation Activity	Timing / Duration	Predicted Effectiveness
Fencing	For the duration of the construction, rehabilitation and monitoring period.	<b>Highly effective.</b> Restrict fauna and vehicle movements to protect rehabilitation areas.
Hydro-mulching with native grasses	Within six weeks of the cessation of works. During wet season is preferable.	<b>Highly effective.</b> Provides erosion and seed protection, dust suppression, eliminated pathogens and weed growth.

To meet requirements for direct seeding, seed of native species will be sourced with consideration of local provenance such that procured seed is adapted to local conditions. Seed purchasing and procurement shall be guided by the list of key species developed for the relevant REs as described in Table 5-12. Rehabilitation of vegetation that is considered potentially suitable habitat for listed threatened species will consider suitable flora species that are present within the Brigalow Belt South Bioregion, as described in Table 5-13. As White-throated needletail are known to be almost exclusively aerial, they have been excluded from the table.

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Elecseed will seek to procure seed from parties that follow sound collection methods, such as Flora Bank Guideline 6: Native seed collection methods where possible (written by the Australian Tree Seed Centre and Mortlock, 1999). Such guidelines recommend the collection of good quality seed from an appropriate source. It is desirable that procured seed is collected as locally as possible, preferably from naturally occurring remnant vegetation within or adjacent to the area of disturbance to be rehabilitated. For this reason, seed may be procured from a range of individuals and organisations that have the local knowledge and site access to be able to collect suitable local provenance seed.

In the instance procured seed is not of local provenance, efforts will be made to match the key environmental characteristics of the intended rehabilitation sites, including rainfall, temperature, and soil type.

**Table 5-12 Vegetation suitable to be used in the restoration of the site as per pre-construction environment**

Scientific Name	Common Name	RE 11.5.1	RE 11.7.4	RE 11.7.5
<i>Ancistrachne uncinulata</i>	Hooky grass		X	
<i>Aristida calycina</i>	Dark wiregrass	X	X	X
<i>Aristida caput-medusae</i>	Many Headed Wiregrass	X	X	X
<i>Aristida jerichoensis</i>	Jericho wiregrass	X	X	X
<i>Aristida leichhardtiana</i>	-	X	X	
<i>Aristida queenslandica</i> var. <i>queenslandica</i>	Queensland wiregrass	X	X	
<i>Austrostipa scabra</i>	Rough speargrass			X
<i>Bothriochloa decipiens</i> var. <i>recipients</i>	Pitted bluegrass	X	X	X
<i>Chloris ventricosa</i>	Tall chloris	X	X	
<i>Cleistochloa subjuncea</i>	-			X
<i>Cymbopogon refractus</i>	Barbed-wire grass	X	X	
<i>Dichanthium sericeum</i>	Queensland bluegrass		X	
<i>Digitaria brownii</i>	Cotton panic		X	
<i>Digitaria ramularis</i>	-	X	X	X
<i>Dinebra decipiens</i>	Slender canegrass	X		
<i>Entolasia stricta</i>	Wiry panic	X		
<i>Enteropogon acicularis</i>	Curly windmill grass	X	X	
<i>Eragrostis brownii</i>	Brown's lovegrass	X	X	
<i>Eragrostis lacunaria</i>	Purple lovegrass			X
<i>Eragrostis leptostachya</i>	Paddock love grass	X	X	
<i>Eragrostis sororia</i>	Woodland lovegrass	X	X	X
<i>Eragrostis spartinooides</i>	-	X	X	X
<i>Eriochloa pseudoacrotricha</i>	Early spring grass	X	X	
<i>Eulalia aurea</i>	Silky brown-top	X	X	X
<i>Panicum effusum</i>	Hairy panic	X		X
<i>Panicum simile</i>	Two-colour panic			X
<i>Paspalidium sp.</i>	-	X		X
<i>Rytidosperma bipartitum</i>	-	X		

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Scientific Name	Common Name	RE 11.5.1	RE 11.7.4	RE 11.7.5
<i>Sporobolus creber</i>	Slender rats-tail grass	X	X	X
<i>Thyridolepis mitchelliana</i>	Mulga mitchell grass			X
<i>Tripogon loliiiformis</i>	Five minute grass			X
<i>Walwhalleya prolata</i>	Rigid panic	X		

**Table 5-13 Suitable Flora Species for Listed Threatened Fauna in the Brigalow Belt South Bioregion**

Scientific Name	Common Name	Relevant Fauna Species	
<i>Acacia harpophylla</i>	Brigalow	Yakka skink	
<i>Acacia catenulata</i>	Bendee		
<i>Acacia shirleyi</i>	Lancewood		
<i>Casuarina cristata</i>	Belah		
<i>Eucalyptus populnea</i>	Poplar Box		
<i>Eucalyptus spp.</i>	Ironbark		
<i>Callitris glaucophylla</i>	White Cypress Pine		
<i>Eucalyptus albens</i>	White Box	Five-clawed worm-skink	
<i>Eucalyptus camaldulensis</i>	River Red Gum		
<i>Eucalyptus coolabah</i>	Coolibah		
<i>Eucalyptus populnea</i>	Bimble Box		
<i>Melaleuca viridiflora</i>	Broad-leafed paperbark	Squatter pigeon (southern)	
<i>Corymbia clarksoniana</i>	Weeping paperbark		
<i>Melaleuca leucadendra</i>	Poplar gum		
<i>Eucalyptus platyphylla</i>	River sheoak		
<i>Casuarina cunninghamiana</i>	Rough-barked apple		
<i>Angophora floribunda</i>	Yellow tea-tree		
<i>Urochloa mosambicensis</i>	Curly windmill grass		
<i>Enteropogon acicularis</i>	Native millet		
<i>Panicum decompositum</i>	Hairy panic		
<i>Dichanthium sericeum</i>	Bluegrass		
<i>Alloteropsis semialata</i>	Carpet grass		
<i>Eragrostis sororia</i>	Woodland lovegrass		
<i>Themeda triandra</i>	Kangaroo grass		
<i>Casuarina spp.</i>	Sheoak		Regent honeyeater Painted honeyeater
<i>Eucalyptus sideroxylon</i>	Mugga (or red) ironbark		
<i>Eucalyptus melliodora</i>	Yellow box		
<i>Eucalyptus albens</i>	White box		
<i>Eucalyptus robusta</i>	Swamp mahogany		
<i>Amyema miquelii</i>	Box mistletoe		
<i>Acacia pendula</i>	Weeping myall		

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Scientific Name	Common Name	Relevant Fauna Species
<i>Acacia harpophylla</i>	Brigalow	
<i>Eucalyptus crebra</i>	Narrow-leaved ironbark	Koala
<i>Corymbia tessellaris</i>	Carbeen	
<i>Melaleuca leucadendra</i>	Weeping paperbark	
<i>Eucalyptus platyphylla</i>	Poplar gum	
<i>Corymbia clarksoniana</i>	Clarkson's bloodwood	
<i>Nauclea orientalis</i>	Bur tree	
<i>Melaleuca fluviatilis</i>	Weeping tea-tree	
<i>Eucalyptus acmenoides</i>	broad-leaved white mahogany	
<i>Eucalyptus tereticornis</i>	forest red gum	
<i>Eucalyptus fibrosa</i>	red ironbark	
<i>Eucalyptus fibrosa subsp. nubila</i>	Dusky-leaved ironbark	
<i>Corymbia watsoniana</i>	Large-fruited yellow jacket	
<i>Eucalyptus moluccana</i>	Gum-topped box	
<i>Angophora floribunda</i>	Roughbark apple	
<i>Corymbia citriodora</i>	Spotted gum	
<i>Eucalyptus crebra</i> × <i>populnea</i>	-	
<i>Acacia harpophylla</i>	Brigalow	Brigalow woodland snail



## Section 6 Proposed Offsets

### 6.1 Background

Item 6 of the DAWE additional information request (dated 14 October 2021), requires that:

*Where residual significant impacts remain after consideration of avoidance and mitigation measures, an environmental offset will be required to compensate for the impacts in accordance with the Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy.*

As identified above, residual significant impacts are expected to occur to the Koala and as a result, environmental offsets must be considered. The below includes information on project offset requirements, offset site options and Offset Management Plan.

It is important to note that offsets are not required to be secured before a decision on whether to approve the proposed action but should the proposed action be approved, conditions of an approval are expected to require that offsets are secured, and management measures are in place, before commencement of the proposed action.

### 6.2 EPBC Act Environmental Offsets Policy

The EPBC Act Environmental Offsets Policy outlines the Australian Government's approach to the use of environmental offsets (offsets) under the EPBC Act. The EPBC Act Environmental Offsets Policy specifies a range of offset principles to guide the development of strategies to offset for residual impacts which are detailed in Table 6-1. The Policy relates to all protected matters under the EPBC Act and has five key aims, to:

- Ensure the efficient, effective, timely, transparent, proportionate, scientifically robust and reasonable use of offsets under the EPBC Act;
- Provide proponents, the community and other stakeholders with greater certainty and guidance on how offsets are determined and when they may be considered under the EPBC Act;
- Deliver improved environmental outcomes by consistently applying the policy;
- Outline the appropriate nature and scale of offsets and how they are determined; and
- Provide guidance on acceptable delivery mechanisms for offsets.

The EPBC Act Environmental Offsets Policy acknowledges that avoidance and mitigation measures are the primary strategies for managing the potential impact of a proposed action. Offsets are not intended to reduce the likely impacts of the Project but are implemented to compensate any residual (after mitigation) significant impacts.

The policy applies to offsetting requirements in terrestrial and aquatic (including marine) environments and applies to projects assessed under the EPBC Act. Under the Offsets Policy, offsets act as a compensation mechanism for impacts (direct and indirect) to all protected matters under the EPBC Act including two relevant MNES for this Project: Listed threatened species and ecological communities. Offsets under Commonwealth legislation are only required where residual impacts are considered significant as defined under the detailed significance criteria.

In accordance with the policy, offsets should compensate for an impact for the full duration of the impact and can involve either direct (e.g., land), indirect (e.g., monetary compensation) or advanced (future) offsets that deliver a conservation gain. However, in accordance with the policy, direct offsets must account for a minimum of 90 per cent of the offset requirements for any given impact.

- Conservation gain is the benefit that a direct offset delivers to the protected matter, which maintains or increases its viability or reduces any threats of damage, destruction or extinction. A conservation gain may be achieved by:

- Improving existing habitat for the protected matter;
- Creating new habitat for the protected matter;
- Reducing threats to the protected matter;
- Increasing the values of a heritage place, and/or
- Averting the loss of a protected matter or its habitat that is under threat.

The proposed offset to be established as per an OMP, focuses on averting the loss of habitat, improving that habitat and reducing threats to the protected matter within that habitat.

**Table 6-1 EPBC Act Offset Principles**

Item	Offset Principle	Response
1	Deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environment law and affected by the proposed action.	The protection of Koala habitat provides an offset for the protection and management of MNES associated with the Project. The total offset area will be determined in accordance with the EPBC Act Environmental Offsets Policy offsets assessment guide (a draft has been provided in <b>Appendix N</b> ). The protection and ongoing improvements proposed will secure an area of Koala habitat and habitat which will be confirmed as habitat for the species. The offset area will be managed through the implementation of an adaptive management framework to improve the condition of habitat and vegetation communities for the Koala. The offset site will be secured by a legally binding mechanisms as discussed in more detail below. The management of the area through an appropriate mechanism is considered important for the long-term viability of the threatened species and ecological communities at this offset site.
2	Be built around direct offsets but may include other compensatory measures.	The management of habitat through ongoing protection and associated on-ground measures to improve vegetation condition is a considered to be a direct offset.
3	Be in proportion to the level of statutory protection that applies to the protected matter.	The draft proposed offset site is expected to range between 500-720 ha (final quantity to be confirmed) is in proportion to the level of statutory protection that applies to the Koala (refer to the draft calculation in Section 6.5.2.1) in accordance with the EPBC Act.
4	Be of a size and scale proportionate to the residual impacts on the protected matter.	The proposed draft offset site (that is to be confirmed), will be required to protect approximately 500-720 ha for an impact of 207 ha of Koala habitat. A number of offset site options are being explored as identified in Section 6.4.
5	Effectively account for and manage the risks of the offset not succeeding.	Risk assessments completed for the Project have been undertaken to identify key threats to Koala values. The results of these risk assessments have informed the development of management objectives, performance criteria, adaptive management triggers and corrective actions included within the Preliminary Documentation. Draft offset management objectives, performance criteria, adaptive management triggers and corrective actions for a potential offset site are identified in <b>Appendix N</b> . The main management approaches to successfully deliver the offset on an offset site in the Brigalow Belt Bioregion are considerate management of cattle grazing, control of weeds and regeneration of regrowth Brigalow and Gidgee.
6	Be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs.	No specific offsets for Koala are prescribed under any State or Local Government offset prescriptions relevant to the Project.

Item	Offset Principle	Response
7	Be efficient, effective, timely, transparent, scientifically robust and reasonable.	An evidence-based and scientifically robust approach will be used to select and offset site. Additional site assessments will further inform the Koala offset area.  The approach identified below will provide a suitable approach to providing offsets.
8	Have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.	Governance will include supervision by the Proponent and auditing by a suitable qualified and independent person with formal reporting submitted to the DAWE where requested or conditioned.

### 6.3 Project Offset Requirements

#### 6.3.1 Koala

Habitat within the Project Area contains suitable habitat for the Koala to occur. As per the residual impacts likely to require referral stipulated in Section 8 of the Referral Guidelines for the Vulnerable Koala, the Project has the potential to result in significant residual impacts to the Koala. The clearing of vegetation and habitat for the Koala is expected to result in the loss of habitat. With the mitigation measures proposed, the Project is not expected to result in fewer impacts. As such residual significant impacts are expected to occur to the Koala and as a result, environmental offsets must be considered.

### 6.4 Offset Site Options

#### 6.4.1 Desktop Investigations

The proponent is exploring offset site options suitable for hosting an offset site. Based on desktop investigations to date, the most suitable potential offset sites are identified below (Table 6-2) and on Figure 6-1. This is not an exhaustive list and does not eliminate identifying other potential offset site options as the investigation moves forward.

**Table 6-2 Offset Site Options**

Site No.	Size (ha)	Regional Ecosystem (State Mapping) / Koala Values (preclear)	Comment	Koala Records*	Connectivity
1	2,148	11.5.21/11.7.4/11.5.4 11.3.14	<b>Positives:</b> adjacent to Binkey SF/Gurrulmundi SF and contains L Tree Creek corridor. <b>Negatives:</b> Likely to be marginal Koala habitat	No Koala records within 10 km. There are two records within 25 km.	This site is partially located in a Statewide terrestrial biodiversity corridor buffer
2	733	11.5.1/11.7.4/11.3.4	<b>Positives:</b> Close to Rocky Creek corridor with known Koala <b>Negative:</b> Small lot sizes.	No Koala records within 5 km. There are 4 records within 10 km located in proximity to Chinchilla. There are an additional three records within 10-25 km.	This site is entirely located in a Statewide terrestrial buffer corridor. It also overlaps a state-wide riparian buffer corridor.
3	2,053	11.5.1/11.7.7/11.7.5/ 11.7.2	<b>Positives:</b> Close to Barakula SF. <b>Negatives:</b> Low connectedness.	No Koala records within 5 km. There are four records within 25 km.	This site is located approximately 10 km west of a Statewide terrestrial buffer corridor.
4	1,498	11.5.1/11.7.4/11.3.4	<b>Positives:</b> Baking Board Creek <b>Negatives:</b> Fragmented landscapes	No Koala records within 5 km. There is 1 record within 10 km located in proximity to Chinchilla. There are an additional 4 records within 10-25 km.	This site is partially located in a statewide terrestrial buffer corridor. It is also in proximity to a state-wide riparian buffer corridor.
5	3,043	11.11.15/11.3.25	<b>Positives:</b> Range country with extensive creeks and gullies, tributaries of Ironpot Creek.	There is 4 Koala record within 5 km. There is an additional 1 Koala record within 5-10 km. There are additional records within 10-25 km. The landholder has confirmed that they have sighted Koalas on their property.	This site is located approximately 1 km away from a State-wide terrestrial buffer corridor. It also overlaps statewide riparian buffer corridors.



## Section 6 Proposed Offsets

Site No.	Size (ha)	Regional Ecosystem (State Mapping) / Koala Values (preclear)	Comment	Koala Records*	Connectivity
6	10,500	11.11.5/11.3.25 11.12.3 11.12.3/11.11.4a 11.5.20 11.12.3/11.7.6	<b>Positives:</b> Range country with extensive creeks and gullies, tributaries of Waragai and Jumma Creeks. Mix of remnant non-remnant with Boyne River frontage. Koala records within area.	There is 5 Koala record within 5 km. There are additional records within 10-25 km	This site is partially located in a statewide terrestrial buffer corridor. It also overlaps statewide riparian buffer corridors.
7	809	11.5.1/11.3.18 11.3.25/11.5.1a 11.7.7/11.7.5 11.5.1	<b>Positives:</b> Joins Kumbarilla SF <b>Negatives:</b> Mix of remnant non-rem with Paget Creek through property	There is no Koala record within 5 km. There is 1 record within 5-25 km. The landholder has confirmed that they have sighted Koalas on their property.	This site is located adjacent a statewide terrestrial buffer corridor. It is also in close proximity to statewide riparian buffer corridors.
8	1,325	11.3.2/11.3.25/11.3.1 11.3.14 11.5.1a	<b>Positives:</b> Finch Creek and Moonie River frontage. <b>Negatives:</b> Possibly not enough area for offset requirements. Unknown quality or regrowth.	There is no Koala record within 5 km. There are 2 records within 5-25 km	The majority of this site located in a State-wide terrestrial buffer corridor. It is also located over statewide riparian buffer corridors.
9	886	11.7.4/11.7.7/11.7.5 11.5.1	<b>Positives:</b> Connectedness is okay through existing remnant areas. <b>Negatives:</b> Possibly too small but depending on condition the balance of regrowth area could be supplemented with remnant.	There is no Koala record within 5 km. There is 1 record within 5-25 km	This site is located adjacent a Statewide terrestrial buffer corridor

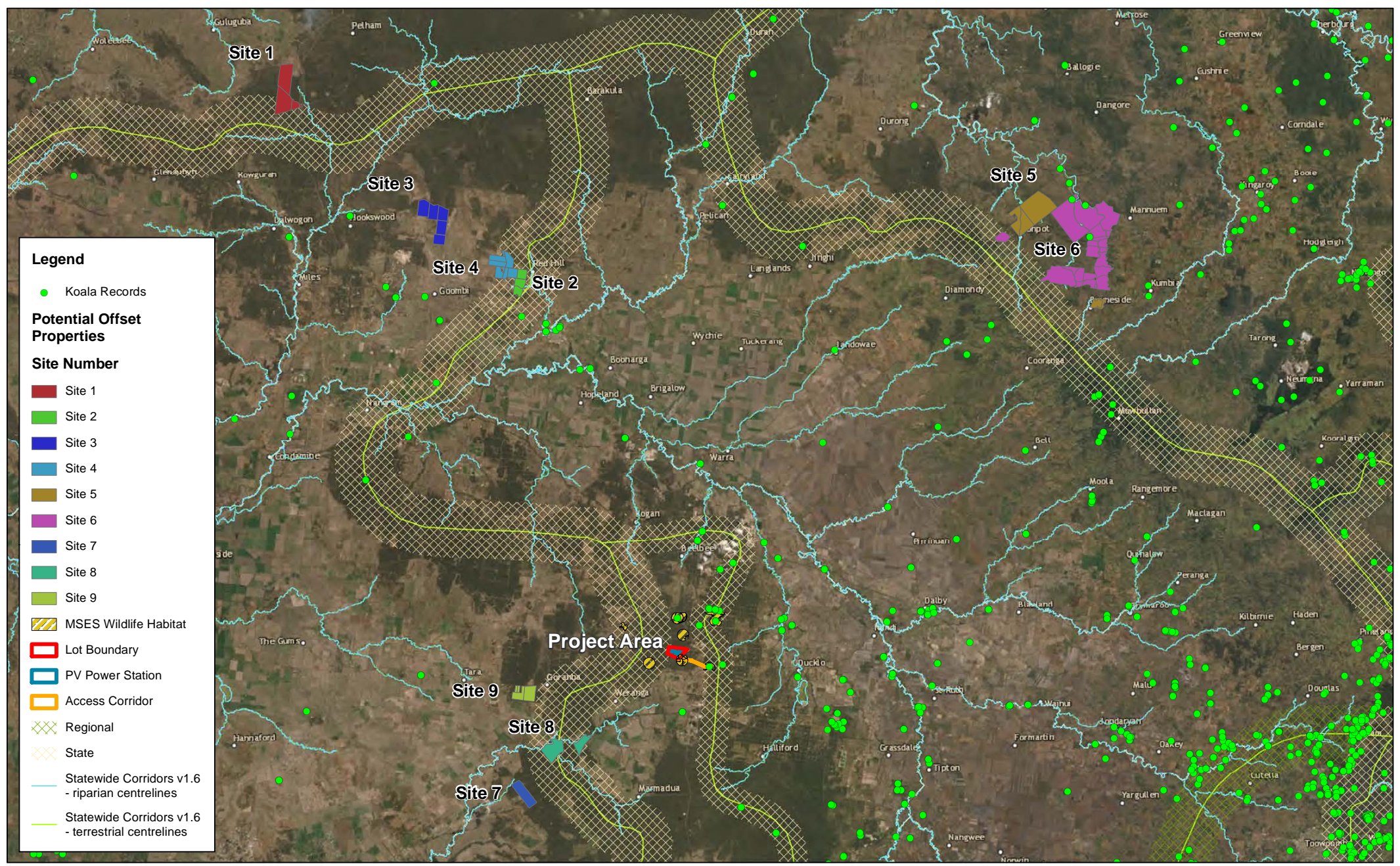
\*Source: WildNet 2019<sup>5</sup>, Atlas of Living Australia (ALA) 2021<sup>6</sup>, 2023<sup>7</sup>.

<sup>5</sup> Queensland Government, 2019. WildNET Koala Locations. Data current as at 5 July 2019.

<sup>6</sup> Atlas of Living Australia (ALA) 2021, Koala Occurrence Records.

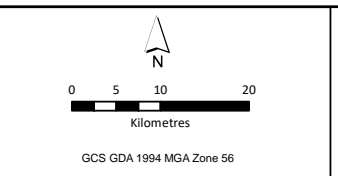






R	Details	Date
1	First Draft	01/08/21
2	Revision	29/11/21
3	Revision	08/03/22
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DATA SOURCE  
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FIGURE 2-1  
**Potential Offset Site Options**  
DRG Ref: Figure6\_1\_PotentialOffsetSiteOptions

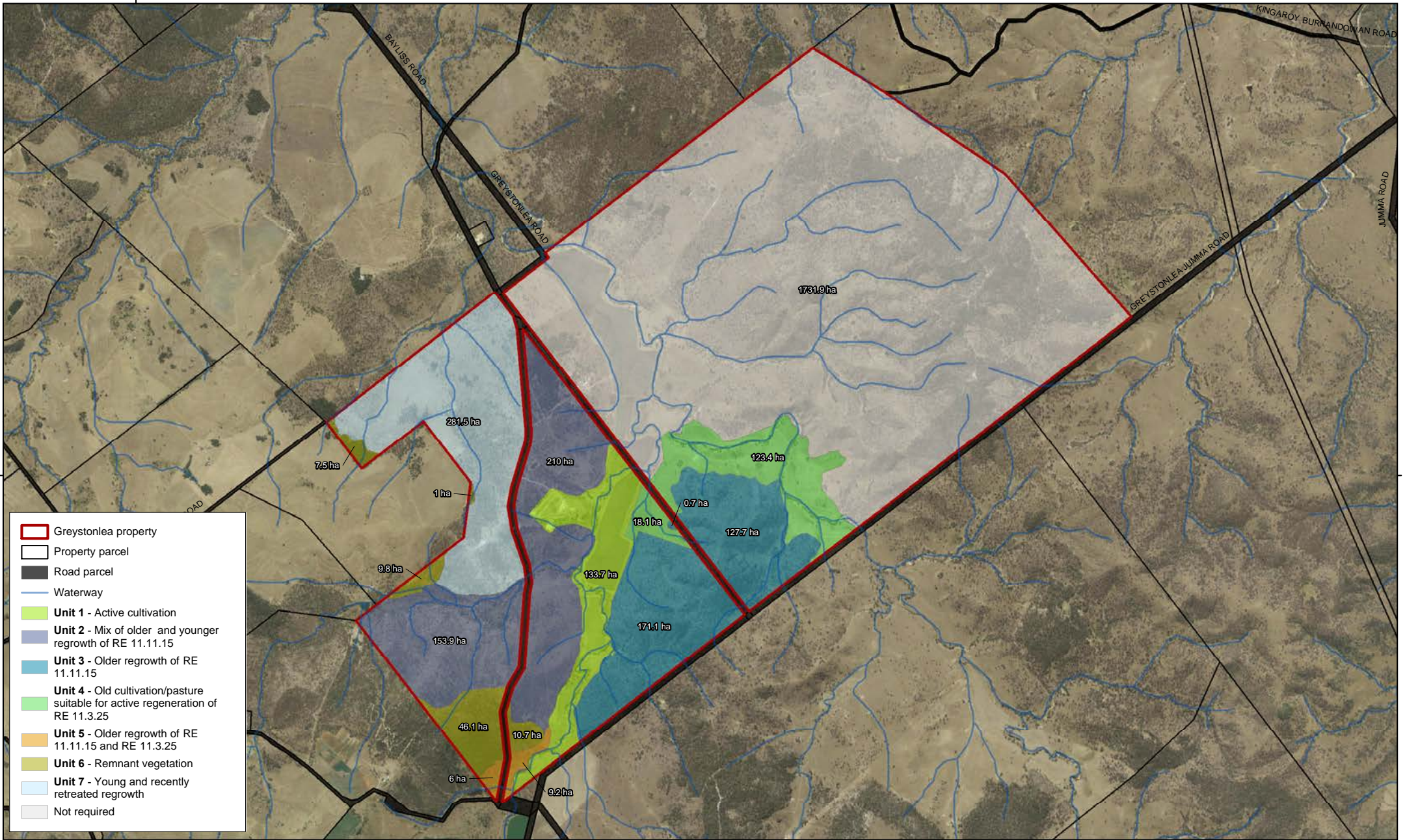


### 6.4.2 Preliminary Site Investigations

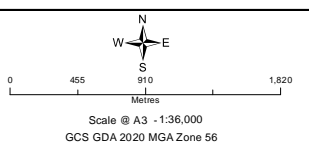
Preliminary site investigations have been undertaken at four of the sites identified in Table 6-2. The preliminary site investigations were undertaken to further understand:

- Size of property;
- Proximity to known Koala areas/sightings;
- Estimated start quality score;
- Identify potential management actions ;
- Identify estimated end quality score;
- Identify possible offset security mechanism; and
- Further understand landholder willingness to proceed with offset.

Following the preliminary site investigation two of the offset sites were deemed potentially suitable, these are offset option 1 (site 5) (refer to Figure 6-2) and offset option 2 (site 7) (refer to Figure 6-3). A follow-up habitat quality assessment was undertaken for offset site option 2 (site 7) in May 2022 (refer to Figure 6-4). If required a habitat quality assessment will also be undertaken for offset option 1 (site 5).



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2	-	-	DRAWN	DB	CHECKED	BM
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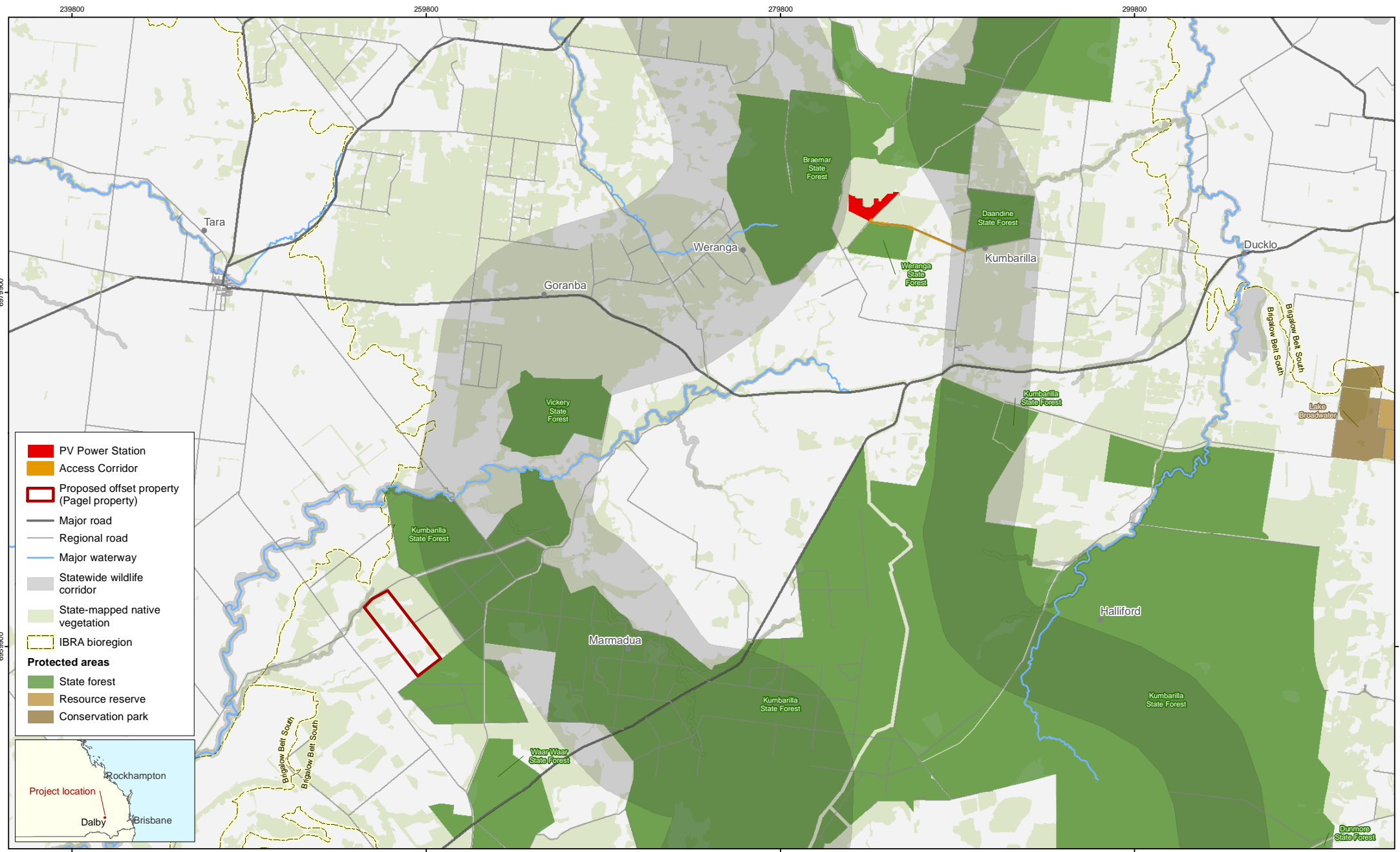
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**Figure 2-2**

Potential Offset Areas - Offset Option 1 (Site 5)

DRG Ref: MP1\_Greystonlea



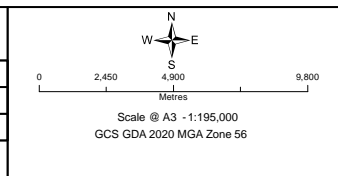


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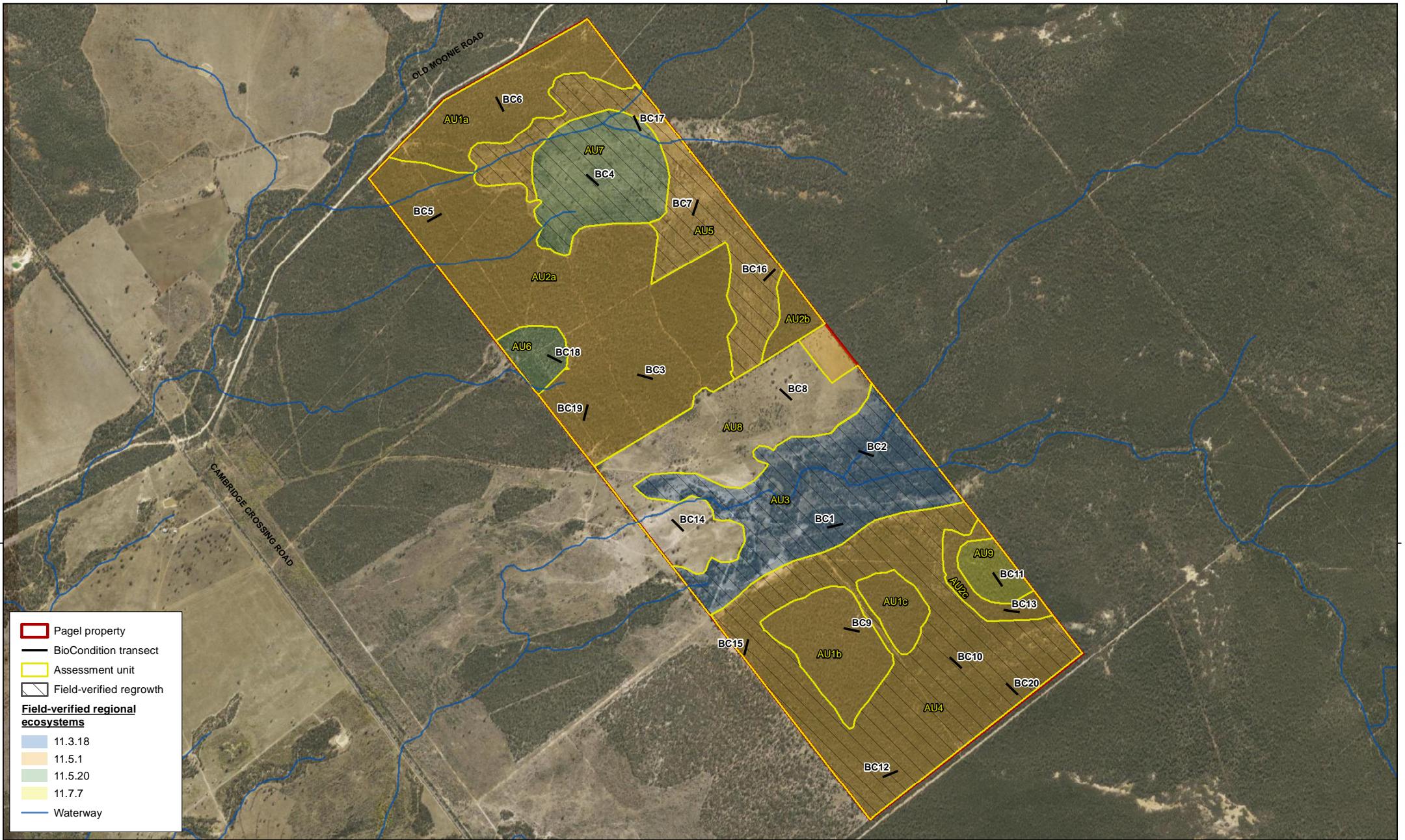


**Figure 2-3**

Offset Option 2 (Site 7) - Location

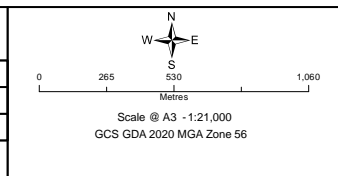
DRG Ref: MP1\_Regional





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**Figure 2-4**

Offset Option 2 (Site 7) - Ground Truthed Regional Ecosystems

DRG Ref: MP2\_FV\_RE



### 6.4.3 Offset Site Summaries

See below an offset site overview for the two options. As mentioned above, only Offset Option 2 (Site 7) has had a habitat quality assessment undertaken on the property, refer to Section 6.4.3.2 for further information.

#### 6.4.3.1 Offset Option 1 (Site 5)

Option 1 is Site 5 (Lots 3 on BO514 and 36 on BO236) described in Table 6-2. The site was visited on 18 December 2021 by Bruce McLennan (Principal Ecologist - Arcadian Ecology).

##### *Size of Property*

The property is 3,043 ha. Expansion of the Cooper's Gap windfarm is expected to cross the property along the ridge country on the northeast of Lot 36, however there is adequate land area to accommodate an offset of over 700 ha on Lots 3 and 36.

##### *Quality of Offset Site*

The property is currently stocked with breeding cattle. The operation is moving to a Wagyu breeding program. The property also has a feedlot on Lot 3 which is used to supplement feeding in drier seasons. Fences on the property are all stock proof cattle fencing and in reasonable condition.

There is good landscape connectivity through remnant and non-remnant vegetation, though the site is not directly connected to any protected areas. The property is all granite country, so fairly different to the Project impact site. However, it is noted Koala habitat with regular sightings by the landholders. Most of the upland parts of the property and some of the watercourses would be a suitable offset. There are good linkages with the creeks which the Koalas obviously use as an access corridor.

Tracks within the property are in reasonable condition but overgrown with grass. There is some erosion in places, especially close to the creeks. The landholders intend to repair the eroded areas and are committed to improving the condition of the property and looking at regenerative agriculture principles. Environmental weeds such as African lovegrass (*Eragrostis curvula*), red Natal grass (*Melinis repens*) and Mayne's pest (*Glandularia aristigera*) are dominant in most places.

Onsite vegetation changes between 1984 and 2019 are shown in Plate 6-1 and Plate 6-2. It shows some natural regeneration of the site in this time. Large areas of cleared vegetation still remain.



Plate 6-1 Option 1 – 1984 – Onsite Vegetation Changes Plate 6-2 Option 1 – 2019 – Onsite Vegetation Changes

##### *Biological Characteristics and Quality of Habitat*

The property has a consistent cover of woody vegetation which is utilised by Koala apart from old and currently used cultivation on the creek flats. It includes mostly regrowth woodland along two watercourses (Ironpot Creek and

## Section 6 Proposed Offsets

Boughyard Creek) and their tributaries. There are some areas of young regrowth (<5 years old) with sparse but developing density progressing to more advanced regrowth 8-11m (estimated 30 years old based on historical imagery) without a significant shrub layer. All areas are in good biological condition.

The dominant canopy species across the property are all Koala feed species. *Eucalyptus crebra* and *Eucalyptus melanophloia* are the most common with *Eucalyptus tereticornis* along the watercourses. Other species include *Angophora floribunda* on the watercourses and a patch of remnant vegetation which is dominated by *Corymbia citriodora*, which is scattered through some of the regrowth. *Corymbia tessellaris* is evident in patches along Greystonlea Road. The site was only briefly assessed for Koala presence however the landholder regularly sees Koalas and saw one the day before the property visit on the 17th December 2021. Such likelihood of presence will be confirmed as part of additional habitat quality survey on the site, should this site be pursued; however, it should be noted that actual presence is not required to confirm historical presence which can be determined from scats, tracks and other traces.

A stream order 3/4 watercourse (Ironpot Creek) crosses the property from south to northeast. The vegetation along the watercourse for the most part appears to be close to remnant but too narrow to have been mapped. The property currently has no Property Map of Assessable Vegetation (PMAV) and numerous watercourses across the property are mapped as category R with a 50 m clearing buffer.

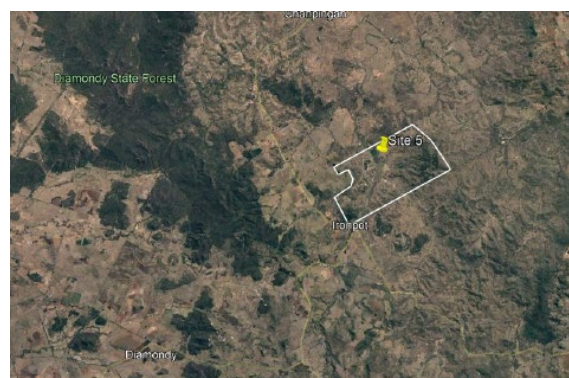
Ground cover species are abundant and diverse. It is expected that BioCondition for the property would score highly for species composition at the present time. The attributes likely to result in lower BioCondition scores for this property are canopy height, shrub canopy, non-native species and coarse woody debris. There is uplift potential for canopy height and cover and in a developing shrub canopy. Coarse woody debris and percentage of non-native pasture cover is unlikely to change over the life of an offset.

The site is expected to be able to provide habitat for the Koala as per the species conservation advice. Resources for a Koala include sufficient quality food and shelter trees and a place to avoid predators. This includes forests or woodlands and paddock trees to facilitate movement between patches.

### Surrounding Vegetation Pattern

This property is traversed by a State-wide biodiversity corridor – riparian corridor and buffer. The property is located approximately 1 kilometre north of a State-wide biodiversity corridor – terrestrial corridor buffer. Both of these corridors are associated with the Brigalow Belt Bioregion. Refer to [Biodiversity Planning Assessment for the Brigalow Belt Bioregion Expert Panel Report](#)<sup>8</sup> for additional information on these corridors.

A review of historical aerial photography shows minimal changes in vegetation cover in the region over a 36 year period (see Plate 6-3 and Plate 6-4).



<sup>8</sup> Department of Environment and Science, 2018. A Biodiversity Planning Assessment for the Brigalow Belt Bioregion: Expert Panel. Version 2.1. Brisbane: Department of Environment and Science, Queensland Government.



### Plate 6-3 Option 1 – 1984 – Surrounding Vegetation Changes

### Plate 6-4 Option 1 – 2020 – Surrounding Vegetation Changes

#### *Management Actions*

Expected management actions will include:

- Expanded and more intensive invasive animal control – feral animals will be managed on site as required, targeting predatory animals and those which have the potential to impede vegetation rehabilitation success;
- Expanded and more intensive invasive plant control – while the weeds presently on site do not directly impact on Koalas, removal of weeds will be undertaken to facilitate regeneration of native vegetation. Minimal control of *Opuntia* sp. Weeds;
- Fire management - fire fuel management is a management action likely to be put in place;
- Grazing management plan – implement a plan in conjunction with the landholder, that addresses fire fuel loads while restricting access at critical periods such as intense wet or dry weather when damage to soils and recovering canopy vegetation might occur.
- General land management - fencing of the offset, fire breaks and tracks, removal of barbed wire in areas of Koala habitat, restricted access, erosion and sediment control if required;
- Habitat augmentation – installation of habitat features for a range of fauna species in previously disturbed or depauperate areas. Specific habitat features may include those that can be a limiting factor to population thresholds, and may include nest boxes, salvaged tree hollows, fallen timber, hollow logs and / or rocks and boulders;
- Erosion and sediment control – implement erosion and sediment control measures. Inspection of areas of erosion concern as part of routine inspection surveys, targeting riparian areas and sites with limited vegetation cover; and
- Rehabilitation and regeneration - natural rehabilitation is preferred to reconstruction of the vegetation community (i.e., importation of soil and planting etc) however, where natural regeneration is unsuccessful minor infill planting can be implemented to facilitate recovery. Rehabilitation areas aim to achieve one canopy tree per 10 m<sup>2</sup>, three shrubs per 10 m<sup>2</sup> and one groundcover per 2 m<sup>2</sup>. Plants reinstated in any particular location will be consistent with the mapped RE or pre-clear RE over that area. Infill planting will be implemented where regeneration has been unsuccessful after three years. Replanting of RE 11.3.25 vegetation in old cultivation areas adjacent to watercourses, which may lack a viable soil seed bank, would be a useful management action and contribute to internal connectivity and habitat quality.

#### *Overview of Discussions with Landholder*

The landholders are passionate about regenerative agriculture and keen to improve the environmental condition of the property which they believe has been neglected. They aren't interested in selling as they are now only in the process of purchasing the property.

The landholder is very interested in offsets as an income option for the property and is also looking at carbon farming income tied into a more biodynamic farming approach. It is acknowledged that an area for carbon storage incentives must occur on a different part of the property than the area of a property proposed as an offset.

The landholders would be interested in having an offset as part of their farming operation and also keen to be involved in any of the management actions required such as fencing, track maintenance, pest control, etc.

#### *Summary*

The key points for Option 1 are:

- The site can accommodate 700 ha of category X vegetation with 590 ha on Lot 3 and 1164 ha on Lot 36;

- The site is located near a State-wide terrestrial buffer corridor and is in close proximity to state-wide riparian buffer corridors;
- Possibly more capacity for uplift on this property compared to Option 2, albeit minimal; and
- There are good linkages with the creeks which the Koalas obviously use as an access corridor.

Figure 6-2 shows the location and potential offset areas, with the final offset area requirements to be determined after detailed field assessment for habitat quality (if undertaken for this property).

### 6.4.3.2 Offset Option 2 (Site 7)

Option 2 is Site 7 (Lot 10 DY167) described in Table 2-1. The preliminary site visit investigation was completed on the 11 December 2021 by Bruce McLennan (Principal Ecologist - Arcadian Ecology).

#### *Size of Property*

The total property size is 809 ha. Sunwater has a 5.1 ha planted offset on the property not far from the homestead. Galilee Energy has a CSG tenement across the property and have drilled one exploration well. Their development intention is unknown. Refer to Figure 6-3 for a figure of the location.

#### *Quality of Offset Site*

The property is not currently stocked however the landholder has expressed a wish to restock at some time. Fences on the property are in varied states. The western boundary is relatively new and in good condition, as are a couple of internal fences. The western and southern boundaries are old netting in poor condition that is not stock proof.

Tracks within the property are generally poor with some erosion in places. The dead subcanopy trees in many places have fallen across the tracks. The vigorous grass recovery from recent rains combined with a large number of dead subcanopy, and in some places canopy trees, presents a significant fire risk when conditions return to dry.

Wild dogs are an issue in the area and baiting is ongoing. Feral pigs are also present although little evidence was seen of them. Weeds are present at very low densities, similar to the project impact area.

Onsite vegetation changes between 1985 and 2019 are shown in Plate 6-5 and Plate 6-6. It shows natural regeneration on the southern portion of the site. Large areas of cleared vegetation still remain.



Plate 6-5 Option 2 – 1985 – Onsite Vegetation Changes



Plate 6-6 Option 2 – 2019 – Onsite Vegetation Change

### *Biological Characteristics and Quality of Habitat*

The property has a consistent cover of woody vegetation which would be utilised by Koala in optimal conditions. Vegetation includes remnant woodland (REs 11.5.5, 11.5.1a, 11.5.20 and 11.3.18) and regrowth of the same from small open areas (old farming) with scattered regrowth to younger regrowth (15 years old) with moderate density to advanced regrowth to 15m (40 years old) with dense subcanopy. All areas have suffered significant dieback from recent drought but could be viewed as effective natural thinning of what would have been overly dense stands of *Callitris glaucophylla* and *Allocasuarina luehmannii*.

The dominant canopy species across the property are all Koala feed species. *Eucalyptus crebra* and *Eucalyptus populnea* are the most common with some areas of *Eucalyptus woollsiana* to the north of the lot and *Eucalyptus chloroclada* along the watercourse. There is a scatter of *Corymbia tessellaris* and possibly occasional *E. tereticornis* along the watercourse.

The site was only briefly assessed for Koala presence with little evidence of occupation found, however the landholder has seen Koalas from time to time in the 70 years he has been on the property. It is assumed likely that the population is small and transient, similar to the impact site. Although landholder sightings suggest the presence of Koalas, the likelihood of presence will be confirmed as part of additional survey on the site, should this site be pursued.

A stream order 3 watercourse crosses the property from east to west. Within the Lot the watercourse appears to be a series of larger waterholes and deep sand bars with what appears to be vegetation mostly consistent with RE 11.3.18 regrowth. The mapped pre-clear vegetation for this watercourse is 11.3.25. The regrowth along the watercourse for the most part appears to be close to remnant.

The site is expected to be able to provide habitat for the Koala as per the species conservation advice. Resources for a Koala include sufficient quality food and shelter trees and places to avoid predators. This includes forests or woodlands and paddock trees to facilitate movement between patches. Within the offset site, potential Koala habitat is present in the areas mapped as eucalypt dry woodlands on Cainozoic sand plains and eucalypt woodlands on alluvial drainage lines. The entirety of 'the offset site' should be considered potential Koala habitat with the exception of the old cultivation areas in the centre of the property. However, those cleared areas should be considered as having potential for Koalas to traverse between patches of woodland and represent useful areas for revegetation.

### *Surrounding Vegetation Pattern*

The neighbouring block (Lot 11 to the east) is owned by the landholder's son. The block is mostly remnant vegetation with some areas of Landzone 7. This property could be used to bolster the area needed for an offset should the size of Lot 10 be insufficient, however there is only approximately 35 ha of category X vegetation on the property. This property was not inspected however drone footage was obtained during the site visit and more dieback was noted.

This property is located adjacent a State-wide biodiversity corridor – riparian corridor and buffer. The property is located approximately 1.5 kilometres west of a State-wide biodiversity corridor – terrestrial corridor buffer. Both of these corridors are associated with the Brigalow Belt Bioregion. Refer to [Biodiversity Planning Assessment for the Brigalow Belt Bioregion Expert Panel Report](#)<sup>9</sup> for additional information on these corridors.

A review of historical aerial photography shows a reduction in vegetation cover over properties to the north, west and south of the property, most likely as a result of agricultural expansion (see Plate 6-7 and Plate 6-8). This pattern of encroachment has the potential to influence the distribution of the Koala on this potential offset site and surrounds.

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<sup>9</sup> Department of Environment and Science, 2018. A Biodiversity Planning Assessment for the Brigalow Belt Bioregion: Expert Panel. Version 2.1. Brisbane: Department of Environment and Science, Queensland Government.



**Plate 6-7** Option 2 – 1984 – Surrounding Vegetation Changes



**Plate 6-8** Option 2 – 2020 – Surrounding Vegetation Changes

### Regional Ecosystem Verification

Field verification was conducted at the 20 habitat quality site locations which involved site traverses on foot to determine approximate RE boundaries based on vegetation structure and geology. At a GIS level, RE boundaries were adjusted to reflect the findings of the field traverses.

Field verification of REs was conducted as per Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland (Neldner et al. 2020).

The ground truthed RE layer is close to the state mapped REs with some key changes which included below and shown on Figure 6-4:

- Areas previously mapped as RE 11.5.1 (*Eucalyptus crebra* and/or *E. populnea*, *Callitris glaucophylla*, *Angophora leiocarpa*, *Allocasuarina luehmannii* woodland on Cainozoic sand plains and/or remnant surfaces) were determined to be RE 11.5.1 remnant. Historical aerial imagery suggested that those areas had not been cleared in the previous 70 years which was confirmed by field verification. However, condition within the confirmed RE 11.5.1 area was highly variable as the property and wider landscape has suffered significant drought dieback over the prior three years. Large parts of the mapped 11.5.1 have suffered an almost complete loss of canopy and subcanopy and has reverted to a shrubland of eucalypt and acacia saplings. Consequently, the RE 11.5.1 remnant has been divided into two assessment units: Assessment Unit 1 – RE 11.5.1 in good condition and Assessment Unit 2 – RE 11.5.1 in poor condition. Assessment Unit 2 also includes a small area of previously mapped non-remnant woodland which largely meets remnant characteristics, although also suffering drought dieback.
- A small area of the mapped RE 11.5.1 vegetation was determined to be consistent with RE 11.7.7 (*Eucalyptus fibrosa* subsp. *nubilis* +/- *Corymbia* spp. +/- *Eucalyptus* spp. woodland on Cainozoic lateritic duricrust). This vegetation was in average to good condition and assigned to Assessment Unit 9. One BioCondition transect was recorded in this Assessment Unit due to size constraints;
- Woodland in the centre of the property was mapped as non-remnant, however, was assessed as advanced regrowth of RE 11.3.18 (*Eucalyptus populnea*, *Callitris glaucophylla*, *Allocasuarina luehmannii* shrubby woodland on alluvium) which was approaching remnant characteristics. This vegetation was pre-clear mapped as RE 11.3.25 (*Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines). Elements of this RE (11.3.25) are present with both *E. camaldulensis* and *E. tereticornis* present as a very narrow fringe around waterholes in the



drainage system, however too narrow to map as a separate ecosystem and too narrow to conduct BioCondition assessments. Historical photos indicate that the regrowth is up to 40 years old. The RE 11.3.18 ecosystem was assigned to Assessment Unit 3.

- Woodland to the south of the property (mapped as non-remnant) was assessed as being advanced regrowth vegetation of RE 11.5.1, some of which is close to remnant characteristics. Historical photos indicate that the regrowth is up to 40 years old. This area was of variable condition with considerable dieback with the loss of canopy and subcanopy species. This area was assigned to Assessment Unit 4;
- Areas of regrowth (pre-clear mapped RE 11.5.1) to the north of the property were found to be young recovering vegetation corresponding to RE 11.5.1 and RE 11.5.20 (*Eucalyptus moluccana* and/or *E. microcarpa* and/or *E. woollsiana* +/- *E. crebra* woodland on Cainozoic sand plains). Historical photos indicate that the regrowth is up to 20 years old. This vegetation had a canopy that was sparse and below 5m in height. The young regrowth RE 11.5.1 was assigned to Assessment Unit 5 and the young regrowth 11.5.20 was assigned to Assessment Unit 7;
- An area of regrowth on the western boundary was assessed to be advanced regrowth of RE 11.5.20 and assigned to Assessment Unit 6. Historical photos indicate that the regrowth is up to 30 years old. One BioCondition transect was recorded in this AU due to size constraints; and
- Areas of old cultivation with only sparse regrowth of *Callitris glaucophylla* and *Eucalyptus populnea* in the centre of the property were assigned to Assessment Unit 8. Most of this area is clear of woody vegetation but would ideally suit assisted revegetation. The area consists of deposited sand drifts associated with the watercourse.

### *Terrestrial Habitat Quality (Koala)*

Koala habitat is defined by the vegetation community present and the vegetation structure; Koalas do not necessarily have to be present (DotE 2014<sup>10</sup>). Any forest or woodland containing species that are known Koala food trees, or shrubland with emergent food trees can be considered as 'potential koala habitat' (DotE 2014). This can include remnant and non-remnant vegetation in natural, agricultural, urban and peri-urban environments. Koala food trees can generally be those of the genus *Angophora*, *Corymbia*, *Eucalyptus*, *Lophostemon* and *Melaleuca* (DotE 2014). Koala habitat surveys were undertaken in accordance with the relevant State and Commonwealth survey guidelines. Survey methods included active searches, searches for scats and other signs, and habitat assessments.

Within the offset site definitive evidence of Koala habitation was not recorded at the time of this survey. This should not be considered an indication that the habitat is unsuitable for Koala or that Koalas would be unlikely to utilise the habitat on the proposed offset site. The landholder has observed Koalas at various times on the site in his 70 years on the property. It is considered likely that given the extreme nature of the drought which has killed a significant part of the remnant and advanced regrowth woodland canopy on the property (including the riparian corridors) that there has been a recent contraction (previous 5-10 years) of the Koala population to the east and into more favourable vegetation.

Offsite records of Koala in country adjacent to the offset site are very limited and mostly associated with roads and passing traffic, where incidental observations are made by members of the public and reported and recorded. It is likely the vast majority of incidental sightings are never reported. The closest official record is 24 km to the north on Western Road, near the Surat Development Road. This record was from 2011 (a wet year) in cleared farming country so likely to be an animal traversing. The next closest is a 1987 record from 29 km southwest of the offset site in cleared country but associated with a remnant riparian corridor that extends to the northern boundary of the offset site. Very few records exist for the area, not necessarily because Koalas aren't present, but more to do with a lack of regularly driven roads or proximity to large projects requiring ecological assessments.

A limitation of scat and scratch surveys has become evident on many sites in the previous 12 months where high rainfall events in southern Queensland have resulted in loss of scat evidence due to organic breakdown and dense ground cover growth as well as loss of scratch evidence on smooth barked eucalypts with repeated bark shedding over a short period

<sup>10</sup> Department of the Environment (DotE) 2014, EPBC Act Referral Guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian Capital Territory). DotE, Canberra.

of time. Eucalypts shed their bark to remove moss, lichen, fungi and parasites, and due to increased growth rates – both scenarios associated with increases in rainfall.

Within the offset site, potential Koala habitat is present in the areas mapped as eucalypt dry woodlands on Cainozoic sand plains and eucalypt woodlands on alluvial drainage lines. At a wider scale the potential habitat contributes to remnant linkages through existing remnant blocks including areas of private property to the east and state forest to the southeast. The entirety of the offset site should be considered potential Koala habitat with the exception of the old cultivation areas in the centre of the property. However, those cleared areas should be considered as having potential for Koalas to traverse between patches of woodland and represent useful areas for revegetation. A small offset established within the boundary of the offset site and planted to eucalypt species indicates a high likelihood of success of a plantation for Koala habitat.

Koala feed trees observed at the site include:

- *Eucalyptus crebra* (Narrow leaved ironbark) – the dominant canopy species in RE 11.5.1 and also associated with RE 11.3.18, RE 11.7.7 and RE 11.5.20, present as mature trees to seedling regeneration in cleared and recovering remnant;
- *Eucalyptus populnea* (Poplar box) – subdominant canopy species in RE 11.5.1, dominant species in RE 11.3.18, present as mature trees to sapling regeneration in cleared and recovering remnant;
- *Eucalyptus chloroclada* (Baradine red gum) – associated species within RE 11.3.18 regrowth and RE 11.5.1 remnant;
- *Eucalyptus camaldulensis* (river red gum) – associated species in RE 11.3.18 and fringing small patches of RE 11.3.25 in riparian regrowth in the centre of the offset site, present as mature trees and saplings;
- *Eucalyptus tereticornis* (Queensland red gum) - associated species in RE 11.3.18 and fringing small patches of RE 11.3.25 in riparian regrowth in the centre of the Offset site, present as mature trees and saplings;
- *Eucalyptus woollsiana* (Western grey box) – the dominant canopy species in RE 11.5.20 advanced and young regrowth;
- *Eucalyptus fibrosa subsp. nubilis* (Broad leaved ironbark) – dominant species in RE 11.7.7 (not considered highly palatable Koala feed); and
- *Corymbia clarksoniana* (Clarkson's bloodwood) – noted as present in remnant RE 11.5.1.

The level of risks to Koala on the offset site were assessed as generally low. Apart from a small sawmill which operates intermittently there is no machine activity that would deter the presence of Koala. The site is approximately 2 km from a minor main road (Cambridge Crossing Road) and a little used local road (Old Moonie Road) runs along the northern boundary of the property. Tracks within the property are poor and there is no risk to Koalas from vehicle strike. Wild dog tracks were noted in parts of the property; however, no dogs were sighted during surveys. Surrounding landholders maintain a regular dog baiting campaign. Wild pig numbers within the property were elevated though likely to pose little danger to Koalas.

The EPBC Koala Habitat Assessment tool was used to assess potential Koala habitat and indicated an average score of six to seven for advanced regrowth and remnant, three to four in young regrowth and two in old cultivation. There were 20 sites assessed including twelve in RE 11.5.1 ranging from remnant to young regrowth, three in RE 11.5.20 regrowth, two in RE 11.3.18 regrowth, two in non-remnant old cultivation conforming to RE 11.3.18 and one in RE 11.7.7.

### Management Actions

Dieback of canopy and sub-canopy in remnant areas of the property are likely to realise potential uplift gains (BioCondition and habitat) over time if the property is used as an offset. Permanent removal of grazing pressure may improve dieback recovery. Active management actions would include:

- Fencing of the offset – The current fencing on the site is inadequate and is not capable of excluding stock from the offset area from the northwest, northeast and southeast boundaries. It is proposed that a stock proof and Koala



friendly boundary fence be constructed to ensure no stock ingress. The landholder has indicated little interest in stocking the property which is currently unstocked apart from 3 sheep observed and a small herd of stock horses;

- Expanded and more intensive invasive animal control - wild dog and pig management and removal of feral animals which may impact on vegetation regeneration;
- Expanded and more intensive invasive plant control – as with Option 1, while the weeds presently on site do not directly impact on Koalas, removal of weeds will be undertaken to aid regeneration of native vegetation.
- Fire management – it is proposed that a program of cool fuel reduction burns be undertaken around Year 2 onward of a proposed management plan. Currently the property has an abundance of regenerating seedlings to saplings of mostly *Eucalyptus crebra* and *E. populnea* which would be fire sensitive in the current season but likely to grow to sufficient height within two years to allow fuel reduction burns in cooler and wetter conditions. Fire management would require the repair and maintenance of fire containment tracks around the property which are currently overgrown. An Offset Area Fire Management Plan would need to be developed with a suitably qualified operator;
- General land management – fencing to ensure stock exclusion, track maintenance, removal of barbed wire in areas of Koala habitat, restricted access, erosion and sediment control if required;
- Replanting of old cultivations – it is proposed that within two years of offset commencement a large-scale planting of up to 10% of the offset area be undertaken in previously cultivated country to link vegetation from south to north through the centre of the property. Replanting would require the sourcing of locally provenanced seed of species consistent with already existing woodland on the site. Tubestock would be planted into a worked medium with suitable soil amelioration and watering to establish the area as a recovering woodland;
- Habitat augmentation – installation of habitat features for a range of fauna species in previously disturbed or depauperate areas. Specific habitat features may include those that can be a limiting factor to population thresholds, and may include nest boxes, salvaged tree hollows, fallen timber, hollow logs and / or rocks and boulders.
- Erosion and sediment control – implement erosion and sediment control measures. Inspection of areas of erosion concern as part of routine inspection surveys, targeting riparian areas and sites with limited vegetation cover;
- Rehabilitation and regeneration – As with Option 1, natural rehabilitation would be the preferred approach, supported by appropriate weed management. Infill planting would be considered where regeneration has been unsuccessful after three years; and
- Monitoring – It is proposed that ongoing monitoring would happen on a prescribed basis and would include a combination of regular BioCondition surveys, fauna surveys and photo-point monitoring. Key targets would include site security, canopy height and cover improvements, Koala usage of the site and management of fire fuel loads.

A detailed breakdown of targets and timing to be provided in an OMP at a later date.

### 6.4.4 Surrounding Koala Presence

Figure 6-1 provides a spatial representation of Koala using WildNet records up to June 2019, and additional ALA records to November 2021. The figure demonstrates a landscape distribution of Koala that is largely incongruent with vegetation distribution and naturally associated with survey locations and incidental sightings or Koala hospital reports where vehicular strike or dog attacks have occurred. Accordingly, the records may not represent a natural distribution in the landscape which would likely be more consistent with available habitat in the landscape. Noting records occur around the two potential offset sites and both landholders of the potential offset site report incidental sighting of Koala on their properties, which both contain suitable habitat and potentially suitable habitat following management, it can be deduced that both offset options are likely to maintain extant permanent or transient Koala populations. The two potential offset site options are adjacent State-wide biodiversity corridor buffer area for terrestrial corridors and riparian corridors:

- The offset option 1 (Site 5) is:
  - Approximately 1 km east of a State-wide biodiversity corridor buffer area; and
  - A regional riparian corridor is located within the offset site.
- The offset option 2 (site 7) is:
  - Approximately 1.5 km west of a State-wide biodiversity corridor buffer area; and
  - Approximately 50 m south of a regional riparian corridor.

This landscape connectivity further promotes the likelihood of Koala presence.

The population densities for Koalas range from moderately high in south-east Queensland and some parts of central Queensland (e.g., 1-3 Koalas per/ha) to low in other parts of central Queensland (0.01 Koalas per/ha)<sup>11</sup>. Depending on the density of the Koala population, the home range for a Koala in agricultural landscapes in southeast Queensland is between 5.3 ha and 91.4 ha<sup>12</sup>. According to the Species Conservation Advice for the Koala<sup>13</sup>, in 2012 the population estimate for the Brigalow Belt Bioregion South was 11,071.

Offsetting and the associated management actions are expected to improve the biological health of the chosen offset site and likely to increase population densities of Koala on either site should management measures be applied.

## 6.5 Offset Site Habitat Assessments

### 6.5.1 Offset Habitat Assessment Method

Habitat assessments were undertaken for the Koala to determine habitat suitability at the offset site. The habitat assessments were conducted using the same methodology those conducted for the impact site, as described in 3.2.2.2.

#### 6.5.1.1 Koala Habitat Assessment

A habitat assessment (similar to the one undertaken in Section 3.4.2.7.5) has been undertaken to identify the suitability of the offset site for the Koala. The habitat assessment used BioCondition reports and habitat quality reports prepared by Arcadian Ecology in 2022 (Arcadian Ecology, 2022). These two reports identified that the BioCondition transects of the offset site consisted of primary and secondary food trees, including Baradine red gum (*Eucalyptus chloroclada*, primary) and Poplar box (*Eucalyptus populnea*, secondary). Poplar box was recorded in fifteen (15) of the twenty (20) BioCondition transects. Other Koala food tree species recorded within the BioCondition transects included Narrow leaved ironbark (*Eucalyptus crebra*), River red gum (*Eucalyptus camaldulensis*), Queensland red gum (*Eucalyptus tereticornis*), Western grey box (*Eucalyptus woollsiana*), Broad leaved ironbark (*Eucalyptus fibrosa subsp. nubilis*) and Clarkson's bloodwood (*Corymbia clarksoniana*).

The offset site contains some larger trees, with measured attributes within the BioCondition report indicating suitability for Koalas. BIO2, BIO 3, BIO5, BIO7, BIO11 and BIO19 all contained 2 – 6 large eucalypt trees, ranging in heights from 7 – 20 m. The remaining BioCondition transects (BIO1, BIO4, BIO8 – BIO10, BIO12 – BIO18 and BIO20) did not record any large trees, with heights ranging from 3 – 18 m.

The landscape proximal to the offset site consists < 500 ha of remnant vegetation, including areas of state forest. As such, there is sufficient connectivity between the offset site and other habitats in the landscape. Field surveys at the

<sup>11</sup> Melzer, A., Carrick, F., Menkhorst, P., Lunney, D. and John, B.S. 2000 Overview, critical assessment, and conservation implications of koala distribution and abundance. Conservation Biology 14:619-628

<sup>12</sup> Davies, N., Gramotnev, G., Seabrook, L. et al. 2013. Movement patterns of an arboreal marsupial at the edge of its range: a case study of the koala. Mov Ecol 1, 8 (2013).

<sup>13</sup> Department of Agriculture, Water and the Environment 2022, Conservation Advice for Phascolarctos cinereus (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory.

offset site recorded Koala evidence through scats, however the record location does not correlate with landzone formation, as there were no changes in Koala evidence from landzone 3 to landzone 5. There is however, a distinct difference in large tree numbers between landzone 3, with trees being more moist and fertile, and landzone 5. Similar to the impact site, landzone 3 in the offset site are likely to provide areas of potential climate refugia in drying conditions.

The habitat assessment indicated the offset site is likely to provide 207 ha of suitable habitat for an important population of Koala, with the exception of the cleared road reserve. A habitat quality map for the offset site, in relation to suitable Koala habitat is provided in **Appendix O**.

### 6.5.2 Offset Habitat Calculation Method

The PV Power Station has been assessed using a modified version of the Queensland 'Guide to determining terrestrial habitat quality: A toolkit for assessing land-based offsets under the Queensland Environmental Offsets Policy' Version 1.2 (April 2017). The unmodified guide provides a methodology for proponents to use to measure the habitat quality of a land-based offset under the Queensland Environmental Offset policy (QEOP). This methodology has been adopted and modified to assess impacts relating to Matters of National Environmental Significance (MNES) relating to the Project. The methodology is referred to as the Modified Habitat Quality Assessment (MHQA).

As per the MHQA a total of 10 Habitat Quality sites were assessed (as per Sections 3.2.2.3, 3.2.2.4 and 3.3.6.3) across five assessment units of the PV Power Station. Raw site data and scoring as per the MHQA were collated in an excel spreadsheet (Modified QLD Habitat Quality spreadsheet) which outputs to three main scores: Site Condition Score, Site Context Score and Species Stocking Rate (SSR) Score. The scores are combined in the ratio: Site Condition (a score out of 3), Site Context (a score out of 3) and SSR (a score out of 4) to arrive at a Final Habitat Quality score for the site out of 10.

The Site Condition score and Site Context score combined are equivalent to the output of the unmodified 'Guide to determining terrestrial habitat quality: A toolkit for assessing land-based offsets under the Queensland Environmental Offsets Policy' Version 1.2.

The SSR assesses the site for the following attributes:

- Proximity of the site to known records for the species;
- Species usage of the site (habitat type and evidence of use);
- An approximate density of the species on the site;
- The role and importance of the species population on that site, whether it be in breeding, population dispersal, maintaining genetic diversity or supporting a population at the limit of its species range.

The addition of the SSR score completes the MHQA score.

#### 6.5.2.1 Koala Habitat Calculations

The scores that were inputted to the SSR (species stocking rate) section of the Koala MHQA spreadsheet are as follows with site justification:

1. **Presence detected on or adjacent to site:** Yes, koala presence was verified at the time of survey in The Project and adjacent area with evidence of habitation including, scats, scratches and skeletal remains. There are numerous records in the wider immediate area including sightings and evidence of habitation.

**Score: 10**

2. **Species usage of the site:** The site is likely to be used periodically for dispersal, foraging and breeding. It is a relatively undisturbed refuge joining a large intact remnant (consisting of state forest and private lands) to the west and linking an in-part tenuous vegetated corridor to Wilkie Creek in the east. It is likely that given minimal threats at the site such as traffic, rural production or predators, this location would represent a breeding location.

**Score: 15**

3. **Approximate density:** Density of koala population is expected to be low and estimated to be 1 animal/100-500ha in the immediate area.

**Score: 10**

4. **Role/importance of species population at the site:**

**Score of 10** based on the following:

- a) **Is The Project a key source population for breeding?** The wider connected area contains a mobile population that would have a range exceeding that of the Project area. Clearing activities in relation to the Project will take place outside of the breeding season for the Koala (October – May). Sub-score of 0.
- b) **Does The Project contain a key source population for dispersal?** The wider area contains a mobile population that would have a range exceeding that of the Project area. However, it is likely the Project is part of a block of vegetation that would be considered important for dispersal of the species. Sub-score of 5.
- c) **Is the Study Area necessary for maintaining genetic diversity?** The loss of The Project to clearing will mean a net reduction in koala habitat in southern Queensland and thereby impacting genetic diversity. Sub-score of 15.
- d) **Is the study area the limit of the species’ range?** No, the study area is not the limit of the range for koala as the species is found further west of this location, although at increasingly lower population densities. Sub-score of 0.

**Overall SSR Score: 40**

The habitat scoring has resulted in a final habitat quality score of 7.79 as shown in Table 6-3.

**Table 6-3 Final Habitat Quality Table – Koala**

Final habitat quality score (weighted)	AU1	AU2	AU3	AU4	AU5	Average/ Final
Site Condition score (out of 3)	2.78	2.44	2.65	2.64	2.65	2.63
Site Context Score (out of 3)	2.63	2.63	2.63	2.63	2.63	2.63
Species Stocking Rate Score (out of 4)	2.57	2.57	2.57	2.57	2.57	2.57
Habitat Quality score (out of 10)	7.98	7.64	7.85	7.84	7.85	7.83
Assessment Unit area (ha) in disturbance footprint	23.9	58.4	58.5	2.7	47.9	191.4
Total impact area (ha) for this MNES	23.9	58.4	58.5	2.7	47.9	191.4
Size Weighting	0.12	0.31	0.31	0.01	0.25	100.00
<b>Weighted Habitat Quality Score</b>	<b>0.96</b>	<b>2.37</b>	<b>2.43</b>	<b>0.07</b>	<b>1.96</b>	<b>7.79</b>

It expected that the clearing extent will be far less within the Access Corridor than the greater Project Area and disturbance area amounts provided throughout this document. The road within the Access Corridor only requires regrading and enlargement to a 7 m wide gravel pavement on an 8 m formation. It is expected clearing will be limited to only what is necessary in Access Corridor. As such, BioCondition assessments and subsequent Koala habitat scoring has not been specifically undertaken within the Access Corridor. The PV Power Station habitat quality scoring result of 7.79 as per Table 6-3 has been applied to the Access Corridor. This is a conservative approach as the scoring in the Access Corridor is likely to be less.

### 6.5.3 Required Offsets

The Preliminary Documentation identifies a 'significant residual impact', and therefore a necessary offset for Koala habitat, which is known to occur in the Project Area. The species was identified during specific surveys undertaken by CDM Smith in 2020 and 2021.

The Project Area is predicted to potentially impact a maximum 207.6 ha of 'known important habitat' and 'suitable habitat'. The estimated impact based on the disturbance footprint is 204.1 ha of 'known important habitat' and 'suitable habitat'. It should be noted that the area to be cleared associated with the Project is expected to be less based on detailed design refinements. A conservative approach has been applied and therefore the 207.6 ha of 'known important habitat' and 'suitable habitat' based on the Project Area has been used. The significant impact assessment concludes there is potential for significant residual impacts through direct clearing of 'known habitat' for Koala. **Therefore, the Project may be considered to have a 'significant residual impact' on Koala and environmental offsets are required.**

For additional information relating to project offset requirements, refer to the draft Offset Management Plan found in **Appendix N**. The draft Offset Management Plan has been prepared prior to publishing the draft Preliminary Documentation to confirm that there is a workable offsetting solution for the Project. Preliminary site investigations have been undertaken at the two potential offset sites, with subsequent detailed site investigations to be completed prior to the required offset being secured. The draft Offset Management Plan provides additional information on two potential offset site options. One of the potential offset sites has had a habitat quality assessment completed on the property.

While the Squatter pigeon (southern) has not been identified as a species requiring a specific offset, preclearance field surveys will quantify any unavoidable impacts. Offsets already planned for the Project are likely to contain suitable habitat for this species and provide any offsets which may be required given the similarity of habitat and the fact that the proposed offset site is within the natural distribution of the Squatter pigeon (southern) in Queensland.

### Section 7 Social and Economic Matters

#### 7.1 Social Costs and Benefits

The estimated peak of 144 personnel will be required during construction. Most construction positions will be short-term and temporary, and it is expected the bulk of the construction workforce will be provided by contractors. The workforce is likely to be sourced locally, wherever possible. The workers who do not reside locally will be housed within local accommodation facilities in Dalby or surrounding localities. The region has seen a number of similar Projects constructed and therefore the skillset of the local region is expected to be strong and capable of servicing the project. Some specialist services may be required from Brisbane and will be housed locally in Dalby as required.

When operational, the Project will be manned during the daytime, with an ongoing anticipated maximum workforce of 5 full time equivalent staff. These staff are expected to be based locally in Dalby or surrounding centres.

Potential adverse impacts include:

- Minor localised inflation leading to displacement of persons and businesses not benefiting from the Project related businesses;
- Housing shortages and increased housing prices can limit the positive economic flow on to communities and create pressure on non-mining businesses and local communities; and
- Higher road trauma as a result of workers driving from local centres to the Project.

Potential positive social impacts include:

- More employment, business and training increasing the capacity and skillset of the region;
- Population growth and diversification in communities;
- Increased financial support in towns through substantial contributions by companies to community infrastructure development; and
- Infrastructure improvements such as roads and communications.

#### 7.2 Economic Costs and Benefits

The Project has received the formal support from the Trade and Investment Queensland as this Project aligns with many of the Queensland Government's objectives (source: letter dated 20 April 2020 from Trade and Investment Queensland). The Project also has the support of the WDRC (source: [WDRC Website](#) dated 26 October 2020) as energy is recognised as one of the four economic pillars of the region. The Project at the time was the 23<sup>rd</sup> solar farm which was granted approval by WRDRC in the last four years, recognising the importance of such projects for the region.

The total economic investment of this Project is approximately \$130-140M, of which a portion of this will directly benefit the local area and region.

Employment and resources associated with the construction phase will be the largest single financial benefit to the local area. Where local suppliers are not available or practical, contracts with regional suppliers will be required. There is an expected 144 jobs during the construction phase. Significant construction components are:

- Roadworks and drainage contract for the Access Corridor;
- Internal roads, earthworks pads, stormwater;
- Supply and installation of solar panels including components; and
- Buildings including sub-station.



Accommodation requirements for mobile workers when required is expected to have a direct benefit to the local Dalby community.

Following completion of construction, the facility will require periodic maintenance which is expected to be provided by local services.

No economic or employment benefits are expected if the action does not proceed. This Project brings substantial investment to the region which will stimulate the WDRC economy. This would not exist if there was no Project.

The Project is anticipated to result in a range of beneficial impacts including:

- Economic stimulus to the regional, state and national economies during the construction and operational phases of the Project;
- Increased employment opportunities within WDRC which would serve to reduce unemployment within the region; and
- Opportunities for suppliers in the WDRC and surrounding regions to support the construction and operation of the Project.

The Project is anticipated to result in a range of adverse impacts including;

- Minor tightening of the local and regional labour market potentially resulting in increased labour costs;
- Potential for short-term skills shortages;
- Potential for short-term inflationary pressure in the WDRC residential, commercial and industrial property markets; and
- Short-term increased burden on WDRC infrastructure, such as road networks.

### 7.3 Public Stakeholder Consultation

Despite the MCU Application being a code assessable development application, consultation with various local and state government departments was undertaken as well as the community, surrounding landholders and cultural heritage parties.

#### 7.3.1 General Community

Elecseed has developed a website in order to keep the community informed. This website confirms the intention to deliver an innovative Project to drive the future of renewable energies in Queensland and Australia. There is the ability to request further information by utilising the contact link. We understand that there have been no concerns raised via this portal. Project. Elecseed have also printed up brochures for distribution to interested parties to promote awareness of the

Elecseed also provide project posts via social media and their website to allow information to be shared. In December 2020 Elecseed and Advisor Calibre made a video with the Mayor of Western Downs, Paul McVeigh, which was published on social media and You tube, talking about the project.

In December 2020, the PV Magazine posted an article through their national platform on the project masterplan.

#### 7.3.2 Government Organisations

Discussions have been held with various government organisations who represent the community. The various opportunities afforded to the area via the investment in the community have been discussed and have been widely supported, this has included Trade and Investment Queensland. The Proponent have had numerous meetings with Trade and Investment Queensland and they have actively endorsed the proposed development and recognised the strategic importance of the investment. There has also been support from the WDRC.

Elecseed and KOMIPO have received letters of support from Trade Investment Queensland from the very beginning of the project. Elecseed and KOMIPO hold regular meetings with AUSTRADE in Seoul to update them on the project

The Queensland Government are party to a Memorandum of Understanding (MOU) signed by the Hon. Cameron Dick MP following a September 2022 tour of the Joint Venture partner, KOMIPO facilities in South Korea.

A pre-referral meeting was held with the department in May 2021. Subsequent meetings have been held with the department as part of the preparation of the Preliminary Documentation, including the following:

- One in October 2021 to discuss the Preliminary Documentation RFI items;
- One in December 2021 regarding initial feedback on the draft Preliminary Documentation;
- One in June 2022 to discuss an updated revision of the Preliminary Documentation;
- One in August 2022 to discuss a proposed koala survey methodology for the proposed offset site;
- One in January 2023 to discuss the Project and application process;
- In January/February 2023 departmental officers attended the offset site and impact site respectively. On each day an initial site meeting was held between the Project team and the department;
- In March 2023, members of the Project team met with the department in Canberra to discuss a RFI received earlier in the month. The Project team and the department had a follow-up virtual meeting to discuss offset principles;
- In May 2023, the Project team met with the department in Brisbane to discuss progress on the RFI; and
- In June 2023, the Project team met with the department in Brisbane to discuss the Project.

Other Project related meetings have been held with the Queensland Department of Resources in February 2021 and two meetings with the Queensland Department of Environment in July 2021.

More recently, the following meetings with other departments has been undertaken:

- In May 2023 Elecseed and KOMIPO met with various people from DCCEEW in person in Canberra to update them on the project including the Branch Head of Hydrogen and Advisors to the Energy Minister to discuss the project masterplan;
- In June 2023 Elecseed met with Energy and Economic advisors to the Queensland Premier to update the Premier on the project; and
- In June 2023 Elecseed briefed an Advisor to the President of Korea of the project status.

As well as Australian Government Departments, Elecseed and KOMIPO have an obligation to report to Korean Government Departments as they are co-funding the project, including Korean Ministry of Trade, Industry and Energy (MOTIE) and Korean Ministry of Environment (KEITI). These updates and meetings occur regularly.

### 7.3.3 Surrounding Landholders

Early consultation was undertaken with adjacent landowners (refer to **Section 2.2** and **Appendix E** for information related to the site identification process). The initial stages related to queries in the quest for suitable land and landowners were made aware of the scope and requirements of the Project. The adjacent landowners appear to be open to the construction of renewable energy projects on their land and did not voice any concerns relating to the proposed Project.

Further to this the following engagements occurred:

- Discussions and negotiations with the plant adjacent to the Project who were made aware of the Project in May 2019;

- Consultation has been ongoing with QGC and Shell, details of which cannot be disclosed due to a non-disclosure agreement (NDA) being in place with necessary agreements finalised, however an asset sharing agreement has been entered into between Elecseed/KOMIPO and Shell QGC; and
- The Project areas landlord the Crisci family liaise with their neighbours on the project on an ad-hoc basis.

### 7.4 Indigenous Stakeholder Consultation

The Proponent has been involved in discussions with the Barunggam people who are the relevant Cultural Heritage Party. The ACH Act protects Indigenous cultural heritage in Queensland. To comply with the duty of care provision under section 23 of the Act, a proponent of a project is to prepare a CHMP or another agreement, which is an agreement between the proponent and the native title claimants covering the identification and management of Indigenous cultural heritage.

A cultural heritage and archaeological pedestrian survey was undertaken across the Project between 6th and 10th September 2021. The survey was largely confined to the footprint of the Project Area but also extended outside the disturbance area in sections. This was largely done to identify the extent of cultural heritage sites and to investigate landscape features of interest. The survey included an archaeologist from Extent Heritage, five Cultural Heritage Officers from the Barunggam Native Title Party and two Heritage Advisors from Everick Heritage. The field team commenced the pedestrian survey in the Access Corridor beginning at the intersection of Kumbarilla Road and Forest Road and walking west along Forest Road toward the PV Power Station site. Once the PV Power Station boundary was reached the team then walked in systematic transects generally in an east/west orientation effectively covering the entire footprint.

Post survey field reports were prepared by the Proponent and the Barunggam People to inform the draft CHMP or other agreement. The Proponent had a meeting with the Barunggam People in November 2021 and a subsequent meeting in March 2022. These meetings were arranged to discuss the results of the post survey field reports and development of a CHMP. The CHMP is currently under development.

The Proponent has since reached engaged and signed a CHMP with the Barunggam People in September 2022. The Proponent has commitments to inform and involve the Barunggam People during the construction and operation of the Project. Commitment to employ the Barunggam people is in place and a schedule of rates agreed, which forms part of the CHMP.

Elecseed maintain dialogue with the Indigenous Community in the region, the Barunggam people including meeting with their Archaeological advisors regularly, the most recent being in June 2023. Elecseed provide regular updates on the project. Elecseed are also donating to the Barunggam people's Not-for-Profit Community Engagement Charity (The Everick Foundation) to support their application for native title application.

### Section 8 Ecologically Sustainable Development

The Project has been considered against the core objectives and guiding principles of Ecologically Sustainable Development (ESD) as outlined in the National Strategy for Ecologically Sustainable Development (NSES) (ESD Steering Committee 1992). ESD as defined in the NSES is *'development which meet the needs of Australians today, while conserving our ecosystems for the benefit of future generations.'* The NSES was adopted by all levels of Australian Government in 1992 and provides broad strategic directions and framework for governments to direct policy and decision-making.

The core objectives of the NSES are to:

- Enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations;
- Provide for equity within and between generations; and
- Protect biological diversity and maintain essential ecological processes and life-support systems.

The guiding ESD principles defined in the NSES are:

- Decision-making processes should effectively integrate both long and short term economic, environmental, social and equity considerations;
- Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation (the Precautionary Principle);
- The global dimension of environmental impacts of actions and policies should be recognised and considered;
- The need to develop a strong, growing and diversified economy which can enhance the capacity for environmental protection should be recognised;
- The need to maintain and enhance international competitiveness in an environmentally sound manner should be recognised;
- Cost-effective and flexible policy instruments should be adopted, such as improved valuation, pricing and incentives mechanisms; and
- Decisions and actions should provide for broad community involvement on issues which affect them.

While planning and designing the Project, the Proponent and its design engineer and environmental consultant has considered the core objectives and guiding principles as outlined in the NSES. Details of how the Proponent meets the objectives and principles of ESD are provided in Table 8-1.

## Section 8 Ecologically Sustainable Development

**Table 8-1 Core Objectives and Guiding Principles of ESD Addressed**

Objective/Principle	Explanation
<b>Objectives</b>	
To enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations	The Proponent is committed to enhancing the well-being and welfare of the local community within which the Project will be constructed and operated. The Project will provide employment opportunities to members of the community and will support local businesses where possible. The Proponent has conducted numerous consultation activities to identify and avoid/manage any socio-economic issues raised. Consultation activities will continue to be undertaken with local Council, landowners, Indigenous community and stakeholders to identify and address potential socio-economic issues.
To provide for equity within and between generations	<p>The Proponent is committed to constructing the Project so that there is a minimal risk of legacy environmental issues that could cost and impact future generations. The operations period for the Project is for a proposed 40 years unless the infrastructure is otherwise repurposed. A detailed Decommissioning and Handover plan will be developed and implemented in consultation with landholders and government prior to decommissioning. Decommissioning is not anticipated at this stage; but the earliest possible is 40 years. Following decommissioning, transitional rehabilitation will be undertaken on these sites, and a monitoring program will be implemented.</p> <p>stakeholder consultation has been undertaken to engage and maintain a constructive relationship with all stakeholders, including ongoing discussions with landowners and traditional owners.</p> <p>A rehabilitation framework will be developed and finalised to ensure no legacy economic cost or environmental impacts are left for future generations (see Section 5.4).</p>
To protect biological diversity and maintain essential ecological processes and life-support systems	Biodiversity conservation has been considered during the development of the Project. Significant species and ecosystems have been assessed and, where possible, avoided or the impact mitigated.
<b>Principles</b>	
Decision-making processes should effectively integrate both long and short term economic, environmental, social and equity considerations	As part of this assessment, the Proponent has considered both short and long term economic, environmental, social and equity issues. The economic impacts on the local community and region are generally positive and planning of the corridor alignment has considered environmental impacts. In addition, consultation has been undertaken throughout the development planning of the Project (refer to Section 7.3 and 0.
Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation (the Precautionary Principle)	<p>While potential impacts causing serious or irreversible environmental damage are not predicted to result from the development and operation of the Project, the Proponent has the technical experience and financial support to establish, implement, and maintain controls needed to protect the environment. Where this is out of the Proponent's level of experience third party audits and studies will be undertaken and relevant technical experts engaged.</p> <p>The MNES assessment has taken a conservative (precautionary) approach to establishing potential impact areas, MNES occurrence and potential MNES habitat quantification.</p>
The global dimension of environmental impacts of actions and policies should be recognised and considered	The Project is not expected to have a global environmental impact.

## Section 8 Ecologically Sustainable Development

Objective/Principle	Explanation
<p>The need to develop a strong, growing and diversified economy which can enhance the capacity for environmental protection should be recognised</p>	<p>The Project is economically significant at a local, regional and State level. The Project will create new and sustainable opportunities for small and medium-sized businesses in the local and regional economy, especially those providing services to the mining industry. The Project is endorsed by Trade and Investment Queensland as this Project aligns with many of the Queensland Government’s objectives (source: letter dated 20 April 2020 from Trade and Investment Queensland). The Project also has the support of the WDRC (source: WDRC Website dated 26 October 2020) as energy is recognised as one of the four economic pillars of the region</p> <p>It is likely that the majority of ongoing operational expenditure will be spent locally or regionally. This ongoing injection will strengthen local business through direct and indirect (e.g. local supply chain) support and act to maintain a diversified regional economy.</p>
<p>The need to maintain and enhance international competitiveness in an environmentally sound manner should be recognised</p>	<p>A significant proportion of the Proponent’s investment into the Project will flow directly into the local and regional economy from the goods and services required.</p> <p>The Project is a key component ensuring renewable energy can be obtained in an economically competitive manner. As identified any impacts, should there be any, will be negligible and intermittent.</p>
<p>Cost-effective and flexible policy instruments should be adopted, such as improved valuation, pricing and incentives mechanisms</p>	<p>The Proponent supports all levels of Government in the use of cost-effective and flexible policy instruments that oversee valuation, pricing and incentives.</p>
<p>Decisions and actions should provide for broad community involvement on issues which affect them</p>	<p>A transparent and timely stakeholder consultation program has been and continues to be conducted to engage and maintain a constructive relationship with all stakeholders. Consultation activities have occurred to date and feedback has been documented and incorporated into the Project, where possible (refer to Section 7.3 and 0). Further, both the EPBC Act referral and this Preliminary Documentation Report are required to be made publicly available. The Proponent must consider submissions on the Preliminary Documentation and advise DCCEEW of any changes or additions needed to take account of the comments; and provide a summary of the comments received and how those comments have been addressed.</p>



## Section 9 Conclusion

The Proponent is proposing to construct and operate the Project, to provide a renewable energy project which will provide many benefits. The Project is located approximately 40 km west of Dalby, Queensland.

The Project an MCU approval (030.2020.120.001) from WDRC. which was given for a Renewable Energy Facility (PV Power Station) from WDRC. The Project also has an approved Species Management Program.

The ecological values of the Project area and surrounds have been extensively surveyed recently in 2020 and 2021. No EPBC Act listed flora or fauna species were observed within the Project footprint itself during the field assessments other than the Koala. Evidence of Koala was identified in the Project Area during field surveys, through the discovery of Koala scats skulls. The low density, condition and sizes of the Koala scats within the PV Power Station area suggest Koalas had been present several months prior to the surveys. The species is known to occur in the wider area. In respect to the significant impact assessment criteria for each of the reviewed species, this analysis concluded the following:

- **Yakka skink (*Egernia rugosa*)** – There were no species recorded in the Project area and there have been no records within 10km buffer of Project Area. As per the assessment against the Significant Impact Criteria, the Project’s activities are considered unlikely to significantly impact the species;
- **Five-clawed worm-skink (*Anomalopus mackayi*)** – There were no species recorded in the Project area and there have been no records within 10 km buffer of Project Area. As per the assessment against the Significant Impact Criteria, the Project’s activities are considered unlikely to significantly impact the species;
- **Squatter pigeon (southern) (*Geophaps scripta scripta*)** – While an ‘important population’ has been identified within the greater region, the Project Area possesses marginally suitable habitat, with no evidence of the presence of squatter pigeon (southern) inhabitation found in the Project Area. The significance impact assessment and risk assessment concluded that there is not expected to be a significant residual impact on an ‘important population’ of this species;
- **Regent honeyeater (*Anthochaera phrygia*)** – There were no species recorded in the Project area and there have been no records within 10 km buffer of Project Area. As per the assessment against the Significant Impact Criteria, the Project’s activities are considered unlikely to significantly impact the species;
- **Painted honeyeater (*Grantiella picta*)** – Only one record of this species has previously been recorded within a 10km buffer of the Project Area. As per the assessment against the Significant Impact Criteria, the Project’s activities are considered unlikely to significantly impact the species;
- **White throated needletail (*Hirundapus caudacutus*)** – Only two records of the species have previously been recorded within a 10km buffer of the Project Area. This is a wide-ranging aerial species that migrates from the northern hemisphere to eastern Australia. The significance impact assessment concluded that there will not be a significant residual impact on this species;
- **Greater glider (southern and central) (*Petauroides volans*)** – Only one record of this species has previously been recorded within a 10km buffer of the Project Area. The significance impact assessment concluded that there is not expected to be a significant residual impact on this species;
- **Koala (*Phascolarctos cinereus*)** – Habitat within the Project Area and surrounding the Project Area contains suitable habitat for the Koala to occur. As per the residual impacts likely to require referral stipulated in Section 8 of the Referral Guidelines for the Vulnerable Koala, the Project has the potential to result in significant residual impacts to the Koala. The clearing of vegetation and habitat for the Koala is expected to result in the loss of habitat. With the mitigation measures proposed, the Project is likely to result in a significant residual impact and as such, environmental offsets are required; and
- **Brigalow woodland snail (*Adclarkia cameroni*)** – There were no species recorded in the Project area and there have been no records within 10 km buffer of Project Area. However, as of recent, DCCEE have confirmed a

Brigalow woodland land snail individual recorded in close vicinity to the Project area; however, this point data cannot be obtained. As per the assessment against the Significant Impact Criteria, the Project's activities are considered unlikely to significantly impact the species.

The design and mitigation measures proposed will minimise additional indirect impacts to terrestrial fauna and flora communities within and surrounding the Project area from construction and operational activities. These measures include minimising fauna interactions and weed spread, during construction, and rehabilitation, all to be incorporated within the CEMP. An ESCP will be developed to control indirect impacts such as dust and surface water contamination. With control measures in place indirect impacts to fauna and flora additional to those described above are not expected to be significant.

An assessment of the socio-economic impacts of the Project indicates there will be positive impact on the regional economy due to the economic stimulus provided by the Project's construction and operation. This will also result in positive impacts to the regional supply chain and employment opportunities. Adverse impacts from the Project are minor and generally related to a loss of ecosystem services from clearing of remnant vegetation.

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