



GIN GIN BATTERY ENERGY STORAGE SYSTEM (BESS)

MNES Report

FINAL

December 2024



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MNES Report

FINAL

Prepared by

Umwelt (Australia) Pty Limited

on behalf of

Iberdrola Australia Development Pty Ltd

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Report No. 31628/R02
Date: December 2024



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Acknowledgement of Country

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Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
V1	Gina Whittle	01/11/2024	David Gatfield	01/11/2024
V2	Gina Whittle	11/11/2024	David Gatfield	11/11/2024
V3	Gina Whittle	11/12/2024	David Gatfield	11/12/2024

Abbreviations

Abbreviations	Descriptions
AHD	Australian Height Datum
ALA	Atlas of Living Australia
BESS	Battery Energy Storage System
Biosecurity Act	<i>Biosecurity Act 2014</i>
DAF	Department of Agriculture and Fisheries
DBH	Diameter at Breast Height
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DESI	Department of Environment, Science and Innovation
Disturbance Footprint	The maximum spatial extent of direct impacts as a result of the Project's proposed infrastructure
DoR	Department of Resources
EPBC Act	<i>Environmental Protection and Biodiversity Conservation Act 1999</i>
Fisheries Act	<i>The Fisheries Act 1994</i>
GBO	General biosecurity obligation
GES	General ecological significance
ha	hectares
HES	High ecological significance
km	kilometres
kV	kilovolt
LGA	Local government area
m	metres
mm	millimetres
MNES	Matters of National Environmental Significance
MSES	Matters of State Environmental Significance
MW	Megawatt/s
NC Act	<i>Nature Conservation Act 1992</i>
NC Act Animals Regulation	Nature Conservation (Animals) Regulation 2020
NC Act Plants Regulation	Nature Conservation (Plants) Regulation 2020
Planning Scheme	<i>Bundaberg Regional Council Planning Scheme 2015</i>
PMST	Protected Matters Search Tool
PO	Performance Outcomes
RE/s	Regional Ecosystem/s
sp.	Species

Abbreviations	Descriptions
Study Area	The proposed area of development for the Project that comprises leasehold land across seven land parcels and numerous road reserves
TEC	Threatened Ecological Communities
the Project	Gin Gin Battery Energy Storage System
Umwelt	Umwelt (Australia) Pty Ltd
VM Act	<i>Vegetation Management Act 1999</i>
WoNS	Weeds of National Environmental Significance

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1.0 Introduction

1.1 Project Background

Iberdrola Australia Development Pty Ltd (Iberdrola Australia) (the Proponent) is seeking regulatory and environmental planning approval for the construction and operation of a Battery Energy Storage System (BESS) (the Project). The Project will have a capacity of up to 500 megawatt (MW) located near Monduran Dam Road Queensland. The closest town to the Project is Gin Gin, located approximately 16 km south-east on the Bruce Highway (**Figure 1.1**). The Project will be located within the Bundaberg Regional Council local government area (LGA).

The project was referred to Department of Climate Change, Energy, the Environment and Water (DCCEEW) on 29 April 2024 (EPBC reference 2024-09909). The referral was subject to a public notice period, following which a Request for Information (RFI) was received from DCCEEW dated 31 July 2024. Umwelt was engaged to complete the necessary further ecological assessment and RFI response, detailed in **Section 1.1.1**. The purpose of this report is to address the items in the RFI, as well as updating the assessment of impacts to MNES.

1.1.1 RFI Response

Table 1.1 below outlines the items that require further clarification, a response to each item and where these items have been addressed as part of the RFI request received on the 31 July 2024.

Table 1.1 Response to RFI Items dated 31 July 2024

RFI Item	Response	Section Addressed
Further details regarding the proposed action, including		
<p>A) Clarification of the location, boundaries and size (in hectares) of the disturbance footprint. Referral documentation suggests that the action will cover the entire action area (section 1.2.1), but also states (section 4.3.8) that environmentally sensitive areas will be avoided (without identifying any such areas)</p>	<p>Figure 1.2 shows the location, boundaries and size of the Disturbance Footprint within the Study Area. Section 1.3.3 also includes information of each route option within the Transmission Line Corridor.</p> <p>The Disturbance Footprint will not include the entire Study Area, as demonstrated on Figure 1.2.</p> <p>Ecologically sensitive areas relevant to the Project include locally relevant waterways, but also include MNES habitat which has now been assessed, mapped and considered by the Project. The proposed avoidance and/or mitigation measures to limit direct and indirect impacts is also provided.</p>	<p>Section 1.3.3 Section 4.0 Section 6.0 Section 7.0</p>
<p>B) Description of the land uses surrounding the proposed action area, including consideration of habitat connectivity across the landscape</p>	<p>Current and historical land uses and Study Area characteristics have been detailed within Section 4.2.1.</p> <p>The Project's position relative to key vegetation areas and movement corridors has been discussed within Section 4.2.2. Impacts relevant to fauna movement and connectivity due to project activities have been addressed in Section 5.1.1.</p>	<p>Section 4.2.1, Section 4.2.2, Section 5.1.1</p>
<p>C) Information regarding the connection to the existing Gin Gin substation, including the responsible party, disturbance footprint and any associated impacts</p>	<p>There are several options for the Gin Gin Battery project to connect into the high voltage network to import and export power. For instance, there are two existing 275kV high voltage lines adjacent to the Battery. During the feasibility stages of the Project Iberdrola engaged with Powerlink to determine how, where, what route, and what voltage the project is recommended to connect at. The outcome of this engagement was to connect directly into the Powerlink substation at 132kV, however, the question remained open as to how and by what route. Iberdrola received an RFI on 31 July 2024 from DCCEEW as mentioned in the background of this letter and in response Iberdrola has decided, in consultation with DCCEEW, to vary the proposal to incorporate the potential connection options. Iberdrola has continued extensive engagement with the relevant parties including Powerlink, Department of Transport and Main Roads, adjoining landowners and the Bundaberg Regional Council. This approach has sought to balance the delivery of a Project that is economically viable and constructible with the avoidance and minimisation of environmental and social impacts.</p>	<p>Section 1.2 Section 1.3 Section 6.0 Section 7.0</p>

RFI Item	Response	Section Addressed
<p>D) Confirmation on whether the proposed action should be considered a permanent facility with permanent loss of habitat or a temporary action followed by rehabilitation (this distinction may affect the duration of any approval and how mitigation measures are assessed, among other considerations)</p>	<p>The proposed action will be considered a permanent facility, with complete clearance to occur within the Disturbance Footprint (refer to Section 1.3.3). The Significant Impact Assessment detailed in Section 7.0 is tailored to this scenario. Mitigation and management measures have been proposed in Section 6.2 to reduce direct and indirect impacts to native flora, fauna and vegetation identified within the Study Area.</p>	<p>Section 1.3.3, Section 6.2, Section 7.0</p>
<p>E) To the extent reasonably practicable, provide any alternatives to the proposed action location and project design, including a comparative description of the impacts of each alternative on potential matters of national environmental significance (MNES). Discussion of alternatives in the referral gives no indication of what other alternatives were considered or why they were not pursued.</p>	<p>Refer to Section 6.1 for the site selection and design iterations that have taken place to minimise and avoid impacts to ecological values. Iberdrola Australia have undertaken several design iterations before finalising the Study Area, with consideration to ecological values that are likely to occur.</p> <p>It should be noted that three route options are currently proposed within the Transmission Line Corridor (Section 1.3.3). Only one option will be selected, which will further reduce impacts to ecological values.</p>	<p>Section 6.1</p>
<p>Further information to support conclusions on likely impacts on listed threatened species and ecological communities identified in the EPBC Act Protected Matters Report as “species or species habitat known/likely to occur within area</p>		
<p>The referral makes conclusions about habitat suitability without a sufficiently detailed description of the habitat present. The referral also does not appear to have given due consideration to survey techniques and standards preferred for the purposes of the EPBC Act. Where habitat assessments depart from departmental information, adequate justification must be provided to substantiate their suitability to the assessment.</p> <p>Please note the department does not consider Queensland Regional Ecosystem (RE) mapping as a sufficient basis to determine habitat for listed threatened species under the EPBC Act. Habitat assessments must not only consider remnant/non-remnant vegetation. Habitat assessments should consider the suitability of habitat within study area, including dispersal, foraging, and/or breeding habitat, and the likelihood of occurrence to determine the potential impact of the proposed action.</p>	<p>A desktop assessment was completed within the Study Area, which included a 20 km buffer (refer Appendix A). As part of this assessment an initial Likelihood of Occurrence was completed for all the listed threatened species, communities and migratory species that were identified within the search area (Section 3.2). This information was then used to inform the field survey that was undertaken in September 2024 (Section 3.3). The likelihood of occurrence assessment was then revised after the field survey, outlined in Appendix B.</p> <p>After field surveys the vegetation communities and associated habitat types were defined for the Study Area, detailed in Section 4.2.5 and Section 4.2.6 respectively. This was used to map the habitat for species that were assessed as having a High or Moderate potential to occur within the Study Area, which has been discussed in Section 5.1.1, 6.2.3 and 7.0. Functional habitat types such as breeding and denning, foraging, dispersal and climate refugia have been considered when mapping habitat for threatened species that have a High or Moderate potential to occur.</p>	<p>Section 3.2, Section 3.3, Section 4.2.5, Section 4.2.6, Section 5.1.1, Section 6.2.3, Section 7.0, Appendix A, Appendix B</p>

1.2 Project Description

1.2.1 Proposed Infrastructure

The Project's proposed infrastructure will include the following:

- Battery modules (including enclosed lithium-ion type batteries and ancillary systems) with a capacity of up to 500 MW.
- Power conversion systems including associated switchgear, protection and control equipment, transformers and enclosures for housing equipment.
- Underground power and fibre optic cabling interconnecting the equipment.
- Grid connection equipment including main power transformer, switchgear, protection and control equipment, metering, reactive power equipment, filtering equipment, auxiliary/earthing transformers, and enclosures/buildings for housing equipment.
- Earthing and lightning protection systems.
- Site office, storage area/enclosure, internal gravel access tracks, on-site parking, security fencing, CCTV, lighting and temporary construction laydown area.
- Site clearing, levelling and compacting.
- Trenching for underground cabling and concrete covered footings.
- Concrete slabs for BESS facility containers.
- Placement of BESS facility.

1.3 Ecology Study Area Boundaries

1.3.1 Study Area

The proposed area of development includes freehold land across five land parcels and two road reserves, that cover approximately 120.59 hectares (ha) of land. This area will herein be referred to as the 'Study Area' (refer to **Figure 1.1**). All land parcels within the Study Area are provided in **Table 1.1**.

Table 1.2 Study Area Land Parcels

Lot and Plan	Area (ha)	Tenure
22SP109996	50.22	Freehold
58BON1457	23.38	Freehold
2RP151023	28.35	Freehold
2RP137154	1.86	Freehold
1RP137154	0.4	Freehold
Monduran Road reserve	7.3	-
Bruce Highway road reserve	8.77	-

1.3.2 Transmission Line Corridor

The area of development is proposed to occur within the Transmission Line Corridor (**Figure 1.2**). While three potential routes have been identified (**Section 1.3.3**), the exact location has not been confirmed. The indicative locations are shown on **Figure 1.2** to allow for some flexibility whilst the detailed design and stakeholder consultation is still being finalised. The three routes shown are considered to be ‘worst-case scenarios’ and impacts presented in **Section 5.0** and **Section 7.0** are the upper limit or maximum limit of vegetation and habitat removal proposed to occur.

1.3.3 Disturbance Footprint

The Disturbance Footprint represents the maximum direct impact due to Project activities and the placement of proposed infrastructure (as shown in **Figure 1.2**). Infrastructure to be located within the Disturbance Footprint includes:

- Construction of a battery compound facility (up to 500 MW), including battery cabinets and inverters, step up high voltage transformers, office, maintenance shed and internal roads.
- Construction of a 132 kV transmission line. The transmission line will connect to the existing Powerlink Substation. Three routes are proposed, detailed below.
- Temporary construction lay down areas.
- Security fencing and lighting.
- Access tracks (site access from Monduran Dam Road).

Three options of the Disturbance Footprint are presented including:

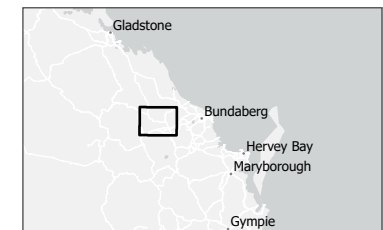
- Route A will comprise of a 132kV overhead dual circuit cable and extends from the BESS development area to the Powerlink Substation in the northwestern section of the Study Area. Route A covers approximately 6.6 ha within the Study Area and has a cable length of 1,707 m. Towers will be approximately 35 m tall, but may vary between 25–50 m. The easement width proposed is 30–40 m. The current placement of Route A traverses cleared agricultural land, patchy areas of remnant vegetation and Monduran Dam Road reserve.
- Route B will comprise of a 132kV underground dual circuit cable and extends from the BESS development area to the Powerlink Substation in the southwestern section of the Study Area. Route B covers approximately 8.5 ha within the Study Area and has a cable length of 1,707 m. Route B traverses cleared agricultural land, patchy areas of remnant vegetation and Monduran Dam Road/ Bruce Highway road reserve.
- Route C will also comprise a 132kV underground dual circuit cable and extends from the BESS development area to the Powerlink Substation, through the centre of the Study Area before redirecting to the south section of the Study Area. Route C covers approximately 8.6 ha within the Study Area and has a cable length of 1,692 m. Route C traverses cleared agricultural land, patchy areas of remnant vegetation and the Monduran Dam Road/Bruce Highway road reserve.

Note, only one option will be selected which will be determined during the detailed design phase.

FIGURE 1.1
Study Area Overview

Legend

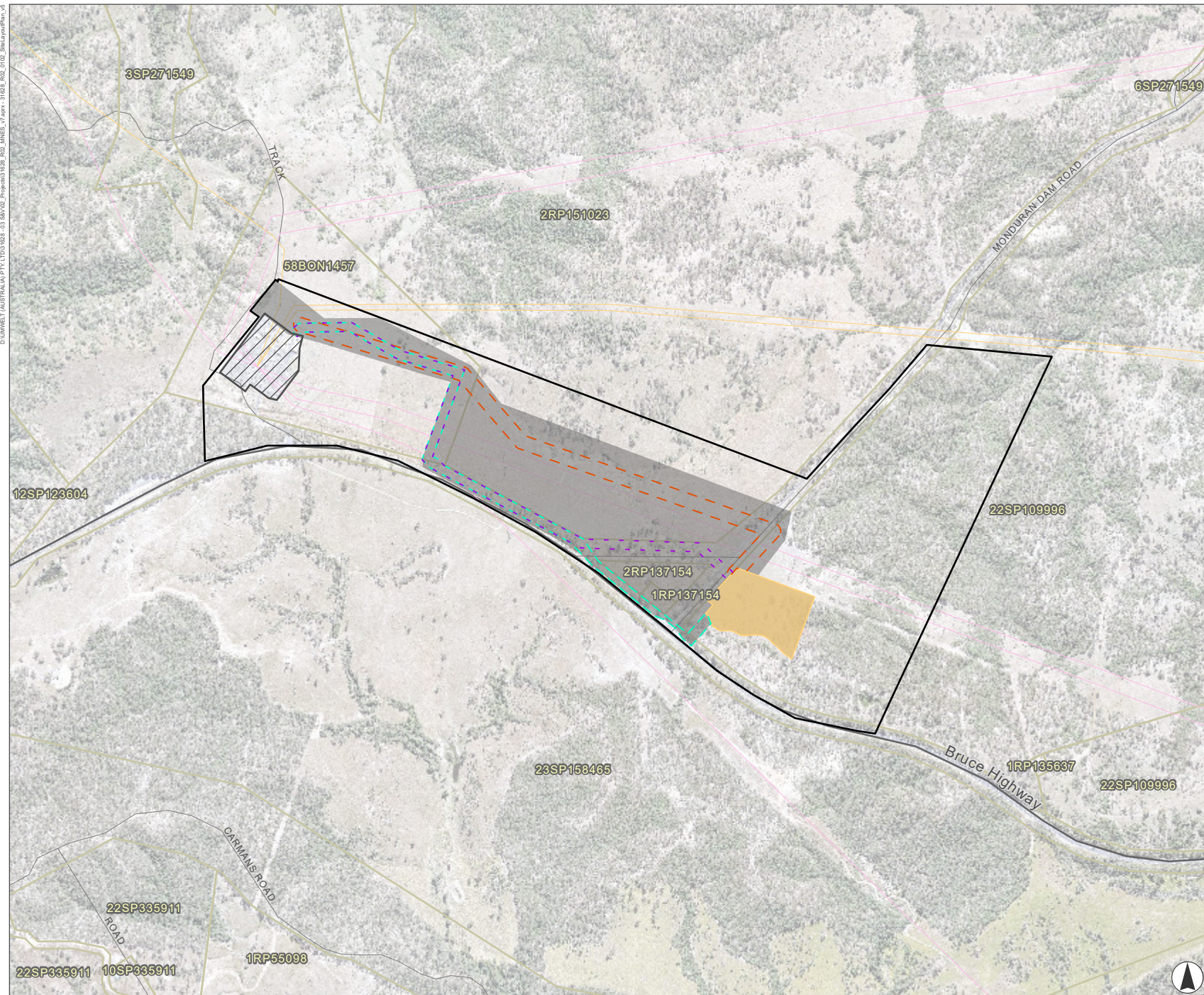
- Study Area
- National Park
- State Forest
- Reservoir
- State Controlled Road
- Local Road
- Watercourse



Scale 1:200,000 at A4
GDA2020 MGA Zone 56

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FIGURE 1.2
Site Layout Plan



- Legend**
- Study Area
 - State Controlled Road
 - Local Road
 - Existing 132kV Powerline
 - Existing 275kV Powerline
 - Cadastre
 - Powerlink substation (existing infrastructure)
 - Transmission Line Corridor
 - Proposed Disturbance Footprints**
 - Proposed BESS Facility
 - Indicative Transmission Routes**
 - Route A
 - Route B
 - Route C



Scale 1:15,000 at A4
GDA2020 MGA Zone 56

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1.4 Scope and Objectives

Primary objectives of this terrestrial ecological assessment are to describe the existing ecological values of the Study Area, as well as undertake an analysis of the potential impacts of the Project. The following scope of work was completed to support these objectives:

- A comprehensive desktop assessment of relevant background information and available environmental databases to identify ecological values within the Study Area, with a focus on MNES.
- Ground-truthing the occurrence, extent and condition of Regulated Vegetation and Regional Ecosystems (REs) in accordance with (Neldner et. al. 2024).
- Assess the likelihood of occurrence for threatened species and threatened ecological communities (TECs) listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- Verify the extent and condition of habitat for threatened species identified as known, high or moderate likelihood of occurring.
- Complete observational fauna surveys in accordance with the *Terrestrial fauna Survey Guidelines* (version 4) (Eyre et al. 2022) targeting threatened or near threatened species.
- Describe and assess potential impacts to ecological values and the underlying ecological processes (e.g. habitat connectivity, ecological threatening processes).
- As required, complete significant residual impact assessments for MNES identified as known to occur, or have a high or moderate likelihood of occurrence, in accordance with the *Significant Impact Guidelines 1.1 - Matters of National Environmental Significance* (Department of the Environment 2013b).
- Where required, the identification of potential impacts, associated with the Disturbance Footprint to MNES and an overview of avoidance strategies and mitigation measures associated with the Project.

It should be noted that Matters of State Environmental Significance (MSES) are excluded from this report. However, it is noted that many MNES also comprise MSES.

2.0 Legislative Context

2.1 Commonwealth Legislation

2.1.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act is administered by DCCEEW. Under the EPBC Act, if the Minister for the Environment and Water determines that an action is a 'controlled action' which would have or is likely to have a significant impact on MNES or Commonwealth land, then the action may not be undertaken without prior approval from the Minister. The EPBC Act identifies nine MNES:

- World Heritage properties
- National Heritage places
- Ramsar Wetlands of International Significance
- Threatened species and ecological communities
- Migratory species
- Commonwealth marine areas
- The Great Barrier Reef Marine Park
- Nuclear actions (including uranium mining)
- Water resources (in relation to coal seam gas development and large coal mining development).

Under the EPBC Act, any action that is likely to have a significant impact on these matters may be deemed a controlled action.

2.2 State Legislation

Species and communities listed under the EPBC Act, and the vegetation and habitat associated with those values, may also be protected under Qld legislation as described below.

2.2.1 Nature Conservation Act 1992

The purpose of the *Nature Conservation Act 1992* (NC Act) is to conserve biodiversity by creating and managing protected areas, managing and protecting native wildlife, and managing the spread of non-native wildlife.

The Nature Conservation (Plants) Regulation 2020 (NC Act Plants Regulation) and Nature Conservation (Animals) Regulation 2020 (NC Act Animals Regulation) lists species that are classed as threatened in Queensland. The following threatened species conservation classes are defined in the NC Act: Extinct; Extinct in the Wild; Critically Endangered; Endangered; and Vulnerable. Species can also be classed as Near Threatened if they are at risk of becoming threatened in the near future.

2.2.2 Vegetation Management Act 1999

The *Vegetation Management Act 1999* (VM Act) establishes the vegetation management framework for Queensland which applies to (Department of Climate Change, Energy, the Environment and Water 2024) all vegetation and regulates the clearing of native vegetation in Queensland, with the exception of state forests, national parks, forest reserves and certain other tenures defined under the NC Act and *Forestry Act 1959*.

A primary purpose of the VM Act is to regulate the clearing of vegetation in a way that conserves remnant vegetation identified as a Regional Ecosystem (RE). REs are vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil (Sattler and Williams, 1999). In Queensland, TECs can be broadly defined based on the RE framework (in conjunction with other diagnostic and conditional criteria), with TECs often corresponding to one or many REs.

2.2.3 Biosecurity Act 2014

The *Biosecurity Act 2014* (Biosecurity Act) imposes a 'general biosecurity obligation' (GBO), which imparts a responsibility on all individuals or organisations to manage biosecurity risks that are under their control and that they know about, or should reasonably be expected to know about. Under the GBO, individuals and organisations whose activities present a biosecurity risk must take all reasonable and practical steps to prevent or minimise their activities from causing a biosecurity event.

The Biosecurity Act lists fauna and flora pest species as either a prohibited or restricted biosecurity matter. A prohibited matter is any species which has not yet become established in Qld and would have significant adverse impacts on human health, social amenity, the economy or the environment if it entered the state. A restricted matter is any species that is already established within Qld and has significant adverse impacts on human health, social amenity, the economy or the environment. Restricted matters are required to be managed by landholders or land managers so that they do not spread further. The Act defines specific requirements for notification and management actions for all listed biosecurity matters, including specific requirements for the disposal of restricted matters.

3.0 Methodology

3.1 Desktop Assessment

3.1.1 Database Searches

A comprehensive desktop assessment was undertaken to compile all existing information pertaining to ecological values and associated MNES, that may occur within or adjacent to the Study Area. The desktop assessment included a review of scientific literature relating to MNES, review of the methods and results of existing ecological surveys conducted in the Study Area, and searches of publicly available datasets and online mapping. The results were used to compile preliminary likelihood assessments, which identified the target threatened species and communities and any potential habitat areas within the Study Area. Survey methods were based on this information and were prepared in accordance with the appropriate Commonwealth survey guidelines, with consideration of State survey guidelines.

The following legislation, triggers and databases were used to assess the potential occurrence of MNES within the Study Area, consisting of:

- Protected Matters Search Tool (PMST) Database (Department of Climate Change, Energy, the Environment and Water 2024a) (20 km buffer around Study Area boundary). The results of this assessment are provided in **Appendix A**.
- Wildlife Online (Department of Environment, Science and Innovation 2024b) extract issued by the Queensland Department of Environment, Science and Innovation (DESI), with a radius of 20 km from the approximate centre of the Study Area (Lat: -24.9076, Long: 151.8330) (Department of Environment, Science and Innovation 2024b).
- Vegetation Management Regional Ecosystem map (Version 13) (Department of Resources 2023b).
- Protected Plants Flora Survey Trigger Map issued by DESI (Department of Environment and Science 2024).
- Regulated Vegetation Management Map as issued by the Department of Resource (DoR, 2023).
- DoR Vegetation Management Supporting Map including Essential Habitat mapping (DoR, 2023).
- Department of Agriculture and Fisheries (DAF) Waterways for Waterway Barrier Works identified under the *Fisheries Act 1994* (Fisheries Act) (Department of Environment, Science and Innovation 2024b) (DAF, 2023).
- DES mapped wetlands under the Queensland Wetlands Program and the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 (i.e. high ecological significance (HES) and general ecological significance (GES) wetlands) under the Environmental Protection Regulation 2019.
- Map of Queensland Wetland Environmental Values (Department of Environment and Science, 2022).
- VM watercourse/drainage feature - 1:100 000 and 1:250 000 (Department of Resources 2023c).

- Atlas of Living Australia (ALA) database records (20 km buffer around the Study Area) (Atlas of Living Australia 2024).
- Latest Queensland Globe available aerial photography (Queensland Globe 2024).
- Qld Herbarium Regional Ecosystem Description Database (REDD) (Version 13) (Queensland Herbarium 2024).
- Certified Biodiversity Planning Assessment (BPA) mapping to identify significant wildlife corridors of State, Regional and Local biodiversity significance (Department of Environment and Science 2020).
- Contours – 1 m and 10 m interval map (Department of Resources 2019).
- Detailed surface geology mapping (Department of Resources 2023a).

3.1.2 Species Literature

Various survey methods were undertaken in accordance with a combination of Commonwealth and State survey guidelines. The initial desktop assessment identified listed Threatened Ecological Communities (TEC), fauna and flora species that have the potential to occur within the Study Area. These species and communities were targeted during field surveys within representative habitat types. Methods used to target threatened species were deployed based on DCCEEW survey guidelines for Australian threatened fauna and other relevant survey guidelines, including:

- Species Profile and Threats Database (SPRAT) (Department of Climate Change, Energy, the Environment and Water 2024b).
- Commonwealth Survey Guidelines for Australia’s Threatened Mammals (Department of Sustainability, Environment, Water, Population and Communities 2011).
- Commonwealth Survey Guidelines for Australia’s Threatened Birds (Department of Environment, Water, Heritage and the Arts 2010).
- Commonwealth Survey Guidelines for Australia’s Threatened Bats (Department of the Environment, Water, Heritage and the Arts 2010).
- A review of koala (*Phascolarctos cinereus*) habitat assessment criteria and methods.

3.1.3 Previous Ecological Studies

A preliminary flora and fauna assessment was completed 9 January 2024 (RPS, 2024), and was limited to the proposed footprint of the BESS. The following surveys were undertaken:

- Ground-truthing and validation of Regional Ecosystems and Regulated Vegetation mapping.
- Identification of significant trees (i.e. diameter breast high (DBH) of 200 mm).
- Searches for potential fauna breeding places.

3.2 Likelihood of Occurrence Assessment

Database searches identified threatened listed communities and species that may occur within the Study Area. The initial likelihood assessments were made prior to undertaking field surveys and were based on a comprehensive desktop assessment (using the database searches listed in **Section 3.1.1**) and the ecologists' understanding of the broader region surrounding the Study Area. These resources allowed for identification of known distributions and preferred habitat areas for species of interest. The criteria used to assess the likelihood of threatened species occurring within the Study Area is presented in **Table 3.1**.

Table 3.1 Likelihood of Occurrence Definitions

Potential to Occur	Description
Known	The listed species or TEC has been recorded in the Study Area during the past decade (or during the Project survey period). The record is considered valid and is associated with a high spatial confidence.
High	<p>Given the extent, quality and suitability of habitat in the Study Area, the location of the Study Area relative to existing contemporary records (past 20 years¹) of the species (with consideration of sampling effort in the region and the species' detectability (e.g. cryptic species) it is highly likely that the species occurs in the Study Area. Also includes species likely to regularly occur within the Study Area during migratory, short-distance season or nomadic movements (including cases for which likelihood of occurrence is high regardless of the nature of habitat present in the Study Area).</p> <p>The TEC has one or more corresponding REs mapped within the Study Area, and key species have been recorded from the broader area (desktop search extent). Key diagnostic characteristics if this TEC is confirmed within the Study Area. and condition thresholds specified as part of the Commonwealth listing advice will need to be evaluated through field survey to determine</p>
Moderate	<p>Potential² or suitable habitat is present in the Study Area, however, given the distribution of records in the surrounding region and/or the species' detectability a moderate rating for likelihood of occurrence is deemed more appropriate than a low or high rating. Includes species that may be present or may occasionally utilise the Study Area but for which there may be little information or those that are either cryptic or occur at low densities. Also includes species that may occasionally occur in the Study Area during migratory, short-distance season or nomadic movements.</p> <p>The TEC has one or more corresponding REs mapped within the Study Area; however, key species have not been recorded from the broader area (desktop search extent). Key diagnostic characteristics and condition thresholds specified as part of the Commonwealth listing advice will need to be evaluated through field survey to determine if the community is confirmed within the Study Area.</p>
Low	The Study Area either contains limited suitable habitat or only potential/marginal habitat. The species is either very scarce or absent in the surrounding region. The species is deemed unlikely to occur within the Study Area based on the aforementioned factors. The species may disperse through or near the Study Area infrequently. The TEC has no corresponding REs mapped within the Study Area.
No	<p>The Study Area is fundamentally unsuitable for the species or the species is presumed extinct or locally extinct. For example, this is usually applied to marine species or seabird for terrestrial sites.</p> <p>The TEC has corresponding REs which are associated with a different bioregion or land zone than REs mapped within the Study Area.</p>

¹ In consideration of any potential land use changes during this period.

² As defined in the LOO assessment justification column.

3.3 Field Assessment

3.3.1 Field Survey Timing and Weather Conditions

The field survey details are provided in **Table 3.2** along with weather conditions. Weather data was extracted from the nearest weather station. The rainfall data was obtained from the Gin Gin Post Office (Weather Station 039040) and the temperature was obtained from Bundaberg (Weather Station 039128) (Bureau of Meteorology, 2024). The methods employed during the field surveys are detailed in **Section 3.3.2** and **Section 3.3.3**.

Table 3.2 Field Survey Timing and Weather Conditions

Field Survey	Survey Dates	Survey Length	Rainfall (mm) ³	Total Rainfall (mm) ⁴	Temperature (°C) (max) ⁵	Season
Baseline flora and fauna	8 September – 10 September 2024	3 days	0.00	152.3	27.4	Spring

3.3.2 Flora

The flora and vegetation surveys were undertaken to identify and record vascular flora species as well as classify and map vegetation communities. These surveys were undertaken to comply with relevant Commonwealth and State Government survey guidelines.

3.3.2.1 Vegetation Communities

Ground-truthing and validation of State vegetation community mapping within the Study Area was undertaken in accordance with the *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland Version 7.0* (Neldner et al. 2023). Vegetation sampling consisted of two Tertiary and six quaternary surveys within representative examples of each RE observed within the Study Area, as shown in **Figure 3.1**.

Quaternary plots constitute rapid vegetation surveys which include marking the GPS location and recording the dominant species in the characteristic layers, along with soil/landform and structural data. Tertiary assessments include the collection of height and cover data for each strata measured using a transect, as well as species presence and dominance in each stratum. To support data collected by tertiary and quaternary sites, rapid flora and vegetation observation points were also made. These sites supplement quaternary and tertiary flora assessment sites to achieve a detailed vegetation record/coverage of the Study Area. These points identified vegetation boundary change or dominant canopy species but include height or cover observations at a location.

Vegetation within the Study Area was classified with reference to the RE Technical Descriptions within the Regional Ecosystem Description Database version 13, for South East Queensland (Queensland Herbarium 2024), and Specht's (Specht 1970) structural classification of structural land formations.

³ Rainfall experienced during the duration of the survey period

⁴ Rainfall experienced during the three months preceding the surveys

⁵ Maximum temperature experienced during the surveys.

Vegetation within the Study Area was classified as ‘remnant’, ‘regrowth’ and ‘non-remnant’ according to the criteria below:

- Remnant – vegetation communities that conform within the definition under the VM Act and referenced by Neldner et al., (2024). Specifically, this comprises vegetation, part of which forms the predominant canopy of vegetation:
 - Covering more than 50% of the undisturbed predominant canopy
 - Averaging more than 70% of the vegetation’s undisturbed height
 - Composed of species characteristics of the vegetation undisturbed predominant canopy.
- Regrowth – is non-remnant vegetation (> 3 m height) that has a significant woody component but fails to meet the structural/floristic characteristics of remnant vegetation.
- Non-remnant – includes changes to vegetation caused by clearing or other extensive human disturbances and fails to meet the structural and/or floristic characteristics of remnant vegetation. It also includes cropping land.

3.3.2.2 Threatened Ecological Communities

EPBC Act listed TECs were subject to validation in the field where analogous REs were identified. Vegetation was evaluated against applicable TEC key diagnostic characteristics and condition thresholds as per the approved Conservation Advice or Listing Advice relevant for each TEC.

The field validation of TECs identified as part of the desktop assessment was undertaken via a two-step process. The first step involved the identification of analogous REs in the desktop vegetation mapping. These locations were targeted for field surveys. Where an analogous RE was confirmed on the ground, the vegetation composition and structure were evaluated against TEC key diagnostic characteristics and condition thresholds to determine if the community meets the requirements of the TEC, as part of step two. Key diagnostic characteristics and condition thresholds and used in the assessment reflect those detailed in the TEC’s respective Conservation or Listing Advice.

Across the field survey program, a total of two TEC assessments were completed targeting the *Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions* TEC (Subtropical Eucalypt Floodplain Forest TEC).

Subtropical Eucalypt Floodplain Forest TEC

The Approved Conservation Advice for the *Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions* (Department of Climate Change, Energy, the Environment and Water 2022) outlines the key diagnostic characteristics and condition thresholds for the Subtropical eucalypt TEC. TEC assessments for the community include both a desktop component (to identify potential corresponding REs, elevation and bioregion) and field validation to determine whether the key diagnostic characteristics are met.

The field validation involved collecting the following data within Subtropical Eucalypt TEC communities:

- Presence of RE analogous to Subtropical Eucalypt Floodplain Forest TEC.

- Canopy crown cover.
- Canopy dominance of one or a combination of *Angophora*, *Corymbia*, *Eucalyptus*, *Lophostemon* and/or *Syncarpia* tree species, but NOT dominated by *Eucalyptus robusta* (swamp mahogany).
- Occurrence in the landscape (e.g. on alluvial landforms including river floodplains, riparian zones).
- Size of patch.
- Presence and abundance of large trees.
- Diversity and dominance of native ground cover.
- Presence of arboreal mammals.

3.3.2.3 Opportunistic Flora Observations

Incidental native flora species observed during the survey were recorded to provide a more comprehensive species list within the Study Area. Opportunistic observations were completed during the vegetation assessments and whilst traversing the Study Area between survey locations.

3.3.2.4 Targeted Threatened Flora Species Search

Surveys to assess the presence/absence of potentially occurring threatened flora identified through the desktop assessment were targeted as part of the flora survey effort. During this survey, all areas of potentially suitable habitat were surveyed for threatened flora using active searches and random meanders (not time bound), adapted from the random meander technique (Cropper 1993). This method is particularly suitable for locating species that typically occur at low densities or that may be distributed in isolated clumps. All threatened flora species identified in the preliminary likelihood of occurrence as high or moderate occurrence were targeted including *Cycas megacarpa* and *Cupaniopsis shirleyana* (wedge-leaf tuckeroo).

3.3.2.5 Introduced Flora

Exotic flora species were recorded opportunistically within the Study Area, in conjunction with quaternary and tertiary flora surveys. The presence of the following species was recorded during the field surveys:

- Restricted matter flora species listed under the Biosecurity Act, Schedules 1 and 2.
- Weeds of National Environmental Significance (WoNS).

It is important to note that the data collected for weed species serves as an indicator and does not encompass all exotic flora within the Study Area. The primary aim of collecting the data was to gain insight into the dominant exotic flora and their threatening processes within the Study Area.

3.3.3 Fauna

A combination of field verification methodologies was employed to assess the occurrence of threatened fauna species identified as having a 'high' or 'moderate' likelihood in the likelihood of occurrence assessment (**Appendix B**). Survey methods employed during surveys were based on survey guidelines for threatened species published by the Commonwealth and State Government as detailed in **Section 3.1.2**.

As well as some targeted methods, the survey included undertaking habitat assessments, while simultaneously actively searching for species of interest. Fauna field survey techniques are detailed in **Table 3.3** and field survey effort implemented to assess the presence of fauna species are specified in **Table 3.4** and displayed in **Figure 3.1**.

Table 3.3 Fauna Field Survey Techniques

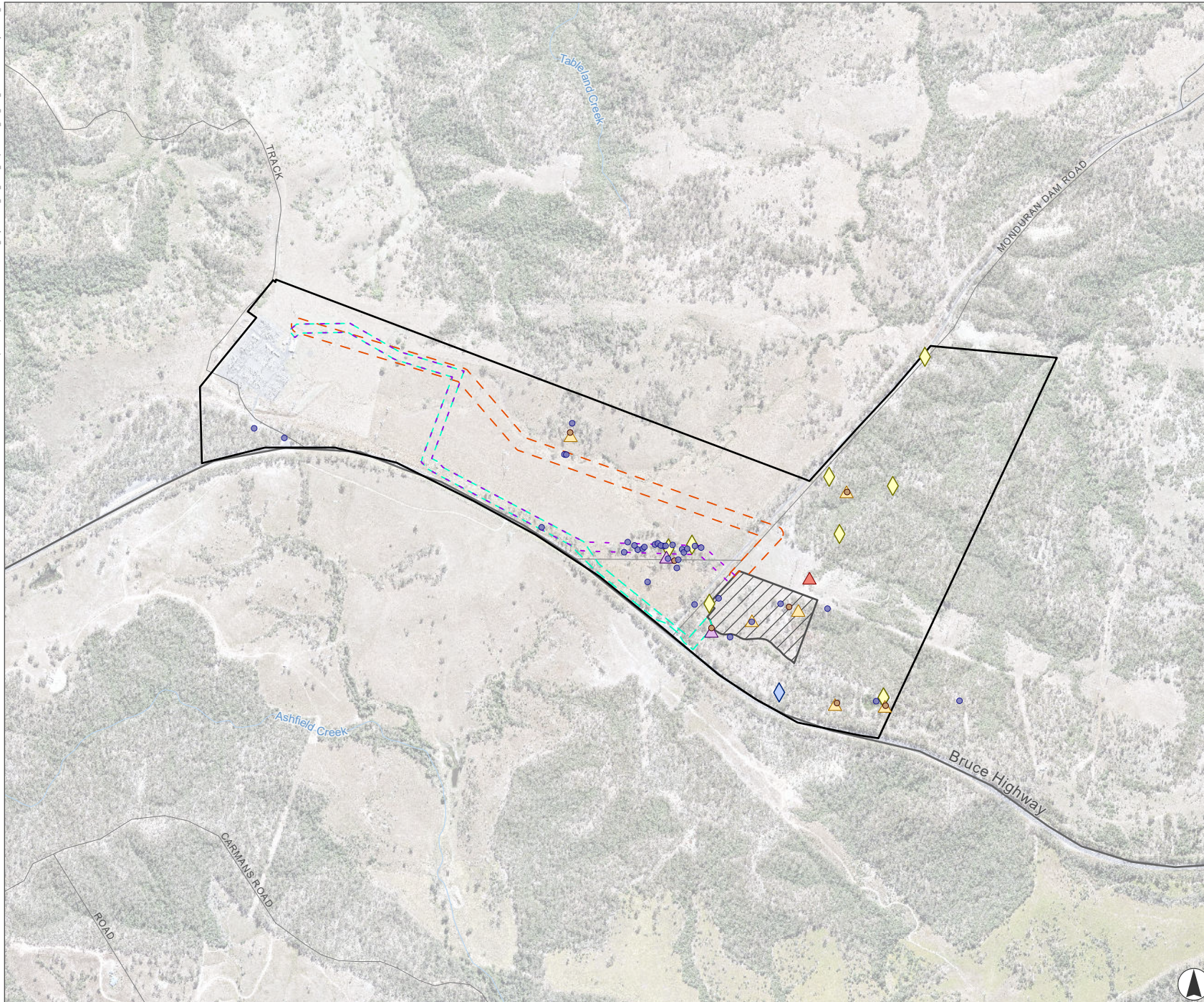
Technique	Description	Effort
Habitat Assessments	<p>Fauna habitat values were characterised using a comprehensive habitat assessment methodology within all accessible broad habitat types capturing variation in condition, vegetation types and disturbances. The presence and abundance of specific habitat resources was also assessed, including but not limited to:</p> <ul style="list-style-type: none"> • Koala food and potential shelter trees • Hollow bearing trees and stags • Fallen logs, woody debris and leaf litter • Rocky features such as surface rocks, boulders, crevices, overhangs and caves • Presence, abundance and type of mistletoe • Presence / absence of wetland features, including gilgai formations • Proximity to water and whether it is permanent or ephemeral <p>Habitat assessments were conducted and used to inform habitat mapping for each of the potentially occurring or known conservation significant species.</p>	7 habitat assessments
Active Diurnal Searches	<p>Active diurnal searches were conducted within all habitat types to identify the presence of fauna or signs of fauna activity including scats and scratches. Searches included scanning the trees and ground, searching beneath microhabitat such as rocks, fallen timber and peeling bark, digging through leaf litter and soil at tree bases and flushing birds from areas with a dense or grassy ground cover. Grass tussocks were gently disturbed to potentially flush ground-dwelling birds such as the threatened squatter pigeon (southern) (<i>Geophaps scripta scripta</i>). Disturbance to microhabitat features and reptiles was kept to a minimum. Active searches were completed opportunistically at Habitat Assessment sites.</p>	Opportunistic at habitat assessments and whilst traversing Project (20 hrs)
Spotlighting	<p>Spotlighting on foot was undertaken within all habitat types, though primarily targeting Eucalyptus woodlands to target species such as the koala, greater glider (southern and central) (<i>Petauroides volans</i>) and the yellow-bellied glider (south-eastern) (<i>Petaurus australis australis</i>). To bolster survey effort, spotlighting was also undertaken from the passenger window of a slow-moving vehicle on Monduran Dam Road, which is a proven method for detecting arboreal mammals. Nocturnal spotlighting surveys were undertaken half-an-hour after sunset for a duration of approximately two hour per night.</p>	4 hours total per ecologist
Call playback	<p>Call playback targeted owls, consisting of the species known to the region. Call playback was conducted at the start of each new spotlight search location to elicit a call response from any individuals in the area.</p>	10 mins per night (2 nights).
Bird Surveys	<p>Roaming/meandering bird surveys using both visual and auditory identification were conducted within all habitat types. Active birding was also completed at farm dams and watercourses where suitable.</p>	All birds recorded over two days.
Opportunistic Sightings	<p>All fauna species observed incidentally throughout the Study Area were recorded.</p>	All Fauna recorded over two days.

FIGURE 3.1

Flora and Fauna Survey Locations

Legend

- Study Area
- State Controlled Road
- Local Road
- Watercourse
- Fauna Habitat Assessment
- Flora Observations
- Timed Fauna Method**
- ◆ Call playback
- ◆ Spotlight
- Flora Forms**
- ▲ Incidental
- ▲ Quaternary
- ▲ Tertiary
- Proposed Disturbance Footprint**
- Proposed BESS Facility
- Indicative Transmission Routes**
- Route A
- Route B
- Route C



Scale 1:15,000 at A4
GDA2020 MGA Zone 56

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Table 3.4 MNES Fauna Field Survey Adequacy

Species	Relevant Guidelines	Recommended Methodology	Survey Effort Undertaken	Survey Adequacy
<p>Latham's snipe <i>Gallinago hardwickii</i></p>	<p>Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species</p>	<ul style="list-style-type: none"> • Identify important (areas that have previously been identified as internationally important sites for the species, or areas that support at least 18 individuals of the species). Identifying important areas without existing credible information requires: <ul style="list-style-type: none"> ○ Survey coverage of all habitat thought to be used including the entire area of contiguous habitat where the species may occur. ○ Four surveys during the period when the species is present in the area (i.e. the Austral summer). ○ One survey during the northern hemisphere breeding season. ○ Surveys to be conducted when habitat conditions are suitable for the species (i.e. when water is present). ○ Surveys should not be undertaken during periods of high rainfall or strong winds. ○ Surveys should not be undertaken when activities are taking place which cause disturbance to the birds. ○ Thorough habitat assessment to identify potential habitat. ○ Surveys of non-tidal wetlands may provide a greater challenge than coastal tidal wetlands, as the roosting and foraging behaviour is less predictable and there are no concentrated high tide roost areas. 	<ul style="list-style-type: none"> • 7 habitat assessments - including at farm dams that provide potential habitat. • Diurnal bird surveys undertaken throughout the fauna surveys. • Bird species were recorded incidentally throughout the survey program both visually and aurally. • Surveys were not undertaken during periods of high rainfall, strong winds or when activities were taking place which may cause disturbance to the birds. 	<p>Survey Effort Adequate</p> <ul style="list-style-type: none"> • The combination of habitat assessments, diurnal bird surveys, and incidental sightings provide suitable survey effort to detect Latham's snipe and/or its habitat.

Species	Relevant Guidelines	Recommended Methodology	Survey Effort Undertaken	Survey Adequacy
<p>White-throated needletail <i>Hirundapus caudacutus</i></p> <p>Fork-tailed swift <i>Apus pacificus</i></p>	<p>In lieu of species-specific guidelines, surveys for all bird species were undertaken in consideration of the <i>Survey guidelines for Australia's threatened birds and the Terrestrial Vertebrate Fauna Survey Guidelines for Qld and Draft referral guideline for 14 birds listed as migratory species under the EPBC Act.</i></p>	<ul style="list-style-type: none"> Although there are no standard survey techniques for this species, it is recommended they be counted by an experienced person from elevated viewpoints during summer. For white-throated needletail, observations should be made as late as possible in the evening of birds coming into roost in tall trees along ridge tops. 	<ul style="list-style-type: none"> 7 habitat assessments -in all areas of representative habitat. Diurnal bird surveys undertaken throughout the fauna surveys. Bird species were recorded incidentally throughout the survey program both visually and aurally. 	<p>Survey Effort Adequate</p> <ul style="list-style-type: none"> Surveys were conducted early in the migration season and its likely detection was low. Given the Projects largely modified state and available desktop information, the survey effort to detect species or habitat is adequate.
<p>Northern quoll <i>Dasyurus hallucatus</i></p>	<p><i>The EPBC Act Referral Guideline for the Endangered Northern Quoll and Survey Guidelines for Australia's Threatened Mammals</i></p>	<ul style="list-style-type: none"> If the Project will occur within the modelled distribution of the species and suitable habitat is likely to occur, initially undertake a reconnaissance survey using remote cameras and latrine searches. If habitat critical to the survival of the species is present and may be impacted, undertake targeted surveys applying a refined and more targeted use of remote cameras and other supplementary techniques. Transects of baited cameras, spaced 100 m apart for four nights is recommended. Remote cameras can be used at any time of the year but preferably when northern quolls are likely to be active and more detectable, i.e. before male die-off. In Queensland, camera trapping is recommended over cage trapping. 	<ul style="list-style-type: none"> 7 habitat assessments -in all areas of representative habitat. Spotlighting searches were also conducted across two nights in September 2024. Spotlighting targeted all suitable habitat patches. 	<p>Survey Effort Adequate</p> <ul style="list-style-type: none"> Habitat assessments were conducted throughout the field survey program to identify potential areas of habitat critical to the survival of the species. Survey effort is considered adequate for the purposes of this assessment, noting the limited availability of habitat present within the main extent of the Study Area (where the Project will occur).

Species	Relevant Guidelines	Recommended Methodology	Survey Effort Undertaken	Survey Adequacy
<p>Yellow-bellied glider (south-eastern) <i>Petaurus australis australis</i></p> <p>Greater glider (southern and central) <i>Petauroides volans</i></p>	<p>In lieu of species-specific guidelines, surveys for these species were undertaken in consideration of the <i>Survey guidelines for Australia's threatened mammals and the Terrestrial Vertebrate Fauna Survey Guidelines for Qld.</i></p>	<ul style="list-style-type: none"> • Arboreal mammal survey methods outlined in the <i>Survey guidelines for Australia's threatened mammals</i> include: <ul style="list-style-type: none"> ○ Diurnal searches for the presence of potentially suitable habitat resources for nest or den sites as well as signs of the species' presence, such as scratches on tree trunks and scats beneath trees. ○ Stag watching. ○ Spotlight surveys in suitable vegetation types. ○ Call detection and/or call playback surveys for vocal species, in addition to playback of the calls of owl predators that are known to induce a call response. ○ Cage trapping. • As per <i>Terrestrial Vertebrate Fauna Survey Guidelines for Qld</i>: <ul style="list-style-type: none"> ○ Spot lighting transects are the most effective method. ○ Survey effort should target habitat known to be suitable for listed species. 	<ul style="list-style-type: none"> • A total of 7 habitat assessments, which included searches for arboreal mammals and/or signs of their presence/ • Spot lighting searches were also conducted across two nights in September 2024. Spot lighting targeted all suitable habitat patches including areas of disconnected habitat. 	<p>Survey Effort Adequate</p> <ul style="list-style-type: none"> • Survey effort is considered adequate for the purposes of this assessment, noting the limited availability of habitat present within the main extent of the Study Area (where the Project will occur). Field survey findings support the conclusion that suitable habitat is restricted to connected remnant vegetation in the north east of the Study Area.
<p>Koala <i>Phascolarctos cinereus</i></p>	<p><i>A review of koala habitat assessment criteria and methods</i> (Youngentob et al., 2021).</p>	<ul style="list-style-type: none"> • No specific methodology or effort standards are prescribed for koala surveys. However, where there is a need to critically evaluate the potential impacts of major projects, multiple techniques should be used. Repeat surveys may be necessary to take temporal variation into account. • Direct observation methods include transect and point surveys, spot lighting, mark-resight or mark-recapture, thermal detection drones, radio-tracking, camera traps and detection dogs. 	<ul style="list-style-type: none"> • A total of 7 habitat assessments, which included searches for koalas and/or signs of their presence, have been undertaken across the Study Area • Spot lighting searches were also conducted across two nights (4 hours total per ecologist) 	<p>Requirements met</p> <ul style="list-style-type: none"> • As recommended, the field survey program employed both direct and indirect methods, including within the months when activity is generally high. Targeted survey methods employed include spot lighting.

Species	Relevant Guidelines	Recommended Methodology	Survey Effort Undertaken	Survey Adequacy
		<ul style="list-style-type: none"> Indirect methods include scratchings, Spot Assessment Technique (SAT) and other scat search methods, call playback, passive acoustics and landscape nutritional quality surveys. To optimise detection, call playback surveys should be conducted at night during the breeding season, and in the absence of strong winds or rain. Indirect methods are reported to be often the most effective for gathering presence/absence data due to the difficulty in observing koalas and the variable density of koalas across the landscape. 		<ul style="list-style-type: none"> Although not all recommended methods have been employed, survey effort is considered sufficient for the purposes of this assessment.
<p>Grey-headed flying-fox <i>Pteropus poliocephalus</i></p>	<p>In lieu of species-specific guidance, surveys were conducted in consideration of the <i>Survey guidelines for Australia's threatened bats and Terrestrial Vertebrate Fauna Survey Guidelines for Queensland</i></p>	<ul style="list-style-type: none"> Prior to survey conduct a database search of active and historical flying fox roosting sites. Diurnal surveys for active flying fox camps should be undertaken to determine the potential presence of unrecorded roosting sites. Signs of flying fox presence such as audible calls, odour and droppings should be examined. Dusk surveys can also be conducted to detect roost sites. Surveys of vegetation communities and food plants by a qualified botanist. Night-time, walking transect surveys in search of feeding and flying bats. 	<ul style="list-style-type: none"> A database search of active and historical flying fox roosting sites was undertaken prior to survey. 7 habitat assessments noting signs of bat activity, food plants and habitat suitability. 2 tertiary plots and 5 quaternary plots were completed to determine presence of suitable winter flowering eucalypts. 4 hours of spotlighting (per ecologist) on foot and from vehicles within locations of identified potential habitat. 	<p>Survey Effort Adequate</p> <ul style="list-style-type: none"> Based on the use of both indirect and direct methods in areas of representative habitat, overall effort is considered sufficient.

Species	Relevant Guidelines	Recommended Methodology	Survey Effort Undertaken	Survey Adequacy
Dunmall's snake <i>Furina dunmalli</i>	Surveys were undertaken in consideration of the <i>Survey guidelines for Australia's threatened reptiles</i>	<ul style="list-style-type: none"> Active searches of sheltering sites, particularly under rocks, logs or debris. Pitfall trapping. Road driving at night. 	<ul style="list-style-type: none"> 7 habitat assessments noting features to confirm species habitat suitability. Opportunistic active searches at habitat assessment sites 4 hours of spotlighting (per ecologist) on foot and from vehicles within locations of identified potential habitat. 	Survey Method & Effort Applied Considered Adequate <ul style="list-style-type: none"> The combination of active diurnal searches, spotlighting and road driving at night provide suitable survey effort. No pitfall trapping was completed; however, given the size of this species (ability to extricate itself from a pitfall trap) and lack of evidence of this technique yielding results it was deemed unsuitable.
Migratory terrestrial birds: Oriental cuckoo (<i>Cuculus optatus</i>).	<i>Draft referral guideline for the 14 birds listed migratory under the EPBC Act.</i>	<ul style="list-style-type: none"> 2 ha survey in 20 minutes over sufficient survey plots to estimate a density, and hence the population size across the proposed development area. Standardised timed periods. 	<ul style="list-style-type: none"> 7 habitat assessments -in all areas of representative habitat. Diurnal bird surveys undertaken throughout the fauna surveys. Bird species were recorded incidentally throughout the survey program both visually and aurally. 	Requirements met <ul style="list-style-type: none"> Survey effort is considered sufficient for purposes of this assessment, considering the conservative approach undertaken when determining the likelihood of occurrence.

3.3.4 Survey Limitations

This assessment has been completed using a combination of field-validated data, desktop information and reasonably extrapolated field survey results. As such, the results are subject to the level of accuracy and detail associated with this information.

Patterns of faunal activity and estimates of relative abundance or presence-absence of species, varies temporally in response to the time of day (e.g. day versus night), seasonal changes (e.g. spring versus winter) as well as between years (e.g. rainy year versus drought year) (Eyre et al. 2022).

Many fauna species have a cryptic or nocturnal nature often limiting fauna species detection during field surveys and habitat assessment. Species directly observed during field surveys are opportunistic sightings and are not deemed a complete complement of fauna species utilising the Study Area.

Despite the above, survey effort and coverage overall is considered appropriate as representative vegetation communities and habitat types were sampled, and an extensive suite of flora and fauna survey methodologies were employed. The limitations have been taken into consideration throughout this report.

3.4 Species Habitat Mapping

Habitat mapping for EPBC Act listed threatened or migratory flora and fauna species identified as known or having high or moderate potential (as per **Section 3.2**) to occur within the Study Area was undertaken. Where available, information from publicly available databases was used as a basis to develop the 'modelling rules', including relevant species referral guidelines, approved conservation advice, the SPRAT database, management plans and peer-reviewed journal articles. Habitat assessments collected during the field surveys, species records (previous and survey records), and Project vegetation mapping was used to map the potential habitat according to the modelling rules. These mapping rules are detailed in **Appendix D** and results are presented in **Section 7.0**. Where required, species habitat is categorised by a species' utilisation of a specific habitat type. For example, habitat utilisation of koala has been divided into climate refugia, breeding and foraging, and dispersal based on this species habitat requirements and usage across the Study Area.

3.5 Significant Impact Assessment

The potential direct and indirect impacts on relevant MNES as a result of the Project have been assessed as per the *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* (Department of the Environment 2013b). Results of the likelihood of occurrence assessment were considered when assessing potential impacts, with only MNES 'known' to occur, or MNES with a 'high' or 'moderate' likelihood of occurring assessed.

Key terms used within significant impact criteria for listed TECs, threatened species and migratory species are defined by the *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* (Department of the Environment 2013b) as follows:

- Habitat critical to the survival of a species or ecological community refers to areas that are necessary:
 - for activities such as foraging, breeding, roosting, or dispersal

- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)
- to maintain genetic diversity and long-term evolutionary development, or
- for the reintroduction of populations or recovery of the species or ecological community.
- Important population of a species refers to 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.

For some MNES, the key terms described above are already defined in the value's associated SPRAT profile, referral guideline, Listing Advice or Conservation Advice. Where this occurs, the specific definition is used in lieu of the above generic definitions.

4.0 Results

4.1 Environmental Context

4.1.1 South East Queensland Bioregion

The Study Area is located within the South East Queensland bioregion which encompasses approximately 6,600,000 ha, extending from Curtis Island in Gladstone in the north to Coffs harbour in New South Wales (New South Wales Government 2021). The ranges, coastal strip and adjacent hills of this bioregion are among the richest parts of Australia for flora and fauna. The area contains a wide variety of habitat types and localised centres of endemism (Sattler and Williams 1999). Moderate to high rainfall with a significant cooler winter component and warm to hot summers characterise this bioregion. The major physiographical features include a coastal plain of varying width, hills and ranges, the major drainage basins of the Brisbane and Mary Rivers, Barabah Creek, the lower Burnett River, the coastal mainland and island sand masses (Sattler and Williams 1999).

The bioregion is encompassed to the north and west by the Brigalow Belt region. The boundary is generally diffuse between the two bioregions, except for Main Range and Kroombit Tops, where sharp-east rainfall gradients are associated with mountainous topography (Sattler and Williams 1999). Subsequently, the western part of this bioregion and the eastern Brigalow Belt region closely correlate in terms of biodiversity (Sattler and Williams 1999).

The South East Queensland bioregion comprises ten provinces, with the Study Area located within the Gympie Block province. This province is based on old sedimentary rocks, metamorphic and intermediate and basic volcanics with scattered acid volcanic intrusions forming low, hilly landscapes (Sattler and Williams 1999). Dominant vegetation communities include araucarian notophyll and microphyll rainforest as well as mixed eucalypt forests. Where rainfall is less than approximately 1,000 mm per year, ironbark woodlands replace the mixed eucalypt forests (Sattler and Williams 1999).

4.1.2 Climate

The Bundaberg region has a warm humid subtropical climate. The annual rainfall for the Gin Gin area is approximately 1,034 mm and is predominantly seasonal, characterised by wet summers (December to February) and dry winters⁶. The average monthly temperatures range between a maximum of 30.3° Celsius (C) and a minimum of 9.9°C recorded during January and July, respectively⁷.

4.1.3 Geology and Land Zones

The detailed surface geology mapping (Queensland Globe 2024) identified three surface rock types mapped within the Study Area (**Table 4.1**). Based on these mapped geological units, one potential land zone as described by (Wilson and Taylor 2012), may be present; Land Zone 11: Metamorphosed rocks (ranges, hills and lowlands).

⁶ Meteorological rainfall data was collected at the Study Area's nearest Bureau of Meteorology (BOM) station: 039040.

⁷ Meteorological climate data was collected at the Study Area's nearest Bureau of Meteorology (BOM) station: 039128.

Table 4.1 Geology and Land Zones within the Study Area

Geological Unit	Source	Description	Land Zone
Tbsr	DoR Detailed Surface Geology (2024)	Stony Range Basalt	11
Co		Goodnight Beds	11
Pgca		Carmans Syenogranite	11

4.1.4 Topography

The Study Area is located on a predominantly gently undulating to flat landscape, ranging from 120 m to 160 m Australian Height Datum (AHD). The surrounding landscape is relatively flat to undulating with no mountain land marks present.

4.1.5 Hydrology

The Study Area is located within the Kolan River drainage sub-basin within the Burnett Mary region. The Kolan drainage basin is approximately 2,905 km² in area and encompasses the townships of Avondale, Gin Gin, Maroodan, Monduran, Moore Park, Tirroan and Yandaran (Department of Environment, Science and Innovation 2024a). Several unnamed, DoR mapped minor ephemeral tributaries of Lake Monduran and the Kolan River extend from the Study Area (Queensland Globe 2024). One farm dam is located in the south-eastern corner of the Study Area. The waterways run north and/or north-east, ultimately flowing into Lake Monduran located north of the Study Area or Koan River located north-east of the Study Area.

4.2 Description of Ecological Values

4.2.1 Land Use and Study Area Characteristics

The Study Area is primarily utilised for agricultural purposes (grazing and cropping) and for utility services. An existing Powerlink Substation is located along the western boundary within the Study Area. All allotments encompassing the Study Area are utilised for cattle grazing, however, lot and plan 22SP109996 contained a large patch of remnant vegetation north-east of the Study Area. The western and southern sections of the Study Area mostly contained non-remnant grazing pasture with smaller areas of remnant vegetation scattered throughout. There are no permanent residences/dwellings within the Study Area. The Study Area also covers Monduran Dam Road and Bruce Highway road reserves which are largely clear of vegetation, with only small, scattered patches of woody vegetation present.

4.2.2 Biodiversity Corridors and Connectivity

The Queensland State government has developed Biodiversity Planning Assessments (BPAs) to identify terrestrial ecological values of conservation significance including biodiversity movement corridors. BPAs use existing data to assess ecological concepts such as rarity, diversity, fragmentation, habitat condition, resilience, threats, and ecosystem processes in a uniform and reliable manner across a bioregion. Movement corridors and areas with special biodiversity value (e.g. centres of endemism or wildlife refugia) are informed by expert knowledge. Whilst MNES are not considered explicitly in this mapping, many of the listed species and communities under the EPBC Act are also protected under Queensland legislation.

Although the Study Area is situated within a predominantly cleared landscape, dispersal opportunities to larger patches of vegetation do exist, albeit restricted. The Study Area is a matrix of large areas cleared for agricultural practices interspersed with fragmented patches of remnant vegetation ranging in size. Patches of remnant vegetation are interspersed throughout the Study Area, the most notable of which is a large patch in the north-east which is functionally connected to extensive tracts of remnant vegetation near Lake Monduran to the north and east. This remnant vegetation located in the north-east of the Study Area may provide habitat opportunities for a diverse range of native species including threatened fauna e.g. koala and greater glider (south-eastern). Patches of isolated remnant vegetation within the Study Area represent potential 'steppingstone' habitat for mobile fauna to move across the landscape between surrounding vegetation.

Riparian vegetation communities identified throughout the Study Area were associated with watercourses. Although fragmented, these thin riparian corridors may provide limited movement opportunities for the fauna from the Study Area to the north. Large expanses of modified pasture exist as barriers to fauna movement within these riparian corridors. There is also a network of farm tracks, fences and electrical infrastructure including powerlines within the Study Area, which are likely to hinder or obstruct movement of small fauna groups including cover dependent reptiles, some birds/bats and ground dwelling mammals and reptiles. The Bruce Highway road reserve within the southern extent of the Study Area and Monduran Road within the western extent of the Study Area also both act as a considerable barriers to fauna movement within and beyond the Study Area.

4.2.3 Wetlands and Watercourse

Several unnamed, ephemeral drainage lines meander north from the Study Area to Lake Monduran situated approximately 2 km north and to Kolan River situated approximately 5 km to the north-east of the Study Area. Due to the small sizes of these drainage lines, in-stream aquatic habitat is relatively simple with an absence of rocky substrates including rocks and boulders. Small fallen branches and timber were present within the drainage lines with channel beds comprising a stony and sandy substrate in one location. The banks of the watercourses were dominated by exotic/native grasses with fringing Eucalypt woodland of juvenile and mature trees. Aquatic flora species were limited and confined to *Juncus* sp. and *Persicaria* sp. recorded within the drainage lines. Other species commonly associated with aquatic flora, i.e. water lilies (Genus *Nymphaea*) were not present within the ephemeral drainage lines.

Whilst the drainage lines within the Study Area are largely ephemeral, during brief periods of inundation, the aquatic environments within the Study Area may support assemblages of aquatic fauna species such as native fish, freshwater crustaceans and common amphibians. Small semi-permanent pools which were observed of Lake Monduran Access Road were noted as potentially providing water source refuge for these species. These areas may also provide a source of drinking water for terrestrial fauna species.

A farm dam was present in the southwestern corner of the Study Area. Exotic pasture species dominated the farm dam and mature Eucalypt trees with small hollows scattered the cleared landscape surrounding the dam. A stag was also present in the dam edge with a small hollow present. Native reed beds fringed the eastern side of the dam and water lilies (Genus *Nymphaea*) were present within the farm dam. The farm dam may also provide suitable habitat for aquatic species and habitat for wetland bird species such as Latham's snipe (*Gallinago hardwickii*). No mapped wetlands were present within the Study Area.

4.2.4 Results of Previous Studies

The existing assessment (RPS, 2024) reported that Study Area (BESS footprint only) had been previously cleared and contained no threatened or migratory fauna, flora or TECs. The previous studies did not quantify and assess threatened species habitat, conduct impact assessments or provide ground-truthed regional ecosystems. The report has not been considered further, with the results presented in this MNES report superseding the RPS, 2024 findings.

4.2.5 Flora

4.2.5.1 Vegetation Communities

A review of the DoR RE mapping (Version 13.0) shows the Study Area is largely mapped as non-remnant. Patches of Category B – Remnant Vegetation occur in the north-east and south-west corners, comprising RE 12.11.6/12.11.14. Category C – Regrowth Vegetation also occurs following a stream, comprising the same Res (Table 4.1).



Field surveys ground-truthed three remnant REs within the Study Area (Table 4.2, Figure 4.2). In total, 43 ha (35.7%) of remnant vegetation was ground-truthed, comprising of one ‘Endangered’, one ‘Of Concern’ and one ‘Least Concern’ REs under the VM Act. This is largely attributed to a single large patch of intact vegetation in the north-east of the Study Area. The majority of the Study Area (64.3%) comprises non-remnant vegetation (77.6 ha). These areas have been subject to historical clearing, livestock impacts, pasture improvement and weed encroachment.

A detailed description of REs including representative photos of each RE is provided in Table 4.3.

Table 4.2 Summary of the Extent and Condition of REs Identified within the Study Area

RE	REDD Short Description	VM Act Status	Vegetation Condition	Extent within the Study Area (ha)
12.3.3	<i>Eucalyptus tereticornis</i> woodland on Quaternary alluvium.	Endangered	Remnant	2.7
12.11.6	<i>Corymbia citriodora</i> subsp. <i>variegata</i> , <i>Eucalyptus crebra</i> woodland on metamorphics +/- interbedded volcanics.	Least concern	Remnant	36.2
12.11.14	<i>Eucalyptus crebra</i> , <i>E. tereticornis</i> , <i>Corymbia intermedia</i> woodland on metamorphics +/- interbedded volcanics.	Of Concern	Remnant	4.2
Non-remnant	-	-	-	71.7
Existing infrastructure	-	-	-	5.9
Total				120.6

Table 4.3 Ground-truthed Regional Ecosystems within the Study Area

RE	Field Description	Representative Photo
12.3.3	<p><i>Eucalyptus tereticornis</i> was dominant to co-dominant with <i>Eucalyptus crebra</i> averaging up to 24 m tall. A sub-canopy of <i>Corymbia tessellaris</i> was noted in places, however not consistent across all patches. The shrub cover ranged from 12–24%, dominated by the exotic species, <i>Lantana camara</i>*, although native shrubs such as <i>Acacia disparrima</i> and <i>Ficus opposita</i> were recorded. The ground cover density was high, exceeding 85% cover and dominated by the exotic grasses, <i>Hyparrhenia rufa</i>* and <i>Megathyrsus maximus</i>*. Past clearing, grazing and weeds are the dominant forms of disturbance to this vegetation community.</p>	
12.11.6	<p><i>Corymbia citriodora</i> and <i>Eucalyptus crebra</i> woodland, open woodland or open forest averaging up to 18 m tall. Other canopy and/or sub-canopy trees included <i>Eucalyptus exserta</i>, <i>Lophostemon confertus</i> and <i>Corymbia tessellaris</i>. A shrub layer was mostly sparse, although pockets of high shrub cover were noted where <i>Lantana camara</i>* was present. The ground cover did not exceed 50%. Isolated patches of this community showed increased signs of disturbance from edge effects and cattle access. Larger patches including those in the north-east of the Study Area, were had a more complex structure and supported relatively higher habitat features for fauna.</p>	



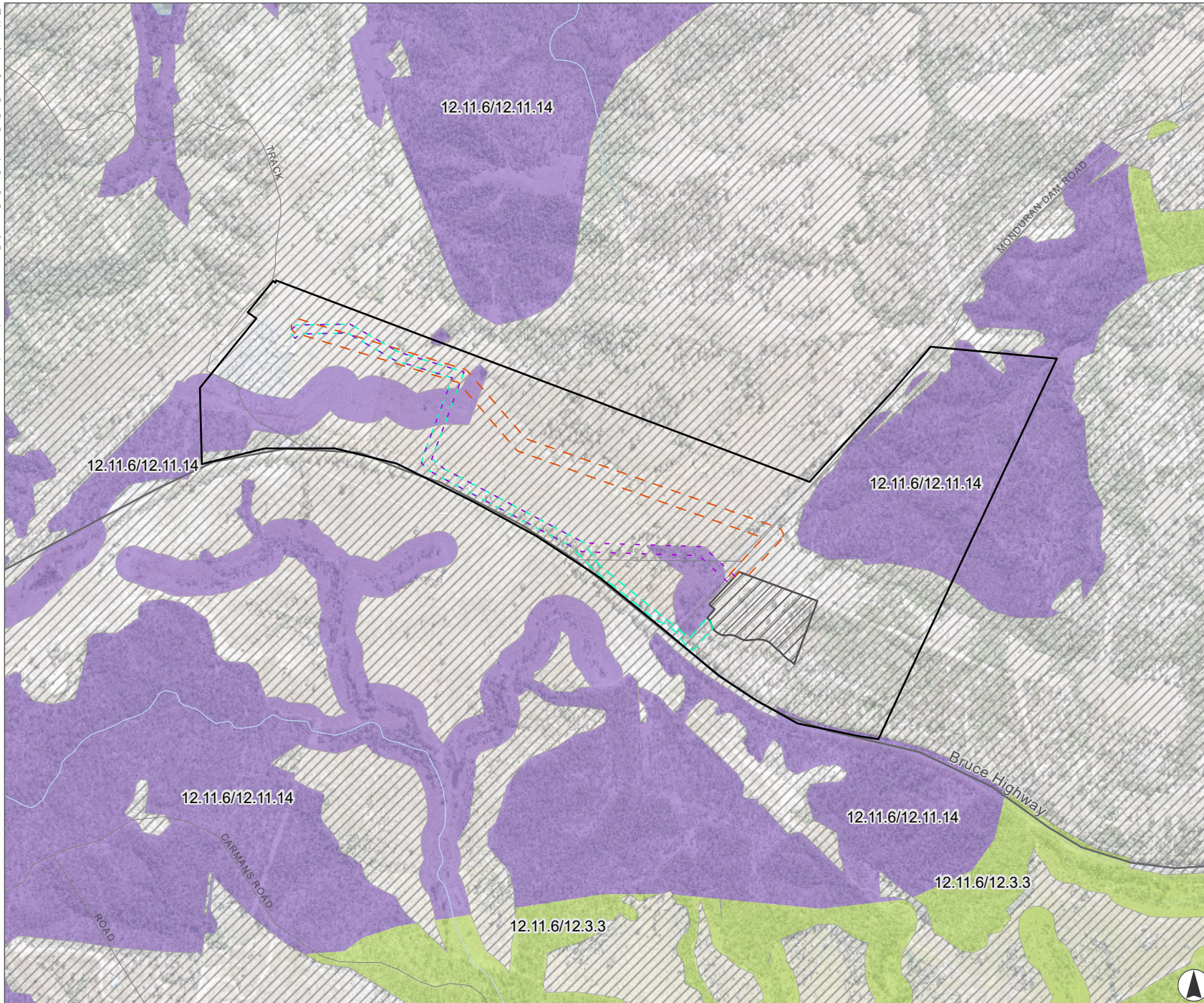
RE	Field Description	Representative Photo
<p>12.11.14</p>	<p>Open woodland of <i>Eucalyptus crebra</i>, <i>Eucalyptus tereticornis</i> and <i>Angophora leiocarpa</i> averaging up to 16 m tall. Shrub layer was sparse (<5%) and comprised <i>Acacia</i> spp. This vegetation occurred within road verges and showed signs of disturbance such as weeds, primarily exotic grasses. Access to these areas was limited (adjacent to major highway) and more comprehensive flora survey was not possible, however confirmation of canopy, heights and cover estimates was achieved.</p>	
<p>Non-remnant</p>	<p>This vegetation is characterised by the dominance of exotic pasture grasses with occasional scattered emergent trees, typically <i>Eucalyptus crebra</i> and <i>Angophora leiocarpa</i>. Extensive grazing activities are evident in addition to past land clearing. This vegetation community is associated with a diversity of landforms and soils.</p>	

FIGURE 4.1

State Regional Ecosystem Mapping

Legend

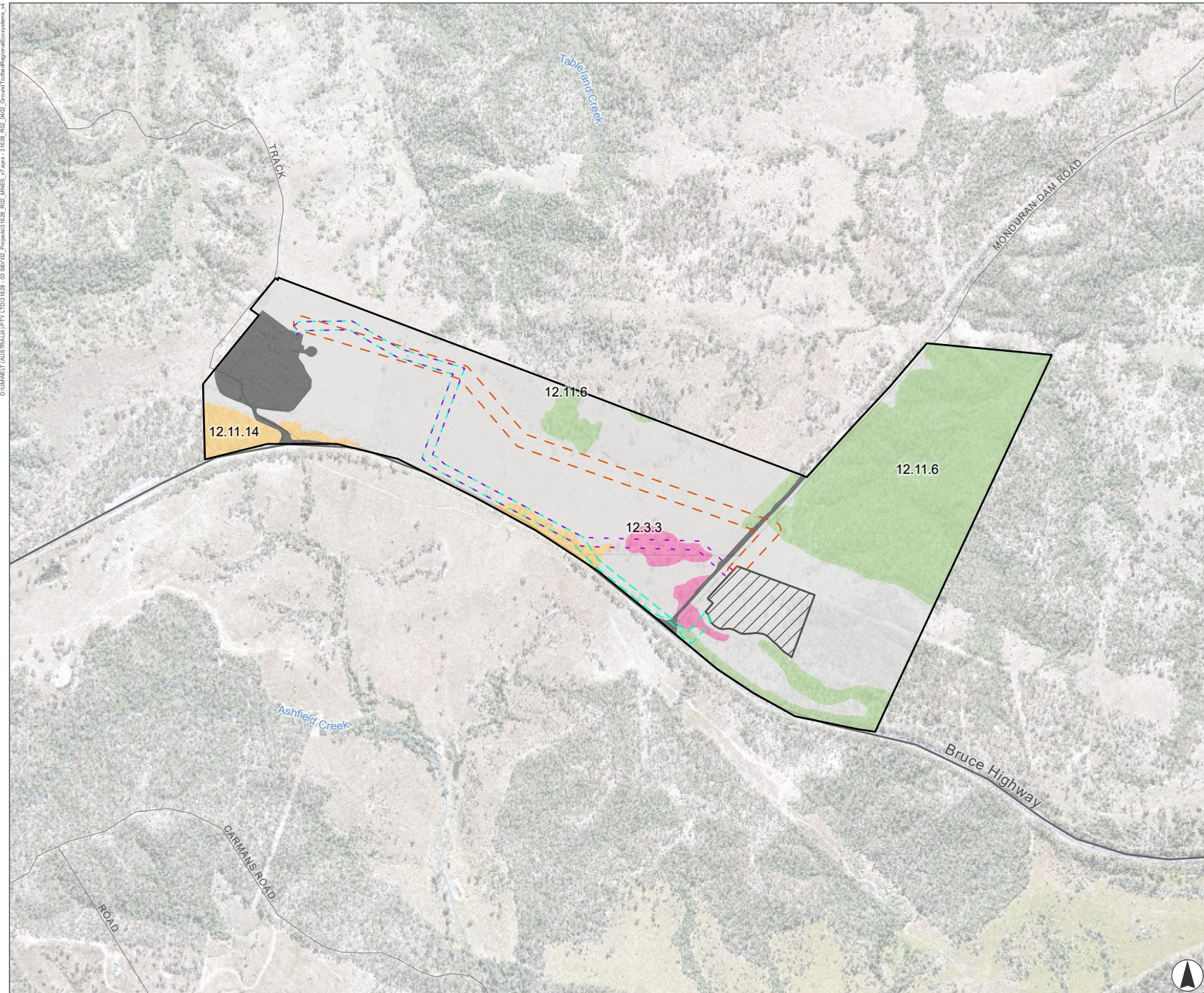
- Study Area
- State Controlled Road
- Local Road
- Watercourse
- Regional Ecosystems**
- Least concern**
- 12.11.6/12.3.3
- 12.11.6/12.11.14
- Other**
- Non-remnant
- Water
- Proposed Disturbance Footprint**
- Proposed BESS Facility
- Indicative Transmission Routes**
- Route A
- Route B
- Route C



Scale 1:15,000 at A4
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FIGURE 4.2
Ground-truthed Regional Ecosystems



- Legend**
- Study Area
 - State Controlled Road
 - Local Road
 - Watercourse
- GTRE**
- Endangered
 - Of concern
 - Least concern
 - non-remnant
 - Existing Infrastructure
- Proposed Disturbance Footprint**
- ▨ Proposed BESS Facility
- Indicative Transmission Routes**
- Route A
 - Route B
 - Route C



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4.2.5.2 Threatened Ecological Communities

A total of five TECs were identified on the PMST (**Table 4.9**). Of those TECs, only one had potentially analogous vegetation present within the Study Area and was subject to further field assessment; *Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions* (Subtropical eucalypt floodplain forest). No analogous vegetation for the remaining four TECs was recorded within the Study Area and therefore, they are considered to have a low likelihood of occurrence (**Appendix B**).

Table 4.4 Threatened Ecological Communities Identified on the PMST

Community name	EPBC Act Status	Presence within Desktop Search Area per PMST	Analogous Vegetation within Study Area
Coastal Swamp Oak (<i>Casuarina glauca</i>) Forest of New South Wales and South East Queensland ecological community	Endangered	May occur within area	No
Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland	Endangered	May occur within area	No
Lowland Rainforest of Subtropical Australia	Critically endangered	Likely to occur within area	No
Poplar Box Grassy Woodland on Alluvial Plains	Endangered	May occur within area	No
Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions	Endangered	Likely to occur within area	Yes

Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions

Subtropical eucalypt floodplain forest is listed as Endangered under the EPBC Act. The structure of the ecological community, in its undisturbed state, varies from tall open forest to woodland, although partial clearing may have reduced the canopy to scattered trees in some areas. The tree canopy is dominated by eucalypts and/or other myrtaceous trees (specifically from the *Angophora*, *Corymbia*, *Lophostemon* and *Syncarpia* genera), often as a mixture of species. The ecological community is found on alluvial landforms, including floodplains, the riparian zones of parent rivers and other order tributaries, alluvial flats, floodplain/alluvial terraces and periodically flooded depressions. It generally occurs below 50 m above sea-level (ASL), although it can occur up to 250 m ASL. Corresponding REs in the Southeast Queensland bioregion include: 12.3.3/12.3.3a/12.3.3d, 12.3.19, 12.3.10 and 12.3.18.

An assessment against the key diagnostic characteristics and condition thresholds is provided in **Table 4.5** and **Table 4.6** respectively (Department of Climate Change, Energy, the Environment and Water 2022).

Table 4.5 Assessment Against Subtropical Eucalypt Floodplain Forest Key Diagnostic Characteristics

Key diagnostic characteristic	Assessment
It occurs in the New South Wales North Coast (NNC) and Southern Eastern Queensland (SEQ) IBRA bioregions, and on Curtis Island in the Brigalow Belt North IBRA bioregion.	Yes, the Study Area occurs within the SEQ IBRA bioregion.
It occurs in the catchments of the eastern watershed of the Great Dividing Range, typically in their lower reaches.	Yes, the Study Area occurs in the eastern watershed of the Great Dividing Range.
It occurs at elevations up to 250 m above sea-level (ASL), most typically below 50 m ASL.	Yes, the Study Area occurs between 130 m and 180 m ASL.
It occurs on alluvial landforms including river floodplains, riparian zones (e.g. along riverbanks, lake foreshores and creek lines), the floors of tributary gullies, floodplain pockets, alluvial flats, fauns, terraces and localised colluvial fans; as well as on localised depressions amongst low rises and on associated sites where water can pond.	Yes, patches within the Study Area occurs on alluvial landforms.
It occurs on alluvial soils of various textures including, silts, clay loams, sandy loams, gravel and cobbles.	Yes, typically clay loam texture.
It does not typically occur on soils that are primarily marine or aeolian sands, but may occur on such substrates that have been modified by fluvial activity.	Yes, patches within the Study Area do not occur on marine or aeolian sands.
It occurs as a tall closed-forest, tall open-forest, closed forest, open forest, tall woodland, or woodland. The canopy has a crown cover of at least 20%.	Yes, the canopy cover comprised at least 20% (28% and 27%).
It has a canopy dominated by a combination of Angophora, Corymbia, Eucalyptus, Lophostemon and/or Syncarpia tree species, but not dominated by Eucalyptus robusta. Other canopy tree species may be present, and in some areas rainforest trees may be prominent.	Yes, dominated by Eucalyptus tereticornis, Eucalyptus crebra and Corymbia tessellaris.
A mid-layer (including sub-canopy and/or shrub layer) may be present, sparse or absent; and fauna may be abundant or rare.	Yes, a sub-canopy and/or shrub layer was present.

Based on the above key diagnostics being met, potential TEC patches were delineated and an assessment of condition classes and thresholds was completed. The assessment found that no patches of 12.3.3 qualify as a Subtropical eucalypt floodplain forest TEC under the EPBC Act.

Three mapped vegetation areas of 12.3.3 occur in the Project. With a break in vegetation exceeding 30 m, two patches are therefore delineated. These are assessed below in **Table 4.6**.

Table 4.6 Condition Class and Threshold Assessment

	Patch 1	Patch 2
Area (ha)	1 ha	1.7 ha
Large patch test (≥ 2 ha)	No	No
Small patch test (≥ 0.5 ha)	Yes	Yes
Arboreal mammals test (≥ 5 arboreal mammals)	No (3 recorded)	No (3 recorded)
Contiguous Test (within 30 m of one or more areas of native vegetation).	Yes	No
HIGH CONDITION	No	No

	Patch 1	Patch 2
Ground cover richness \geq 10 native species per sample plot AND \geq 20 large native trees per ha. AND \geq 80% of its total perennial understorey vegetation cover comprises native species	Ground cover richness did not exceed 10 native species. No large trees recorded Only 2% of total perennial understorey vegetation cover comprised native species.	Ground cover richness did not exceed 10 native species Large trees were 10/ha Only 44% of perennial understorey vegetation cover comprised native species.
GOOD CONDITION Ground cover richness \geq 6 native species per sample plot AND \geq 10 large native trees per ha. AND \geq 50% of its total perennial understorey vegetation cover comprises native species	No Ground cover richness did not exceed 6 native species. No large trees recorded Only 2% of total perennial understorey vegetation cover comprised native species.	No Ground cover richness did not exceed 6 native species Large trees were 10/ha Only 44% of perennial understorey vegetation cover comprised native species.
MODERATE CONDITION Ground cover richness \geq 4 native species per sample plot AND at least one of: \geq 6 very large native trees per ha AND/OR \geq 30% of its total perennial understorey vegetation cover comprises native species	No Ground cover richness did not exceed 6 native species. No very large trees recorded Only 2% of total perennial understorey vegetation cover comprised native species.	Not applicable (fails contiguous measure)

4.2.5.3 Flora Diversity

A total of 34 flora species were recorded within the Study Area during field surveys undertaken by Umwelt, comprising 26 native and eight introduced species. The dominant plant families recorded included: Myrtaceae and Poaceae. A full flora species list is provided in **Appendix C**.

Introduced Flora Species

One introduced flora species recorded during field surveys listed as Weeds of National Significance (WONS) and listed as State Restricted under the *Biosecurity Act 2014*; *Lantana camara* (Lantana).

Threatened Flora Species

No flora species listed under the EPBC Act were recorded within the Study Area during field surveys undertaken by Umwelt.

A total of 16 flora species listed under the EPBC Act were identified during the desktop assessment based on a 20 km buffer of the Study Area. Locations of the available desktop records for threatened flora species previously recorded within the Study Area or 20 km buffer are displayed on **Figure 4.3**.

The likelihood of occurrences assessment (**Appendix B**) identified two threatened flora species with a moderate likelihood of occurring within the Study Area based on suitable habitat encountered during the field surveys. For both species, the likelihood of their occurrence is associated with the single large patch of vegetation (12.11.6) north of the existing transmission line. These species are summarised in **Table 4.7**.

Species habitat mapping was developed for these species, detailed in **Appendix D**, and includes a discussion of potential habitat for each species.

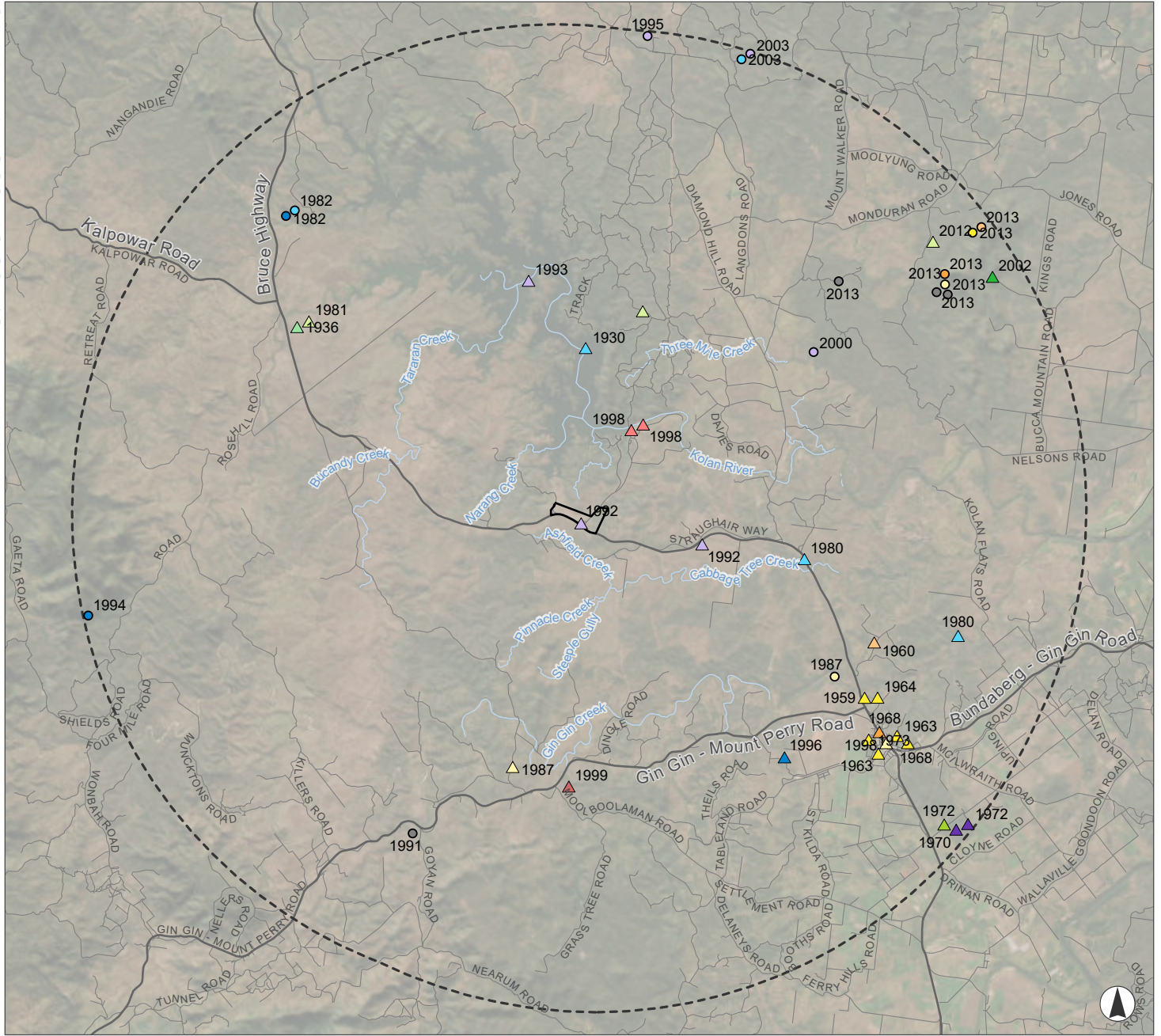
All remaining threatened species are considered to have a low likelihood of occurring or are unlikely to occur within the Study Area, and therefore are not discussed further. Refer to **Appendix B** for the full likelihood of occurrence assessment.

Table 4.7 Threatened Flora Likelihood of Occurrence Results

Scientific Name	Common Name	EPBC Act Status
Moderate likelihood of occurrence		
<i>Cycas megacarpa</i>	-	Endangered
<i>Samadera bidwillii</i>	Quassia	Vulnerable

FIGURE 4.3

Threatened Species within Desktop Assessment Area



Legend

- Study Area
- 20km study area buffer
- Watercourse
- State Controlled Road
- Local Road

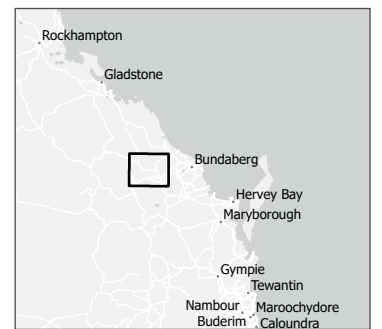
Threatened Fauna Species

- ▲ black-breasted button-quail (*Turnix melanogaster*)
- ▲ glossy black-cockatoo (*Calyptorhynchus lathami*)
- ▲ koala (*Phascolarctos cinereus*)
- ▲ oriental cuckoo (*Cuculus optatus*)
- ▲ plumed frogmouth (*Podargus ocellatus plumiferus*)
- ▲ powerful owl (*Ninox strenua*)
- ▲ red goshawk (*Erythrotriorchis radiatus*)
- ▲ rufous fantail (*Rhipidura rufifrons*)
- ▲ southern greater glider (*Petauroides volans volans*)
- ▲ spectacled monarch (*Symposiachrus trivirgatus*)
- ▲ tusked frog (*Adelotus brevis*)
- ▲ white shark (*Carcharodon carcharias*)
- ▲ white-throated snapping turtle (*Eelsey albagula*)
- ▲ yellow-bellied glider (southern subspecies) (*Petaurus australis australis*)

- *Lobelia purpurascens* (white root)
- *Lobelia quadrangularis*
- *Microsorium punctatum*
- *Pellaea nana*
- *Platynerium superbum* (staghorn fern)
- *Potamogeton tepperi*
- *Pyrrosia rupestris* (rock felt fern)

Threatened Flora Species

- *Adiantum atroviride*
- *Adiantum hispidulum* var. *hispidulum*
- *Adiantum hispidulum* var. *minus*
- *Doryopteris concolor*
- *Drynaria rigidula*
- *Lastreopsis tenera*
- *Lobelia membranacea*



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4.2.6 Fauna

4.2.6.1 Fauna Habitat

The Study Area can be characterised into three terrestrial habitat types based on the findings of the field survey program. The presence and extent of these habitat types is summarised in **Table 4.3** and displayed on **Figure 4.4**.

The ‘modified areas’ habitat type dominates the Study Area occupying 64.28%. A description of each habitat type, relevant microhabitat features and associated MNES is provided in the following subsections.

Table 4.8 Summary of Terrestrial Habitat Types

Habitat Type	Extent within Study Area (ha)
<i>Eucalyptus tereticornis</i> and <i>Eucalyptus crebra</i> woodland to open forest, fringing waterways	2.7
Mixed Eucalypt open woodland to woodland on hills and lowlands	40.2
Modified areas comprising exotic pasture, scattered mature Eucalypts, farm dams and low order waterways	77.5

***Eucalyptus tereticornis* and *Eucalyptus crebra* woodland to open forest, fringing waterways**

All occurrences of this habitat type were sampled, restricted to two discrete patches near the southern boundary of the Study Area and centred around a lower order waterway (stream order 1). The habitat type occurs on Quaternary alluvial deposits, influenced by the ephemeral to semi-permanent waterway which dissects the habitat. Dominant canopy vegetation within the is habitat type includes *Eucalyptus tereticornis* (Queensland blue gum), *Eucalyptus crebra* (narrow-leaved red ironbark), *Corymbia tessellaris* (Moreton Bay ash). A sub-canopy and/or shrub layer was also present, with typical species including *Eucalyptus* spp, *Euroschinus falcata*, *Acacia dissosperma*, *Ficus* sp., and *Alphitonia excelsa* (soap tree). The exotic shrub, *Lantana camara*, was present in dense thickets. The ground layer was dense and dominated by exotic grasses, *Megathyrsus maximus* (guinea grass) and *Hyparrhenia rufa* (thatch grass). Native grasses were rare.

Key habitat features large mature trees including several with a DBH greater than 60 cm, rare hollows (typically small sized), occasional fallen logs (10–30 cm width) and decorticated bark. Within the channel of the drainage feature, a stony bed with relatively steep, low banks was noted. In patches west of Lake Monduran Dam Road, water pools were present and aquatic macrophytes (*Juncus* sp.) were prevalent.

The dominance of a eucalypt canopy provides a food resource for koala. The small size of the hollows and disconnected nature of the habitat patches renders this habitat unsuitable for threatened hollow dependent subspecies such as greater glider (central and southern) and yellow-bellied glider (south-eastern). The dominance and density of exotic grasses render the habitat unsuitable for squatter pigeon (southern).



Photo 4.1 **Representative Image of *Eucalyptus tereticornis* and *Eucalyptus crebra* Woodland to Open Forest, Fringing Waterways**

Mixed Eucalypt open woodland to woodland on hills and lowlands

This habitat type was sampled across the Study Area and often occurred as isolated stands or within road easements. Dominant canopy vegetation within the is habitat type includes *Corymbia citriodora* and *Eucalyptus crebra*. The exotic shrub, *Lantana camara*, was often present in dense thickets, although not distributed widely throughout. The ground layer was moderately sparse (30–50% cover) and comprised a mix of native and non-native species.

Key habitat features included high leaf litter, although not forming deep mats, occasional rocky features including surface stones to 20 cm. Fallen timber was generally small in size, with rare occurrences of larger habitat logs. Shedding bark, particularly on *Angophora leiocarpa*, provided opportunities for reptiles and ground mammals. The dominance of a eucalypt canopy provides a food resource for koala. The larger remnant patch in the north east of the Study Area was connected more broadly to areas beyond the Study Area and included small gullies where higher vegetation complexity (mostly shrub layer) was noted.

Isolated patches typically showed signs of disturbance and were disconnected quite considerably by local road access, major highways and cleared land for grazing. Where gullies intersected this habitat type, considerable erosion was recorded. Larger habitat patches, such as those in the north east of the Study Area maintain connection to areas beyond the Study Area and thus hold higher potential to support threatened species such as yellow-bellied glider (south-eastern) or northern quoll.



Photo 4.2 **Representative Image of Mixed Eucalypt Open Woodland to Woodland on Hills and Lowlands**

Modified Areas Comprising Exotic Pasture, Scattered Mature Eucalypts, Farm Dams and Low Order Waterways

This habitat type comprises large areas of land that have been cleared and modified (historically and recently) for grazing or other anthropogenic purposes. Canopy cover and shrub cover is typically sparse to absent, whilst grass cover varies dependent on pressures present. Several larger paddock trees were noted near the BESS area, comprising *Eucalyptus crebra* and *Angophora leiocarpa*.

Despite the general poor quality of the farm dams and modified wetlands, it is acknowledged that they may still provide a reliable water source for a range of fauna species. Although highly disturbed and subject to ongoing threatening processes, this habitat type supports potential dispersal opportunities for koala and northern quoll, as well potential roosting and foraging habitat for Latham’s snipe.



Photo 4.3 **Modified Habitat Comprising Exotic Pasture Grasses (left) and Scattered Mature Trees (Right)**