Calvale to Calliope River Transmission Line Reinforcement Project

Final Public Environment Report
(EPBC 2024/10044)

April 2026

umwelt

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Final Public Environment Report
(EPBC 2024/10044)

Prepared by
Umwelt (Australia) Pty Limited

On behalf of
Queensland Electricity Transmission Corporation Limited trading as Powerlink Queensland under ABN 82 078 849 233

Project Director: Gavin Elphinstone
Project Manager: Julius Frias
Report No.: 22823 / R18
Date: April 2026

This report was prepared using Umwelt's ISO 9001 certified Quality Management System.

Acknowledgement of Country

Umwelt acknowledges the Traditional Custodians of Country throughout Australia and their continuing connection to land, waters, and skies.

Umwelt acknowledges the Gaangulu Nation People and the Bailai, Gurang, Gooreng Gooreng, and Taribelang Bunda Peoples as the Traditional Custodians of the land, waters and skies upon which this report is based.

We pay our respects to Elders past and present.



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Document Status

Rev No.	Reviewer Name	Date	Approved for Issue Name	Date
V6 – Final PER for Submission	J. Frias	1.4.2026	G. Elphinstone*	1.4.2026

*Final changes to create V6 were considered immaterial and reviewed by C Adamson.

Executive Summary

Project Overview

The Calvale to Calliope River Transmission Line Reinforcement Project (the Project) is proposed by the Queensland Electricity Transmission Corporation Limited trading as Powerlink Queensland (Powerlink). The Project extends from the Calvale Substation, 10 kilometres (km) east of Biloela to the Calliope River Substation, 2 km north of Clinton, near Gladstone, Queensland. The reference number for the Project is EPBC 2024/10044.

Purpose of the Report

This Public Environment Report (PER) has been prepared for submission to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This PER has been prepared in accordance with the PER Guidelines and provides an assessment of the potential impacts to Matters of National Environmental Significance (MNES) to demonstrate that the Project should be approved, subject to conditions. On 4 February 2025, a delegate of the Minister for the Environment and Water determined the Project to be a controlled action requiring assessment by PER for the following controlling provisions that are MNES:

- World Heritage properties (sections 12 and 15A)
- National Heritage places (sections 15B and 15C)
- Listed threatened species and communities (sections 18 and 18A)
- Great Barrier Reef Marine Park (sections 24B and 24C).

Background to the Development of the Project

An opportunities and constraints assessment was undertaken to confirm that with limited additional easement widening, a complete corridor could be achieved from the Calvale Substation to the Calliope River Substation. This would minimise impact to the broader community across social, environmental and economic objectives.

A Draft and Final Corridor Selection Reports (CSR) were prepared by Powerlink to comparatively assess the suitability of existing easements and corridor options to determine the recommended corridor within which to locate the proposed transmission line. The Draft and Final CSRs are available on Powerlink's website for viewing (https://engage.powerlink.com.au/calvale-calliope-river-transmission-line-reinforcement-project).

From Calvale, Powerlink decided that the new transmission line will be co-located within vacant areas of existing Powerlink easements in Sections A, B, D, and E. There is no available vacant space in easements in Section C and a widening of 40 metres (m) to the existing easement is required to accommodate the proposed transmission infrastructure.

Alternatives such as 'no action' and alternative route alignments were considered and ultimately determined to not be feasible for the Project. This determination was made due to several factors including alignment with Commonwealth policy, Project constructability and adverse impacts to environmental values. The Project represents a suitable balance between environmental values, local communities and the need to develop a design that achieves minimum performance requirements to deliver viable transmission infrastructure. The co-location of transmission infrastructure is also preferred in avoidance and minimisation of potential impacts to environmental and heritage values.

Project Description

To ensure the future security of electricity supply to the Gladstone area, the existing infrastructure corridor between the Calvale Substation and Calliope River Substation is to be strengthened with the establishment of a new transmission line. The Calvale Substation and Calliope River Substation will also be expanded to accommodate the connection of the Project to the electricity network. Co-location with existing transmission infrastructure was prioritised to minimise environmental and social impacts. The Project comprises the following components:

- A new double circuit, 87 km 275 kV transmission line between the existing Calvale Substation and the Calliope River Substation within an existing transmission easement.
- Expansion of the Calliope River Substation, which may include components such as reactors, transformers, synchronous condensers, laydown areas, changes to access tracks, statis synchronous compensation and the expansion of the existing 132 kV and 275 kV switching yards.
- Expansion of the Calvale Substation to include a new substation bay to connect to the new transmission line.
- Grid connection of the new transmission line to the Calvale and Calliope River substations.

The start of construction is planned for July 2026 and is planned to be completed prior to the closure of the Gladstone Power Station in 2029.

The Project Area covers approximately 14,321 ha and contains the Disturbance Footprint for construction and operations and an additional area to allow for the assessment of potential permanent and temporary impacts (the Project Area). The Project Area and Disturbance Footprint as presented in the Draft PER have been refined following further detailed design to facilitate safe installation and operation of the Project.

The Project Area extends from the Calvale Substation site to the Calliope River Substation site and is split into five sections as detailed below:

Section	Start of Section Coordinates	End of Section Coordinates	Approximate Length	Existing Powerlink Infrastructure
Section A	-24.3418, 150.6270	-24.3268, 150.6560	3.5 km	132 kV and 275 kV lines Calvale Substation
Section B	-24.3268, 150.6560	-23.9344, 150.9174	51.5 km	One 275 kV line
Section C	-23.9344, 150.9174	-23.9230, 151.0733	16 km	Two 275 kV lines
Section D	-23.9230, 151.0733	-23.8484, 151.1754	13.5 km	One 275 kV line
Section E	-23.8484, 151.1754	-23.8580, 151.1943	2 km	Two 275 kV lines Calliope River Substation

Key Project activities are:

- **Construction–**site preparation, pre-clearing, earthworks, civil works, establishment of laydown areas and temporary batch plants, tower foundations and erection, assembly of brake and winch sites, stringing, site rehabilitation.
- **Operation–**commissioning activities, maintenance of easement and access tracks, vegetation management and routine inspections of infrastructure.
- **Decommissioning–**either replacement or refurbishment works will occur at the end of the Project's operational life to bring the equipment to the required level of performance and reliability. If the substation is no longer required, it will be removed and remediation works undertaken.

Existing Environment

The current land uses within the Project Area vary from cattle grazing, production and plantation forestry and conservation through to pipeline and transport infrastructure, reservoir/dam infrastructure, mining and power stations. High voltage transmission lines along with the Calvale Substation and Calliope River Substation exist in the Project Area.

The characteristics of the Project Area vary from floodplains along the Calliope River and associated tributaries (Section C) and tidal areas on the Calliope River estuary (Section E) to mountainous ranges (Mount Larcom Range in the east and Calliope River Range to the west). The Project Area occurs within two Queensland bioregions, being the Brigalow Belt bioregion (Sections A, B, C and western portion of D) and the Southeast Queensland bioregion (eastern portion of Section D and Section E).

Matters of National Environmental Significance

Six categories of MNES have been identified within the Project Area and 42 listed species are considered known or likely to occur. The categories of MNES identified are:

- World Heritage Places
- National Heritage Places
- Great Barrier Reef Marine Park
- Listed Threatened Ecological Communities (TEC)
- Listed Threatened Species
- Listed Migratory Species.

The listed TECs, Threatened Species and Migratory Species include:

MNES	Species (likelihood of occurrence)
Listed TECs	• Semi-evergreen vine thicket (known) • Coastal saltmarsh (known) • Eucalypt floodplain forest and woodland (known)
Listed Threatened Species	• Atalaya collina (high) • Bertya opponens (high) • Cossinia australiana (known) • Cycas megacarpa (known)

MNES	Species (likelihood of occurrence)
	• Polianthion minutiflorum (high) • Samadera bidwillii (known) • Squatter pigeon (southern subspecies) (known) • White-throated needletail (high) • Nunivak bar-tailed godwit (high) • Greater glider (southern and central) (high) • Yellow-bellied glider (south-eastern) (high) • Koala (known) • Grey-headed flying fox (known) • Water mouse (high) • Collared delma (known) • Ruddy turnstone (high) • Sharp-tailed sandpiper (high) • Red knot (high) • Curlew sandpiper (high) • Great knot (high) • Loggerhead turtle (high) • Great sand plover (high) • Lesser sand plover (high) • Green turtle (high) • Northern quoll (high) • Latham's snipe (high) • Painted honeyeater (high) • Flatback turtle (high) • Eastern curlew (high) • Australian painted snipe (high) • Common greenshank (high) • Black-breasted button-quail (high) • Terek sandpiper (high)
Listed Migratory Species	• Fork-tailed swift (known) • Oriental cuckoo (moderate) • Common sandpiper (moderate) • Bar-tailed godwit (moderate) • Eastern osprey (known) • Pacific golden plover (moderate)

Potential Impacts

Key potential impacts that identified and assessed in the PER include:

- Vegetation clearance and loss of habitat
- Changing resource availability
- Habitat degradation, fragmentation and connectivity
- Fauna injury or mortality

- Invasive plants and animals
- Changed fire regimes
- Soil erosion, sedimentation and contamination
- Noise and vibration
- Construction specific impacts including dust and light spill
- Water and hydrology
- Decommissioning impacts
- Facilitated impacts
- Cumulative impacts of the Project in combination with other activities in the region.

Avoidance, Mitigation and Management

The following avoidance, mitigation and management approach has been undertaken:

Avoidance

- The Project's corridor has undergone significant revisions throughout a progressive and iterative design and development. This process has been informed by community and landholder consultation, corridor selection process, substation locations and an understanding of on-ground constraints. Each span and tower location was carefully considered, to ensure avoidance of impacts to MNES was achieved where possible.

Minimisation

- Where impacts on MNES cannot be avoided, all reasonable efforts have been made to minimise Project impacts. This has been achieved through staged vegetation clearing and subsequent construction, minimising disturbance activities and allowing opportunity for fauna to relocate to adjacent areas. Micro-siting of infrastructure will be undertaken to accommodate design and construction refinements, avoid sensitive areas, respond to landowner requests, address unexpected finds, manage safety concerns, and mitigate impacts that arise from ground conditions

Management Plans

- Throughout the life of the Project, potential impacts on MNES will be managed through a suite of project management plans, developed using best practice and governmental advice. All measures included in the management plans have been developed to be consistent with the S.M.A.R.T. principles, ensuring they are specific, measurable, achievable, relevant, and time-bound. These plans will be finalised before Project commencement and will guide the Project's environmental management throughout its phases.

MNES-specific Measures

- A comprehensive list of MNES-specific mitigation and management measures has been developed for all listed species known or likely to occur. Greater consideration has been given to MNES values that may be particularly sensitive to potential project impacts including *Cycas megacarpa*, *Samadera bidwillii*, greater glider (southern and central), koala, water mouse and collared delma. Key measures for MNES that have potential or are likely to result in a significant impact as a result of the Project are further refined in the MNES Management Plan.

Rehabilitation

Areas of temporary construction activities that are not required for operations will be subject to rehabilitation efforts. Rehabilitation will include leveling activities and seeding to achieve soil stabilisation. A Rehabilitation Management Plan for the Project will be prepared prior to construction in accordance with the Powerlink Environmental Management Plan (EMP) and will identify rehabilitation areas, best practice standards, acceptance criteria, weed and pest management and monitoring.

Significant Impact Assessments

Significant impact assessments (SIAs) have been undertaken for the controlling provisions.

Ecology

SIAs have been undertaken for three TECs and 39 listed species considered known or likely to occur within the Project Area. The SIAs have been undertaken in accordance with the Significant Impact Guidelines 1.1–MNES (Department of the Environment, 2013b), and have utilised relevant information from Approved Conservation Advice, Listing Advice, the SPRAT database, National Recovery Plans and peer reviewed journal articles to establish conclusions. The SIAs concluded that of the TECs and listed species assessed, the Project is likely to have a significant impact on:

- Semi-evergreen vine thicket TEC
- Eucalypt Floodplain Forest and Woodland TEC
- *Cycas megacarpa*
- *Samadera bidwillii*
- Greater glider (southern and central)
- Koala
- Collared delma
- Yellow-bellied Glider (south-eastern).

SIAs of potential impacts to Great Barrier Reef World Heritage Area (WHA) and National Heritage List (NHL), and the environment of the Great Barrier Reef Marine Park have been undertaken. The assessments concluded that the Project is unlikely to have a significant impact of the environment of the Great Barrier Reef Marine Park, Great Barrier Reef WHA or NHL as the identified water quality impacts can be effectively managed through the mitigation measures outlined in the PER, the Water Quality Management Plan and Powerlink's EMP.

Offsets

An Offset Management Plan (OMP) has been prepared which outlines a detailed description of the offset requirements for each MNES with significant residual impacts, together with the underlying habitat mapping, habitat quality assessments, species-specific habitat analyses and offset area assessment. The OMP forms the technical basis for the Project's proposed offset package and demonstrates how the offset properties satisfy the EPBC Act Environmental Offsets Policy. The OMP also outlines the suite of management actions, habitat quality improvement measures and risk-management considerations that will underpin offset delivery. The OMP will operationalise the strategy by providing detailed, enforceable management commitments, monitoring requirements, performance criteria and reporting procedures required under the EPBC approval.

Consultation

Consultation to date has included a broad range of stakeholders including engagement with Traditional Owner groups for the Project, being the Gaangalu Nation People (GNP) and the Bailai, Gurang, Gooreng Gooreng, Taribelang Bunda People (BGGGTBP) as well as elected representatives and landholders from as early as March 2023. Powerlink has an existing 'Whole-of-Claim' (WoC) Cultural Heritage Investigation and Management Agreement (CHIMA) with the GNP, executed in December 2015. At present, Powerlink is engaged with ongoing discussions with the BGGGTBP, to reach a similar Cultural Heritage Management Agreement (CHMA) over the portion of the Project Area within their traditional country. Powerlink will continue to hold regular on-site and off-site meetings with both Traditional Owner groups in accordance with the terms of the current CHIMA with the GNP, as well as the future CHMA with the BGGGTBP.

Matters raised during consultation with elected representatives and landholders continues to be addressed, including through a Community Engagement Strategy which outlines its commitments to ensure Powerlink continues to undertake targeted, respectful and transparent engagement across all stages of the Project's lifecycle.

Other Considerations

Social and economic assessments have been undertaken to inform the assessment of impacts and opportunities, and has presented management, mitigation or enhancement measures associated with each impact. To address the social and economic impacts of the Project, the implementation of several management measures is recommended to enhance community benefit, including a community investment program that comprises a number of grants to support initiatives and activities across regional Queensland.

Conclusion

The PER has undertaken a comprehensive assessment of the potential impacts to MNES associated with the Project and demonstrated that the impacts can be reduced though the implementation of a range of avoidance, minimisation, mitigation and management measures.

Having regard to the assessment undertaken, and the benefits associated with the Project, the PER concludes that the Project aligns with the Ecological Sustainable Development principles and the objectives of the EPBC Act and should be approved subject to reasonable and relevant conditions.

Abbreviations

Abbreviations	Description
ABN	Australian Business Number
ACH Act	*Aboriginal Cultural Heritage Act 2003* (Qld)
AEP	annual exceedance probability
AGL	above ground level
AHD	Australian Height Datum
ALA	Atlas of Living Australia
APLNG	Australia Pacific Liquified Natural Gas
ATSICH	Aboriginal and Torres Straits Islander Cultural Heritage Database and Register
BGGGTBP	Bailai, Gurang, Gooreng Gooreng, Taribelang Bunda People
BMP	Bushfire Management Plan
BSC	Banana Shire Council
CASA	Civil Aviation Safety Authority
CBA	Cost Benefit Analysis
CEO	Chief Executive Officer
CEMP	Construction Environment Management Plan
CHIMA	Cultural Heritage Investigation and Management Agreement
CHM	Canopy Height Model
CHMA	Cultural Heritage Management Agreement
CHMS	Cultural Heritage Management Strategy
CHMP	Cultural Heritage Management Plan
CMP	Construction Management Plan
CTMP	*Cycas megacarpa* Translocation Management Plan
Cth	Commonwealth
DA	Development application
Db	decibel
DBH	Diameter at Breast Height
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEM	Digital Elevation Model
DEMP	Decommissioning Environmental Management Plan
DES	Department of Environment and Science (former)
DESI	Department of Environment and Science and Innovation (former)
DETSI	Department of the Environment, Tourism, Science and Innovation
DoR	Department of Resources (former)
DMP	Decommissioning Management Plan
DSM	Digital Surface Model

Abbreviations	Description
DTM	Digital Terrain Model
DWATSIPM	The Department of Treaty, Aboriginal and Torres Strait Islander Partnerships, Communities and the Arts
EMR	Electromagnetic radiation
EMPO	Environmental Management Plan Outline
EIA	Economic Impact Assessment
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
EPBC Regulations	Environment Protection and Biodiversity Conservation Regulations 2000
EPC	Engineering, Procurement and Construction
ESCP	Erosion and Sediment Control Plan
ESD	Ecologically Sustainable Development
EWA	Early Works Agreement
g	grams
GAC	Gladstone Airport Corporation
GBRMP Act	*Great Barrier Reef Marine Park Act 1975* (Cth)
GHG	Greenhouse gas
GLNG	Gladstone Liquified Natural Gas
GNP	Gaangulu Nation People
GRC	Gladstone Regional Council
GW	Gigawatt
GWh/yr	Gigawatt-Hour per year
ha	Hectare
HQAs	Habitat Quality Assessments
HVR	High-value regrowth
IAIA	International Association for Impact Assessment
IAP2	International Association of Public Participation
IBRA	Interim Biogeographic Regionalisation for Australia
ICHA	Initial Cultural Heritage Assessment
ILUA	Indigenous Land Use Agreement
IO	Input-Output
IUCN	International Union for Conservation of Nature
kg	Kilogram
km	Kilometre
Km/hr	Kilometres per hour
kV	Kilovolt
kWh	Kilowatt-hour
LiDAR	Light Detection and Ranging

Abbreviations	Description
LGA	Local government area
LVIA	Landscape and Visual Impact Assessment
NEM	National Electricity Market
m	Metre
MHQAs	Modified Habitat Quality Assessments
mm	Millimetres
m/m	Metres per metre
m/s	Metres per second
MID	Ministerial Infrastructure Designation under the *Planning Act 2016*
MNES	Matters of National Environmental Significance
MW	Megawatt
NC Act	*Nature Conservation Act 1992* (Qld)
NREL	National Renewable Energy Laboratory
OAG	Offsets Assessment Guide
OEMP	Operations Environmental Management Plan
OHTL	Overhead transmission line
OMP	Offset Management Plan
O&M	Operations and Maintenance
OSOM	Oversize Overmass
PCCC	Port Curtis Coral Coast Trust
PDMP	Preliminary Decommissioning Management Plan
PER	Public Environment Report
Planning Act	*Planning Act 2016* (Qld)
PMST	Protected Matters Search Tool
PTI	Priority Transmission Investment
QGP	Queensland Gas Pipeline
Qld	Queensland
QNTIME	Queensland Native Title Information Management Environment
RE	Regional Ecosystem
Reef 2050 Plan	Reef 2050 Long-Term Sustainability Plan
Reef 2050 WQIP	Reef 2050 Water Quality Improvement Plan
RIA	Regional Impact Analysis
RMP	Rehabilitation Management Plan
RPAS	Remotely piloted aircraft system
RPD	Relevant Purpose Determination
SEVT	Semi-Evergreen Vine Thicket
SIA	Significant Impact Assessment

Abbreviations	Description
SMP	Species Management Plan
SPRAT	Species Profile and Threats
TEC	Threatened Ecological Community
TPZ	Tree Protection Zone
TUFLOW	Two-dimensional Unsteady FLOW
VM Act	*Vegetation Management Act 1999* (Qld)
WGP	Wallumbilla Gladstone Pipeline
WoNS	Weed of National Significance
°	Degrees

Glossary of Terms

Term	Description
Approvals	Any approval or agreement, including any amendments, for the Project pursuant to legislation including the *Environment Protection and Biodiversity Conservation Act 1999* (Cth), the *Aboriginal Cultural Heritage Act 2003* (Qld) or the *Planning Act 2016* (Qld).
The Department	The Department of Climate Change, Energy, the Environment and Water.
Disturbance Footprint	The Disturbance Footprint represents the maximum extent of direct impacts associated with the development within the Field Survey Extent (subject to micro-siting).
Draft PER	Refers to the Draft PER that was exhibited for public comment from Thursday 12 February 2026 to Wednesday 11 March 2026.
Ecologica	Ecologica Consulting (ABN: 51 730 022 102) is an Australian company specialising in ecological services that has prepared the *Cycas megacarpa* Translocation Management Plan in support of the PER.
Field Survey Extent	Represents the extent of field surveys completed for the Project and is the defined area within which any amendments to the Disturbance Footprint will be undertaken.
Gladstone Project	The Gladstone Project by Powerlink aims to enhance the electricity transmission network in preparation for the Gladstone Power Station's retirement and a shift to renewable energy. The Gladstone Project currently includes two stages: • **Stage 1 (the Project):** Construction of the Calvale to Calliope River Transmission Line Reinforcement Project, starting mid-2026 and completing late 2028, with substation works and expansions. • **Stage 2:** Construction of the Bouldercombe to Larcom Creek Transmission Line Reinforcement Project. This project is in the early stages of planning and approvals, with construction expected to begin in 2027. Subject to a separate approvals process.
PER Guidelines	Guidelines for the Content of a Draft Public Environmental Report: Calvale to Calliope River Transmission Line Reinforcement Project (EPBC 2024/10044).
The Project (the Proposed Action / the Action)	Calvale to Calliope River Transmission Line Reinforcement Project.
Project Area (the Action Area)	The Project Area is 800 m on each side of the transmission line in Sections A–D, 100 m around Section E, and 100 m around an additional laydown area proposed approximately 1 km north of Section B . The **Disturbance Footprint** is located within the Project Area.
The Proponent	Queensland Electricity Transmission Corporation Limited trading as Powerlink Queensland (ABN: 82 078 849 233).
The Referral	The referral lodged for the Project to the Department under the EPBC Act (EPBC 2024/10044).

<table>
<tr><th>Term</th><th>Description</th></tr>
<tr><td>Section A, B, C, D & E</td><td>The Project was split into five sections to aid in the design and planning phase of the Project. The location of each section is as follows:
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</table></td></tr>
<tr><td>Umwelt</td><td>Umwelt (Australia) Pty Ltd (ABN: 18 059 519 041) is an Australian environmental and social professional services consultancy that has prepared and lodged the Project PER on behalf of the Proponent.</td></tr>
<tr><td>Vision Environment</td><td>Vision Environment ANZ Pty Ltd (ABN: ABN 62 630 202 201) is a company of environmental monitoring specialists that has prepared the Water Quality Monitoring Plan in support of the PER.</td></tr>
<tr><td>WRM</td><td>WRM Water & Environment Pty Ltd (ABN: 96 107 404 544) is an Australian consultancy specialising in water resources that has prepared the Surface Water Assessment and Water Quality Management Plan in support of the PER.</td></tr>
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Appendices

Appendix A PER Guidelines and Checklist

Appendix B Persons Involved and Consulted

Appendix C Description of Commonwealth and State Legislation

Appendix D Surface Water Impact Assessment

Appendix E Likelihood of Occurrence Assessment

Appendix F Offset Management Plan

Appendix G Water Quality Management Plan

Appendix H Protected Matters Search Tool Results

Appendix I Fauna and Flora Species List

Appendix J Draft MNES Management Plan

Appendix K Environmental Management Plan

Appendix L Baseline Water Quality Monitoring Plan

Appendix M Cycas Megacarpa Translocation Management Plan

Appendix N Threatened Species Occurrence Records

1.0 Introduction

Umwelt has been engaged by the Queensland Electricity Transmission Corporation Limited trading as Powerlink Queensland (the Proponent) to prepare the Public Environment Report (PER) for the Calvale to Caliope River Transmission Line Reinforcement Project (the Project [1]).

The PER has been prepared for lodgement to and assessment by the Department of Climate Change, Energy, the Environment and Water (DCCEEW) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This PER has been prepared in accordance with the PER Guidelines issued for the Project in March 2025 (DCCEW Ref: EPBC 2024/10044).

1.1 Background

A referral for the Project was made under the EPBC Act on 6 January 2025. Following a period of public consultation between 6 January 2025 and 20 January 2025, on 4 February 2025, a delegate of the Commonwealth Minister for Environment and Water determined that under the EPBC Act, the Project was a controlled action requiring assessment by PER for the following controlling provisions that are matters of national environmental significance (MNES):

- listed threatened species and communities (section 18 and section 18A)
- the world heritage values of a declared World Heritage property (section 12 and section 15A)
- the national heritage values of a National Heritage place (section 15B and section 15C)
- the environment in the Great Barrier Reef Marine Park (section 24B and section 24C).

On 24 March 2025, DCCEEW issued Guidelines for the content of a Draft PER for the Project (PER Guidelines). A copy of the PER guidelines and a checklist demonstrating compliance with the PER Guidelines and specifying where in the PER each section of the PER Guidelines are included in **Appendix A**. **Appendix B** provides a list of people involved and consulted as part of the preparation of the PER.

1.2 Purpose of this Report

The purpose of this PER is to assess the potential impacts of this Project on MNES in accordance with the PER Guidelines under the EPBC Act.

The PER was prepared following the release of the PER Guidelines. It contains a list of all persons and agencies consulted during the preparation of the PER and preceding steps, contact details for the Proponent and the names of the persons involved in preparing the PER and work done by each of these persons.

[1] Throughout this report and supporting documentation, the 'Action' is referred to as the 'Project' and the 'Action Area' is referred to as the 'Project Area', unless specified otherwise.

In accordance with the EPBC Act, a Draft PER was submitted to DCCEEW on 6 February 2026 for review to confirm compliance with the PER guidelines. Following confirmation of compliance, the Draft PER was published for public comment from 12 February 2026 to 11 March 2026.

At the conclusion of the public comment period, the Draft PER was updated to produce this Final PER. This PER details the comments received and how they have been addressed. This PER will be republished for information purposes and will be assessed by DCCEEW.

1.3 Structure of this Report

The structure of the PER is shown in **Table 1.1**.

Table 1.1 PER Structure

Component	Relevant Chapter
Introduction	**Chapter 1.0**
Description of the Project	**Chapter 2.0**
Environmental Context	**Chapter 3.0**
Assessment Methodology	**Chapter 4.0**
Description of MNES Values	**Chapter 5.0**
Project Impacts	**Chapter 6.0**
Avoidance, Mitigation and Management	**Chapter 7.0**
Significant Impact Assessment – Ecology	**Chapter 8.0**
Significant Impact Assessment – Great Barrier Reef	**Chapter 9.0**
Cumulative Impact Assessment	**Chapter 10.0**
Consultation	**Chapter 11.0**
Offsets	**Chapter 12.0**
Social and Economic Matters	**Chapter 13.0**
Conclusion	**Chapter 14.0**
References	**Chapter 15.0**
PER Guidelines and Checklist	**Appendix A**
Persons Involved and Consulted	**Appendix B**
Description of Commonwealth and State Legislation	**Appendix C**
Surface Water Impact Assessment	**Appendix D**
Likelihood of Occurrence Assessment	**Appendix E**
Offset Management Plan	**Appendix F**
Water Quality Management Plan	**Appendix G**
Protected Matters Search Tool Results	**Appendix H**
Fauna and Flora Species List	**Appendix I**
MNES Management Plan	**Appendix J**
Environmental Management Plan	**Appendix K**
Baseline Water Quality Monitoring Plan	**Appendix L**
***Cycas megacarpa* Translocation Management Plan**	**Appendix M**
Threatened Species Occurrence Records	**Appendix N**

1.4 Title of the Project

The title of the Project, reference number EPBC 2024/10044, is the **Calvale to Calliope River Transmission Line Reinforcement Project** (herein referred to as the **Project**).

1.5 The Proponent

The Proponent for the Project is the Queensland Electricity Transmission Corporation Limited trading as Powerlink Queensland under Australian Business Number (ABN) 82 078 849 233.

Powerlink is a Queensland Government Owned Corporation (GOC) that owns, operates and maintains the Queensland high voltage transmission network. It was established under the *Government Owned Corporations Act 1993* (Qld) and is a Transmission Entity under the *Electricity Act 1994* (Qld). The *Electricity Act 1994* (Qld) sets out the requirements which all electricity industry participants must follow to ensure a safe, efficient and reliable supply of electricity. It also requires the supply of electricity to be undertaken in an environmentally sound manner.

Powerlink's assets comprise the Queensland transmission network that extends 1,700 kilometres (km) from the north of Cairns to the New South Wales border and approximately 15,500 circuit kilometres of transmission lines and 152 substations.

Powerlink's purpose is to connect Queenslanders to a world-class energy future and to provide electricity to more than five million Queenslanders and 241,000 businesses. Through its unique position in the power system, Powerlink is guiding the market to help influence the energy system of the future that effectively balances customer needs, while moving to a low carbon future comprising a diverse array of generation technologies, batteries and storage solutions, new grid technologies and demand management.

As well as connecting large generators to end-use customers through the distribution networks owned by Energex and Ergon Energy (part of the Energy Queensland Group) and Essential Energy (in northern New South Wales), Powerlink also directly provide electricity directly to large industrial customers such as rail companies, mines and mineral processing facilities.

It is anticipated that the construction of the Project will be managed and delivered by a contractor/s engaged by Powerlink. The Proponent details are provided in **Table 1.2**.

Table 1.2 Proponent Details

Proponent Name	Queensland Electricity Transmission Corporation Limited trading as Powerlink Queensland (Powerlink)
Proponent Contact	Ariane Ponting, Manager Environmental Approvals, Powerlink
Proponent Phone Number	07 3860 2111
Proponent Email	pqenquiries@powerlink.com.au
Proponent Postal Address	33 Harold Street, Virginia, Queensland, 4014

1.5.1 Environmental Record of the Proponent

Powerlink has a formidable record of responsible environmental management. Powerlink is committed to the protection of the environment as it seeks to expand and upgrade its network to ensure reliable electricity supply and to progress renewable energy development.

Powerlink has not and is not currently subject to any Commonwealth, State or local proceedings with respect to environmental impacts.

Powerlink's Health, Safety and Environment Policy emphasises the prevention or minimisation of harm to the environment as a core commitment. The policy outlines several key areas of focus to achieve its environmental objectives (Powerlink, 2024).

Sustainable Decisions

- Powerlink decisions are informed by data and insights. Powerlink considers the impacts and opportunities of their decisions on the environment and the reliability of their network. Powerlink builds collaborative partnerships to create a positive impact in the community and for their people.

Agile Delivery

- Powerlink are constantly adapting their systems to respond to the changing requirements and risks of our work. Powerlink's systems are relevant for their people to use. Powerlink focuses on improving the effectiveness of critical processes and controls in their work and builds resilience into our operations aligned with our commitment to our people, customers, contractors, communities and the environment.

Empowered People and Learning

- Powerlink trusts their people who are empowered to use their expertise and create improvements in their work. Powerlink takes every opportunity to learn, share and continuously improve how they work.

Healthy and Engaged Workforce

- Powerlink leads with genuine care for their people and wants everyone to go home safe and well every day. Powerlink creates a constructive and engaging workplace so that their people can thrive. Powerlink enable their people to make positive health and wellness choices at work and at home.

Powerlink systematically monitors its compliance obligations and business requirements related to the environment. It has systems in place to develop, resource, monitor, and continuously improve its environmental commitments and objectives. This includes planning, design, construction, operation, and maintenance of an electrically safe network.

1.6 Objectives of the Project

Investment in the transmission network is critical in connecting new large-scale renewable energy projects in Queensland. Decarbonising Queensland's energy system means increasing the amount of renewable energy used to meet the energy needs of households and businesses, ultimately reducing our reliance on coal-fired power generation.

The primary purpose of the Project is the reinforcement of the Gladstone transmission network to support decarbonisation in the region. The Project also seeks to increase network capacity and reliability to service the growing renewable energy industry in this area. The Project will allow for up to 1,800 megawatts (MW) of renewable hosting capacity in the region.

As further discussed in **Section 1.10**, the Project forms a part of the Gladstone Project. The identified need for the Gladstone Project is to ensure the ongoing reliability and security of supply in the Gladstone area to:

- meet the forecast electrical load in anticipation of the closure of the Gladstone Power Station;
- support the decarbonisation of major industries; and
- compensate for loss of essential system services, such as inertia, system strength and voltage control capability, following the closure of Gladstone Power Station.

As of June 2024, the Gladstone Project has been confirmed as eligible for Priority Transmission Investment (PTI) under the current *Energy (Infrastructure Facilitation) Act 2024* (formerly the *Energy (Renewable Transformation and Jobs) Act 2024*). The Gladstone Project being identified as a critical investment for the Central Queensland region, further highlights its importance and contribution to the achievement of the Queensland Government's Energy Roadmap 2025 (Energy Roadmap). The Energy Roadmap recognises that the Gladstone Project will ensure the region's energy needs are met once the Gladstone Power Station potentially closes in 2029, therefore safeguarding Queensland's energy security and reliability.

At a Commonwealth level, the Gladstone Project is listed on the National Renewable Energy Priority List (Priority List). The Priority List includes priority transmission, generation and storage projects that support meeting the Australian Government's commitment to achieving 82% on-grid renewable electricity by 2030. Priority List projects will receive additional support and facilitation through Commonwealth regulatory and environmental processes. They will still have the same scrutiny applied as any other project and continue to be required to meet all statutory requirements.

1.7 Location of the Project

The Project extends from the Calvale Substation, 10 km east of Biloela to the Calliope River Substation, 2 km north of Clinton, near Gladstone, Queensland. The Project is located within two local government areas (LGA) being Banana Shire and Gladstone Region. A detailed site map showing the Project Area and key features in the locality is provided in **Figure 1.1**. **Figure 1.2** illustrates how the alignment has been divided into zones to present different areas of the alignment in subsequent figures. The Project Area is further defined in **Section 2.2.1**.

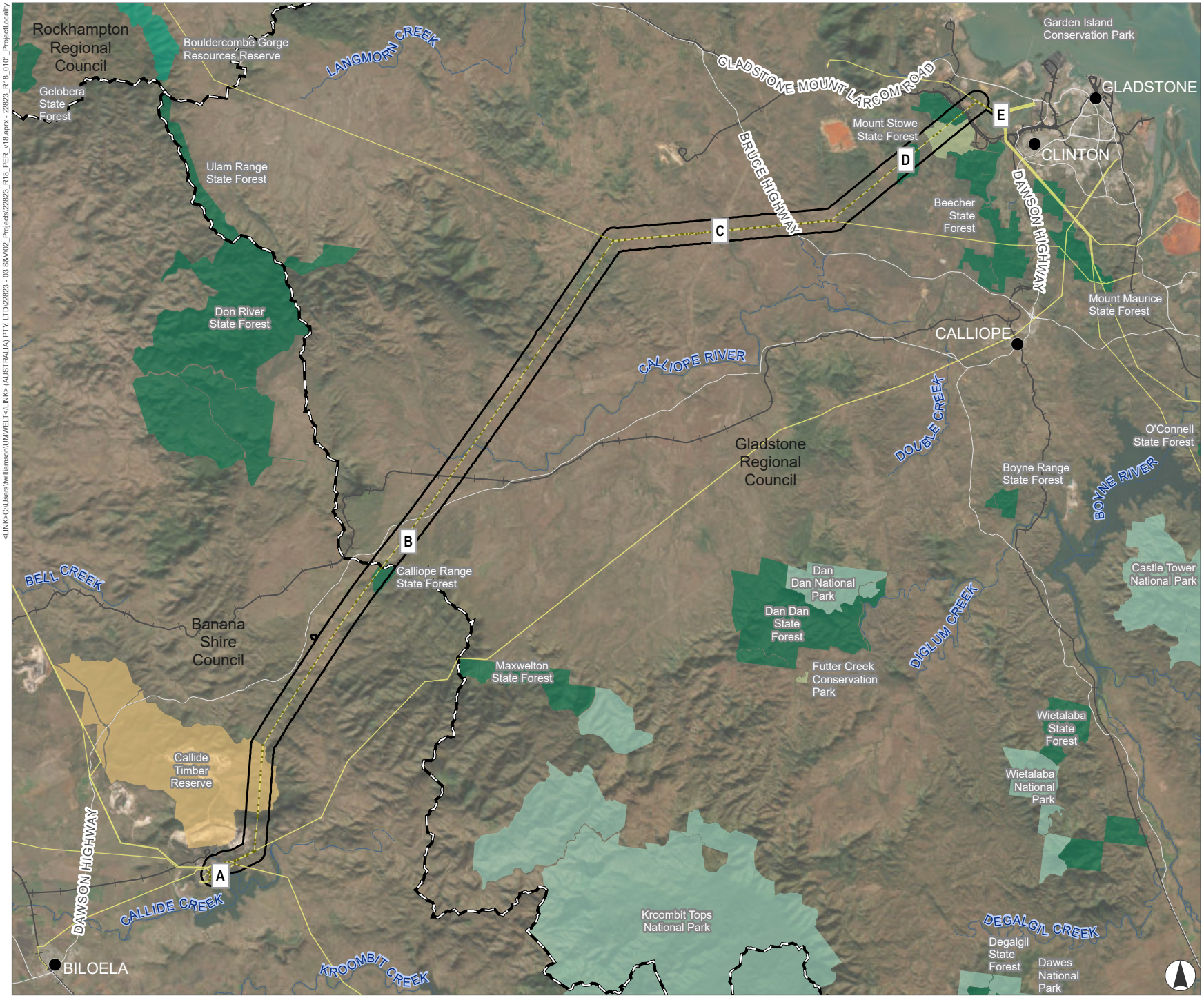


FIGURE 1.1

Project Locality

Legend

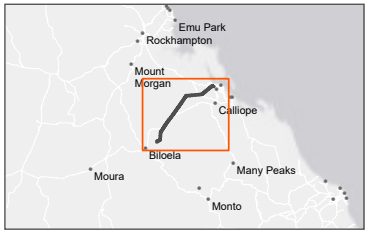
- Town
- Roads
- Railway
- Watercourses
- Local Government Area (LGA)
- Project Area

Protected Areas

- Conservation Park
- National Park
- Resources Reserve
- State Forest
- Timber Reserve

Existing Transmission Line and Association Infrastructure

- Existing Tower
- Existing Feeder



0 5 10

Kilometres

Scale 1:375,000 at A4
GDA 1994 MGA Zone 56

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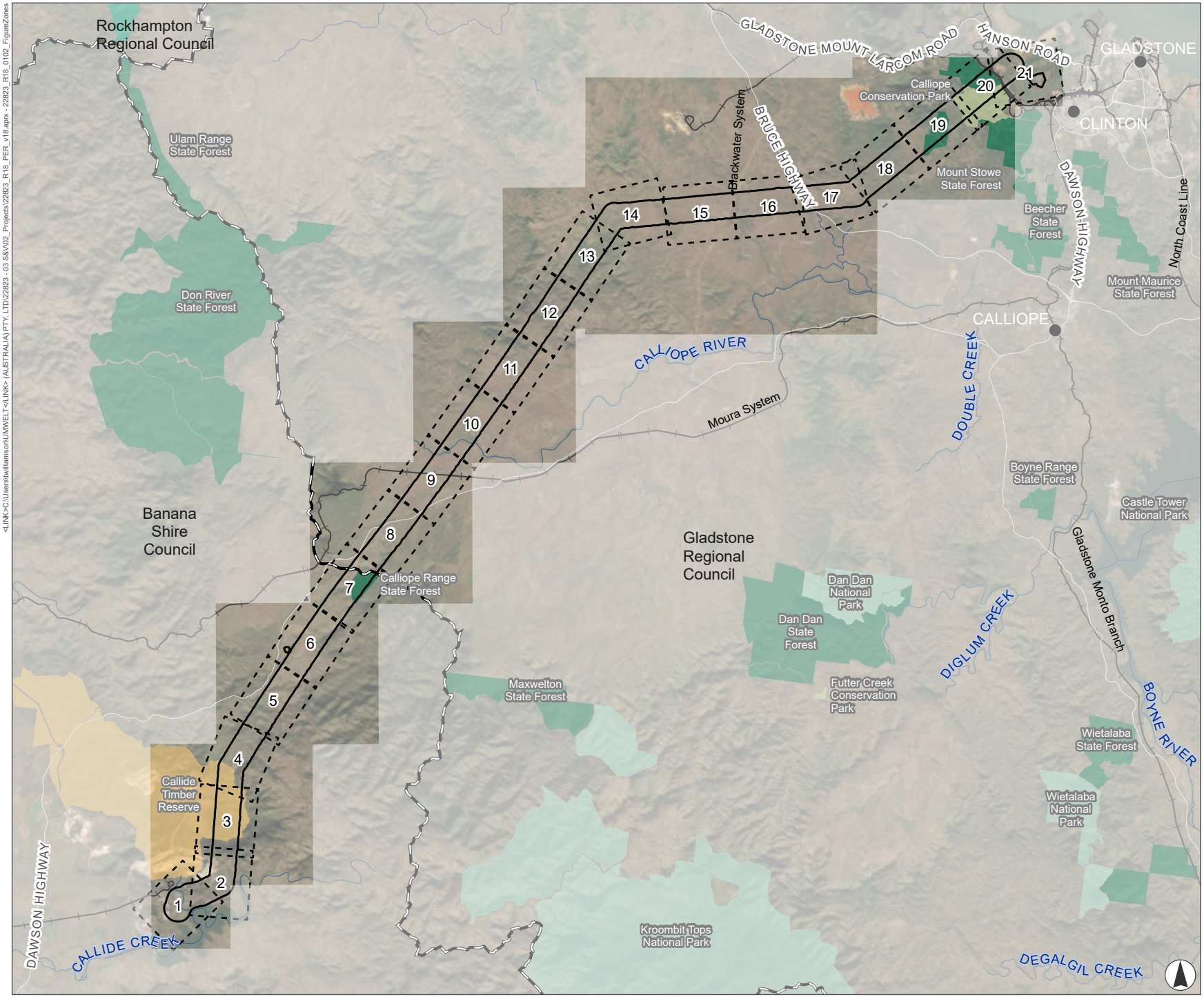


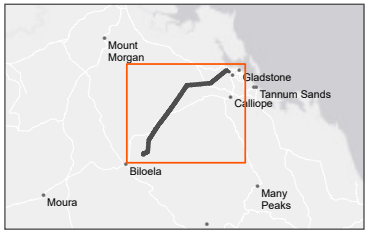
FIGURE 1.2
Figure Zones

Legend

- Town
- Roads
- Railway
- Watercourses
- Local Government Area (LGA)
- Project Area

Protected Areas

- Conservation Park
- National Park
- Resources Reserve
- State Forest
- Timber Reserve



0 5 10

Kilometres

Scale 1:343,539 at A4
GDA 1994 MGA Zone 56

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1.8 Project Timeframes

Powerlink seeks to commence construction of the Project by July 2026 with a view to conclude construction and commence operations by the end of 2028 to ensure continued supply to the Gladstone region. It is anticipated that the Project will be operational for up to 50 years.

1.9 Background to the Development of the Project

To address the objectives of the Project (as discussed in **Section 1.6**), in late 2022, Powerlink commenced investigations into potential corridor options to reinforce the existing Powerlink network between the existing Calvale and Calliope River substations. Through investigations, the opportunity to use space within existing transmission easements was identified.

1.9.1 Approach to Corridor Selection

An opportunities and constraints assessment was undertaken to confirm that with limited additional easement widening, a complete corridor could be achieved from the Calvale Substation to the Calliope River Substation. This would minimise impact to the broader community across social, environmental and economic objectives.

As shown in **Figure 1.1**, this proposed corridor has been split into five sections (Sections A, B, C, D and E) for reporting purposes.

As a key component of the Transmission Easement Engagement Process, Powerlink commenced discussions with landholders and key stakeholders on the Project in February 2023. As further detailed in **Chapter 12**, this engagement included local councils, Traditional Owner groups and peak bodies, to gain better insights into important community matters and what is happening in the area.

Investigations also involved a strategic desktop assessment of legislative frameworks, spatial analysis of land characteristics, and identification of environment, heritage and social constraints.

A Draft and Final Corridor Selection Reports (CSR) were prepared by Powerlink to comparatively assess the suitability of existing easements and corridor options to determine the recommended corridor within which to locate the proposed transmission line. The Draft and Final CSRs are available on Powerlink's website for viewing (https://engage.powerlink.com.au/calvale-calliope-river-transmission-line-reinforcement-project).

Three objectives were used to inform the corridor selection:

- **Social**: To consider the use of land and the community livelihood within and adjacent to corridor options.
- **Environment:** To consider a balanced approach to corridor selection with the least practicable impact on environment and heritage values.
- **Economic:** To consider construction and operational factors such as cost a preliminary level, given the scale of the Project.

From Calvale, Powerlink decided that the new transmission line will be co-located within vacant areas of existing Powerlink easements in Sections A, B, D, and E as detailed in **Section 1.9.2**.

There is no available vacant space in easements in Section C and a widening of 40 metres (m) to the existing easement is required to accommodate the proposed transmission infrastructure–this is further explored in **Section 1.9.3**.

1.9.2 Sections A, B, D and E

Based on the opportunities and constraints assessment for Sections A, B, D and E, it was determined that the proposed new transmission line will be able to be primarily delivered within the existing transmission easements which had available space, subject to further detailed studies, stakeholder engagement and approvals.

Minor additional easement areas are required for Sections A and E. For Section A, an additional easement area is required due to design complexity of transmission line entry into the Calvale Substation. Section E requires minor easement widening to accommodate design requirements.

Co-locating the Project with existing transmission infrastructure within existing easements where possible was deemed to have less impacts compared to creating a new easement that is not co-located with existing transmission infrastructure. It has the benefits of minimising the extent of vegetation clearing required, reducing further impacts to landholders farming operations and visual amenity.

1.9.3 Section C

Based on desktop research and preliminary field studies, corridor selection criteria and feedback from early engagement with landholders and stakeholders, it was determined that co-location with the existing transmission corridor in Section C was the most appropriate option for the new transmission line. The assessment identified two corridor options:

1. Northern Corridor Option: Widening of 40 m to the north of the existing easement
2. Southern Corridor Option: Widening of 40 m to the south of the existing easement.

The corridor options were considered to have broadly similar social, environmental and economic impacts overall however further consideration was made regarding technical constructability issues.

The northern option reduces the level of interaction with existing transmission lines (e.g. crossings) and complex network outages on existing Powerlink transmission infrastructure. It also provides an opportunity to co-locate the proposed transmission line with a section of the existing Calliope to Bouldercombe transmission line.

The southern option has a higher potential for network disruptions during construction and maintenance, that is, there would be temporary network outage restrictions required to construct a transmission line on the south of the existing Calliope River to Bouldercombe and Calvale to Wurdong transmission lines which could significantly impact network security and reliability for the Gladstone region.

Based on desktop assessments, preliminary stakeholder consultation and technical considerations, it was determined that the most feasible and low-impact solution in Section C is to construct a new transmission line to the north of the existing transmission infrastructure.

Section 2.6 provides further detail regarding why there are no feasible alternatives for the Project.

1.10 Related Projects

The Project is the first of a collection of projects which have been identified as PTI and collectively referred to as the 'Gladstone Project'. The primary purpose of the Gladstone Project is the reinforcement of the Gladstone network to support decarbonisation in the region and provides some incremental future generation/renewable connection capacity.

The Gladstone Project is being progressed under the PTI framework established under the *Energy (Infrastructure Facilitation) Act 2024*. The PTI framework allows the Queensland Government to identify and assess PTI projects and direct Powerlink to construct these projects and recover its costs from prescribed charges following completion of assessment activities.

Following further planning and modelling of anticipated power system performance, Powerlink has outlined two stages of work needed to address the proposed identified need for the Gladstone Project.

Stage 1 comprises (the Project)

- Building a new 275 kV high-capacity double circuit line between Calvale and Calliope River substations (Sections A–E).

Expanding the Calliope River Substation to accommodate the expansion of the 275 kV and 132 kV switchyards, as well as up to two synchronous condensers. Also includes the expansion of the Calvale Substation to include a new substation bay to connect to the new transmission line. The anticipated completion date for Stage 1 is December 2028, subject to commencement of construction in July 2026. Construction timeframe is approximately 2.5 years.

Stage 2 comprises

- Building a new 275 kV high-capacity double circuit line between Bouldercombe and Larcom Creek substations, switched through a new Gladstone West Substation.

The anticipated completion date for Stage 2 is December 2029, subject to commencement of construction in June 2027. Construction timeframe is approximately 2.5 years.

As of June 2024, the Gladstone Project has been confirmed as an eligible PTI project in the Energy (Infrastructure Facilitation) Regulation 2024.

Stage 2 will be referred to DCCEEW at a later date.

1.11 Current Status of the Project

The current status of the Project is:

- A Ministerial Infrastructure Designation (MID) Proposal was lodged for the Project in October 2025 to the Queensland Government under the *Planning Act 2016* (Planning Act) (Qld). The MID Proposal is currently undergoing final assessment. Refer to **Section 1.13.1** for further information on the MID process.
- Applications for relevant permits under the *Nature Conservation Act 1992* (Qld) and the *Forestry Act 1959* (Qld) were lodged to the Queensland Government in February 2026. These applications are currently undergoing assessment.

- The Draft PER for Project was publicly exhibited between 12 February 2026 to 11 March 2026. The Project is currently undergoing final assessment by DCCEEW.

Activities to progress the Project are currently ongoing and include:

- Investigation activities relating to cultural heritage management, surveys (ecological, geotechnical, cadastral) and water quality testing.
- Site tours and investigations.

1.12 Consequences of Not Proceeding with the Project

As discussed in **Section 2.7.2.1**, not proceeding with the Project would result in major involuntary load shedding and undermine emissions reduction policies and the clean energy transition.

1.13 Legislation and Approvals

The Project is subject to a range of Commonwealth and State legislation and Commonwealth, State and local policy documents, planning instruments and assessment frameworks. The Project requires primary approvals under the EPBC Act and Planning Act, being a MID as further described in **Section 1.13.1**.

The primary approvals as well as the secondary approvals that may be required for the Project are summarised in **Table 1.3**. Relevant Commonwealth and State legislation are further described in **Appendix C**.

Table 1.3 Summary of the Approvals Required for the Project

Legislation or Instrument	Administering Authority	Approval Trigger	Approval(s)	Relevance to the Project
PRIMARY APPROVALS				
EPBC Act	DCCEEW	Potential impacts to MNES	EPBC Act Approval	The Project has been declared a Controlled Action for impacts to MNES (refer EPBC Number 2024/10044). Approval under the EPBC Act is currently being sought.
Planning Act	Department of State Development, Infrastructure and Planning (DSDIP)	Material change of use	MID	The Project will require a MID to enable construction and operation.
State Development and Public Works Organisation Act 1971	Office of the Coordinator-General (OCG)	Assessable works under the Gladstone State Development Area (GSDA) and Callide	Development approvals under the GSDA and CICSDA	The Project will be located within the GSDA and CICSDA.

Legislation or Instrument	Administering Authority	Approval Trigger	Approval(s)	Relevance to the Project
		Infrastructure Corridor State Development Area (CICSDA) Development Schemes	Development Schemes	
SECONDARY APPROVALS				
Fisheries Act 1994	DSDIP / Department of Primary Industries	Operational works for waterway barrier works	Development permit	The Project intersects watercourses identified as waterways for waterway barrier works. A Development Permit will be required where not complying with the Accepted development requirements for operational works that is raising or constructing waterway barrier works.
		Operational works for the removal, destruction or damage of marine plants	Development Permit	The Project may result in the removal or damage to marine plants adjacent to the Calliope River. A Development Permit will be required where not complying with the Accepted Development Requirements.
Nature Conservation Act 1992 **(NC Act)**	Department of Environment, Tourism, Science and Innovation (DETSI)	Clearing within a 'high-risk area' on the Protected Plants Flora Survey trigger map or within 100 m of any threatened or near threatened plants	Protected Plants Clearing Permit	Clearing of vegetation within high-risk areas for the purposes of the Project will require a Protected Plants Clearing Permit.
		Impact on a breeding place of	Species Management Program	Potential impacts to wildlife created by the construction and

Legislation or Instrument	Administering Authority	Approval Trigger	Approval(s)	Relevance to the Project
		a protected animal		operation of the Project, may necessitate a Species Management Program and/or a Damage Mitigation Permit.
		Taking wildlife associated with the construction or operation of the Project	Damage Mitigation Permit	
		Applying for an Authority under section 34 of the NC Act	NC Act Authority	The Project is located within a Protected Area (Calliope Conservation Park). An authority is currently being sought.
Water Act 2000 **(Water Act)**	DETSI and Department of Local Government, Water and Volunteers (DLGWV)	Excavating, placing fill or destroying native vegetation in any watercourse, lake or spring	Riverine Protection Permit	The Project may involve works being carried out in a watercourse that will impact upon native vegetation. A Riverine Protection Permit would be required for such works where the Riverine protection permit exemption is not complied with.
		Taking or interfering with water	Water Licence	The Project may involve works being carried out in a watercourse that will result in the taking or interfering. A Water Licence would be required for such works where the Accepted Development Requirements are not complied with.
Vegetation Management Act 1999	DSDIP / Department of Natural Resources, Mines, Manufacturing and Regional and Rural Development (DNRMMRRD)	Operational Works for Native vegetation clearing	Development Permit	The Project may involve the clearing of native vegetation outside the MID proposal area, which will require a Development Permit should it not comply

Legislation or Instrument	Administering Authority	Approval Trigger	Approval(s)	Relevance to the Project
				with the Accepted Development Vegetation Clearing Code (ADVCC).
Building Act 1975 **(Building Act)**	Private certifier or local government certifier	Construction of a building or structure and/or temporary and permanent compounds	Building permit	Building approvals will be required for all buildings and structures associated with the Project. The approving authority is a licensed private certifier or a local government building certifier.
Land Act 1994	Roads off alignment application OR road closure and opening	The public road being used as site access is partially constructed outside the land dedicated as a road	Access via gazetted road	Approvals for use of a road for site access may be required where outside the dedicated road.
Local Government Act 2009 **(LG Act)**	Gladstone Regional Council	• Local Law No. 3 (Community and Environmental Management) 2011. • Local Law No. 4 (Local Government Controlled Areas, Facilities and Roads) 2011. • Local Law No. 8 (Waste Management) 2018.	Local Law Permits	Permits may be required from local government to support the Project.
	Banana Shire Council	• Local Law No. 3 (Community and Environmental Management) 2011.		Permits may be required from local. government to support the Project.

Approvals granted by relevant Commonwealth, State and local authorities will establish the required monitoring and management requirements under the respective legislation.

1.13.1 Ministerial Infrastructure Designation

The Planning Act enables the Planning Minister to designate premises for the development of infrastructure prescribed within the Planning Regulation 2017 (Planning Regulation). Electricity operating works are considered infrastructure, which is prescribed development under the Planning Regulation. The Planning Minister is the only State minister with authority to designate land for infrastructure. The MID assessment process involves the submission of a detailed MID Proposal, a 20-day consultation period and a State interest review.

A MID Proposal includes requirements about works for the infrastructure (such as the height, shape, bulk, landscaping, or location of works), the use of premises including access and ancillary uses, or lessening the impact of the works or use (such as environmental management procedures). Under section 44 of the Planning Act, infrastructure that is designated is considered accepted development and will not require further approvals under the Planning Act, including approvals under local planning schemes (with the exception of building work under the Building Act). However, this exemption does not apply to approvals required under other legislation. The MID Proposal for the Project has undertaken a detailed assessment against the relevant State and local government plans and policies described in **Section 1.13.2**. Most of the alignment (Section A, B and E) is located within an existing MID.

1.13.2 State and Local Government Plans and Polices

State Planning Policy

The State Planning Policy (SPP) aims to ensure Queensland's interests are protected and represented in land use planning and development. The SPP identifies 17 State interests across five themes. The MID Proposal includes a detailed assessment against the relevant State interests being Agriculture, Development and Construction, Biodiversity, Coastal Environment, Emissions and Hazardous Activities, Natural Hazards, Risk and Resilience and Energy and Water Supply. The assessment of the SPP relevant benchmarks concluded that the MID Proposal aligns with both the guiding principles and the applicable state interests.

Regional Plans

The Project Area is subject to the Central Queensland Regional Plan (CQRP). The CQRP commenced in 2013, providing policy responses to resolve the region's most important issues affecting its economy and the liveability of its towns. The CQRP specifically provides direction to resolve competing State interests relating to the agricultural and resources sectors, and to enable the growth potential of the region's towns. As part of the Project's MID Proposal an assessment was undertaken against the relevant provisions of the CQRP and concluded that the Project aligns with and progresses the relevant priority outcomes of the CQRP.

State Development Area Development Schemes

The Project traverses the GSDA and CICSDA. Development approvals are required for the Project under the GSDA Development Scheme and CICSDA Development Scheme. These development approvals will be sought from the Coordinator-General.

Local Planning Schemes

The Project traverses both the Banana Shire and Gladstone Region LGAs. Under the Planning Act, section 44 (6)(b), development in relation to infrastructure under a MID is accepted development and is not assessable under a planning scheme. The MID Proposal has undertaken a detailed assessment of the Project against the relevant provisions of the Gladstone Region Planning Scheme and Banana Shire Planning Scheme.

2.0 Description of the Project

This chapter addresses section 2 of the PER Guidelines and provides a detailed description of the Project to outline all Project components, activities and timeframes. This includes a description of all pre-construction, construction, operational and ongoing maintenance, decommissioning and rehabilitation activities relevant to the action.

2.1 Project Description

As discussed in **Chapter 1.0**, Powerlink has identified future projects for the Gladstone transmission grid, collectively known as the 'Gladstone Project'. The Project is the foundational stage of the Gladstone Project. To ensure the future security of electricity supply to the Gladstone area, the existing transmission infrastructure corridor between the Calvale Substation and Calliope River Substation is to be strengthened with the establishment of a new transmission line. The Calvale Substation and Calliope River Substation will also be upgraded and expanded to accommodate the connection of the Project to the electricity network.

The Project extends from 10 km east of Biloela to 2 km north of Clinton, near Gladstone, Queensland and traverses both the Gladstone Regional and Banana Shire LGAs (**Figure 1.1**). The Project comprises of the following components:

- A new double circuit, 87 km 275 kV transmission line between the existing Calvale Substation and the Calliope River Substation within an existing transmission easement.
- Expansion of the Calliope River Substation, which may include components such as reactors, transformers, synchronous condensers, laydown areas, changes to access tracks, statis synchronous compensation and the expansion of the existing 132 kV and 275 kV switching yards.
- Expansion of the Calvale Substation to include a new substation bay to connect to the new transmission line.
- Grid connection of the new transmission line to the Calvale and Calliope River substations.

The stages of the Project referenced in this chapter are:

- **Construction** – Construction activities up to the commencement of transmission line commissioning. Construction activities are further described in **Section 2.3.1**.
- **Operation** – All aspects from the commencement of commissioning through to and including operation and maintenance of the transmission line. Operational activities are described in **Section 2.3.2**.
- **Decommissioning** – All activities associated with dismantling and removal of the infrastructure and environmental rehabilitation. Decommissioning activities are described in **Section 2.3.3**.

2.2 Project Boundaries

2.2.1 Project Area

The Project Area covers approximately 14,321 ha. The Project Area contains the Disturbance Footprint (further described in **Section 2.2.2**) for construction and operations and an additional area to allow for the assessment of potential permanent and temporary impacts.

The Project Area extends from the Calvale Substation site to the Calliope River Substation site (**Figure 2.1-1** to **Figure 2.1-21**) and is split into five sections as detailed in **Table 2.1**.

Table 2.1 Project Area Sections

Section	Start of Section Coordinates	End of Section Coordinates	Approximate Length	Existing Powerlink Infrastructure
Section A	-24.3418, 150.6270	-24.3268, 150.6560	3.5 km	132 kV and 275 kV lines Calvale Substation
Section B	-24.3268, 150.6560	-23.9344, 150.9174	51.5 km	One 275 kV line
Section C	-23.9344, 150.9174	-23.9230, 151.0733	16 km	Two 275 kV lines
Section D	-23.9230, 151.0733	-23.8484, 151.1754	13.5 km	One 275 kV line
Section E	-23.8484, 151.1754	-23.8580, 151.1943	2 km	Two 275 kV lines Calliope River Substation

The Project Area is 800 m on each side of the transmission line in Sections A-D, 100 m around Section E, and 100 m around an additional laydown area proposed approximately 1 km north of Section B.



FIGURE 2.1-1

Project Area, Field Survey Extent and Disturbance Footprint Boundaries

Legend

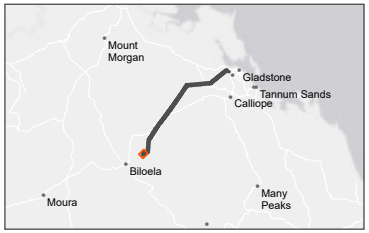
- Railway
- Watercourse
- Existing Access Tracks
- Field Survey Extent
- Project Area
- Disturbance Footprint

Existing Transmission Line and Association Infrastructure

- Existing Tower
- Existing Feeder

Protected Areas

- Timber Reserve



0 0.5 1

Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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FIGURE 2.1-2

Project Area, Field Survey Extent and Disturbance Footprint Boundaries

Legend

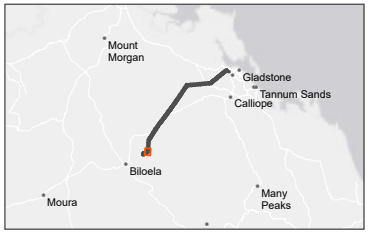
- Watercourse
- Existing Access Tracks
- Field Survey Extent
- Project Area
- Disturbance Footprint

Existing Transmission Line and Association Infrastructure

- Existing Tower
- Existing Feeder

Protected Areas

- Timber Reserve



0 0.5 1

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FIGURE 2.1-3

Project Area, Field Survey Extent and Disturbance Footprint Boundaries

Legend

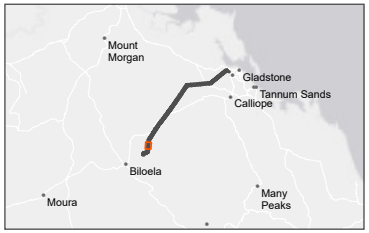
- Existing Access Tracks
- Field Survey Extent
- Project Area
- Disturbance Footprint

Existing Transmission Line and Association Infrastructure

- Existing Tower
- Existing Feeder

Protected Areas

- Timber Reserve



0 0.5 1

Kilometres

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FIGURE 2.1-4

Project Area, Field Survey Extent and Disturbance Footprint Boundaries

Legend

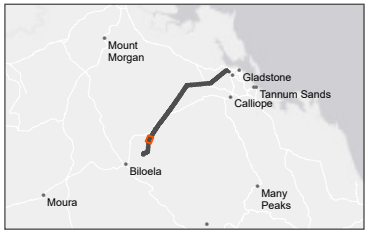
- Existing Access Tracks
- Field Survey Extent
- Project Area
- Disturbance Footprint

Existing Transmission Line and Association Infrastructure

- Existing Tower
- Existing Feeder

Protected Areas

- Timber Reserve



0 0.5 1

Kilometres

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FIGURE 2.1-5

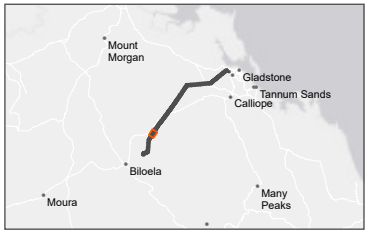
Project Area, Field Survey Extent and Disturbance Footprint Boundaries

Legend

- Roads
- Existing Access Tracks
- Field Survey Extent
- Project Area
- Disturbance Footprint

Existing Transmission Line and Association Infrastructure

- Existing Tower
- Existing Feeder



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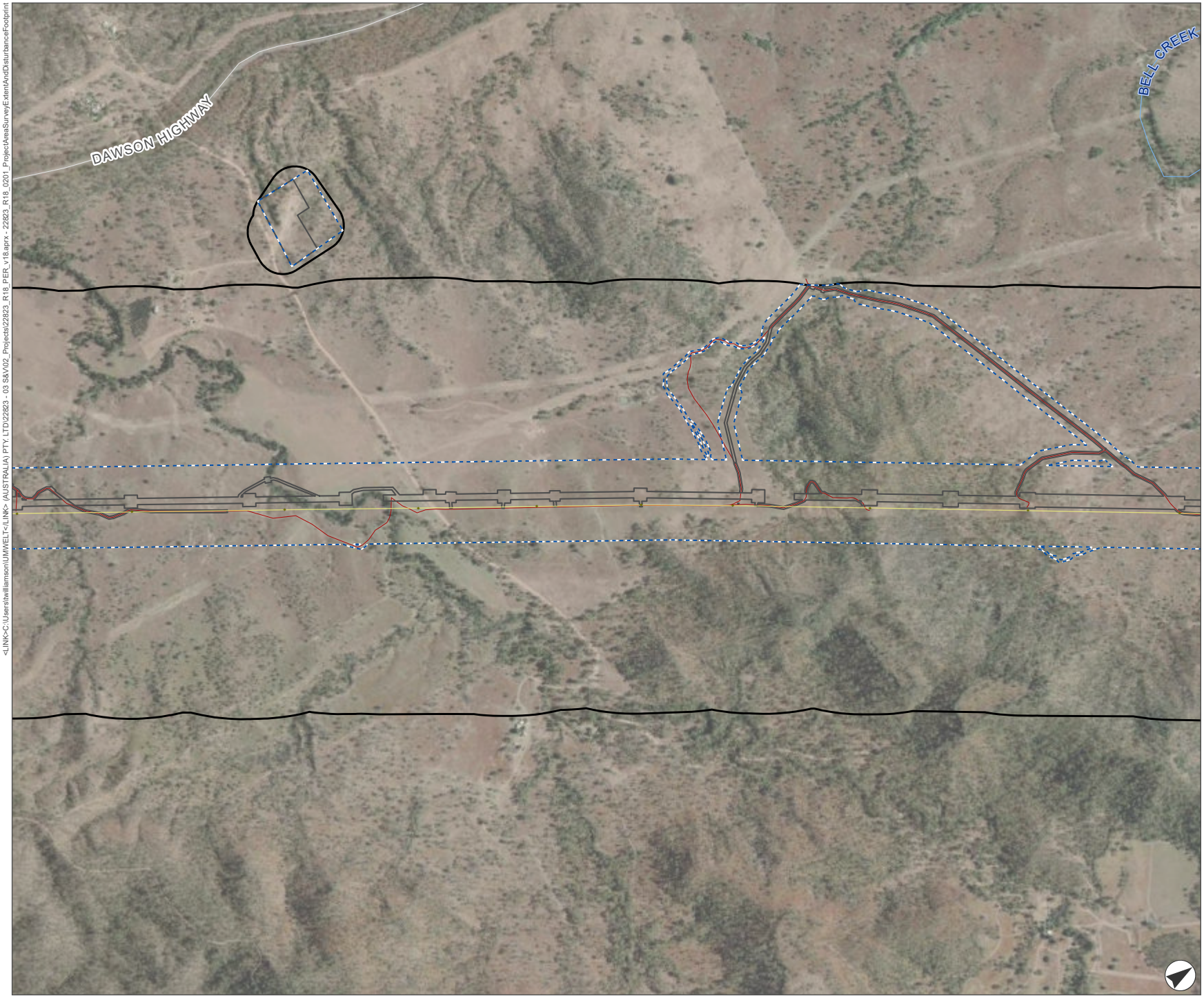


FIGURE 2.1-6

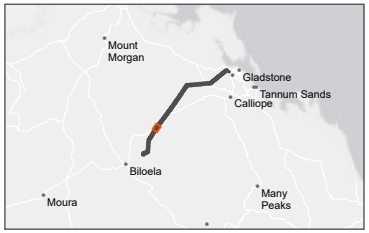
Project Area, Field Survey Extent and Disturbance Footprint Boundaries

Legend

- Roads
- Watercourse
- Existing Access Tracks
- Field Survey Extent
- Project Area
- Disturbance Footprint

Existing Transmission Line and Association Infrastructure

- Existing Tower
- Existing Feeder



0 0.5 1

Kilometres

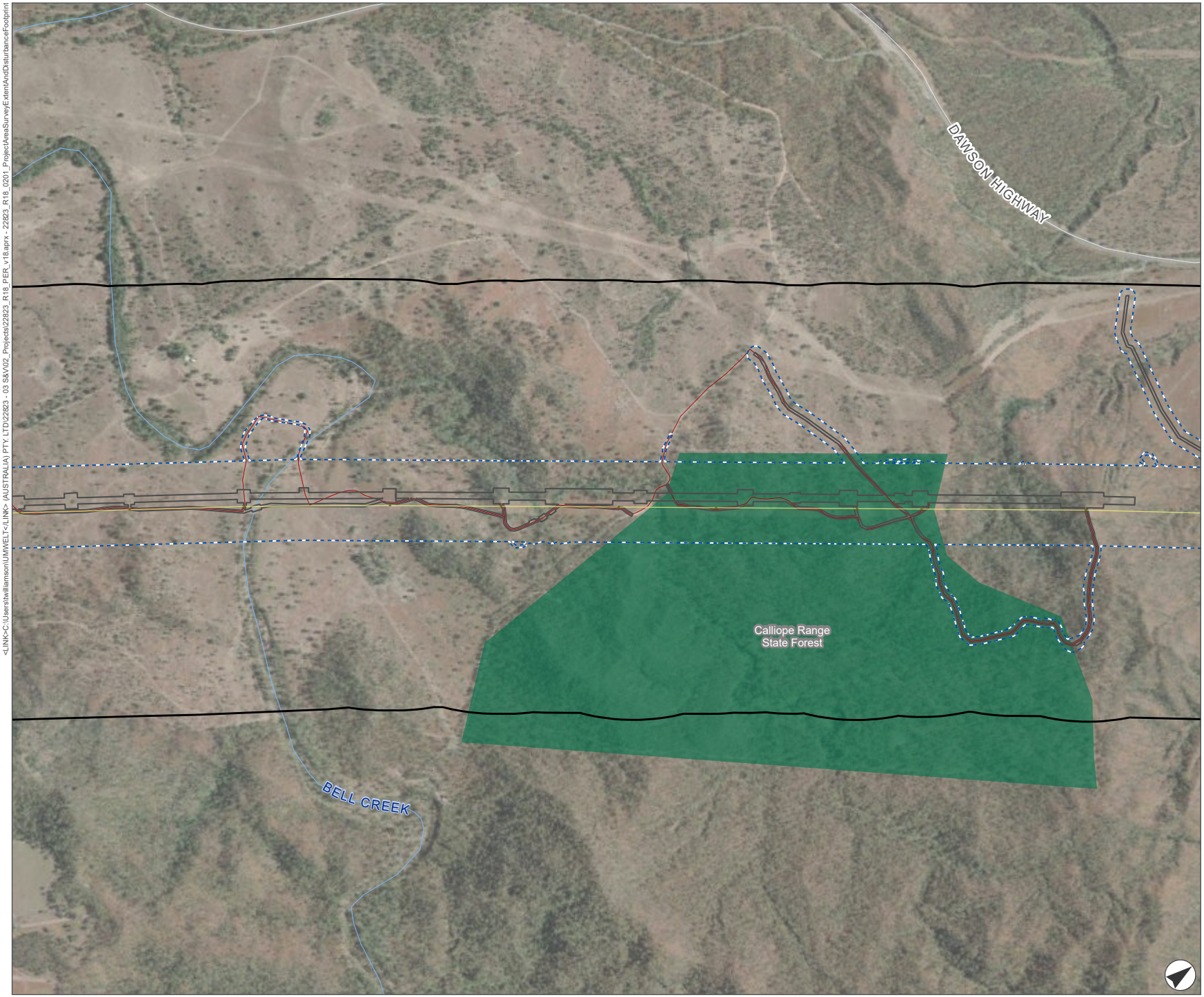
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FIGURE 2.1-7

Project Area, Field Survey Extent and Disturbance Footprint Boundaries

Legend

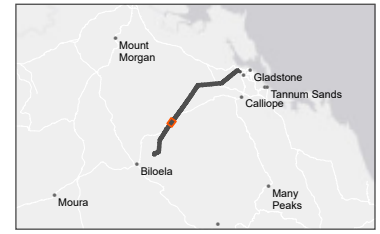
- Roads
- Watercourse
- Existing Access Tracks
- Field Survey Extent
- Project Area
- Disturbance Footprint

Existing Transmission Line and Association Infrastructure

- Existing Tower
- Existing Feeder

Protected Areas

- State Forest



0 0.5 1

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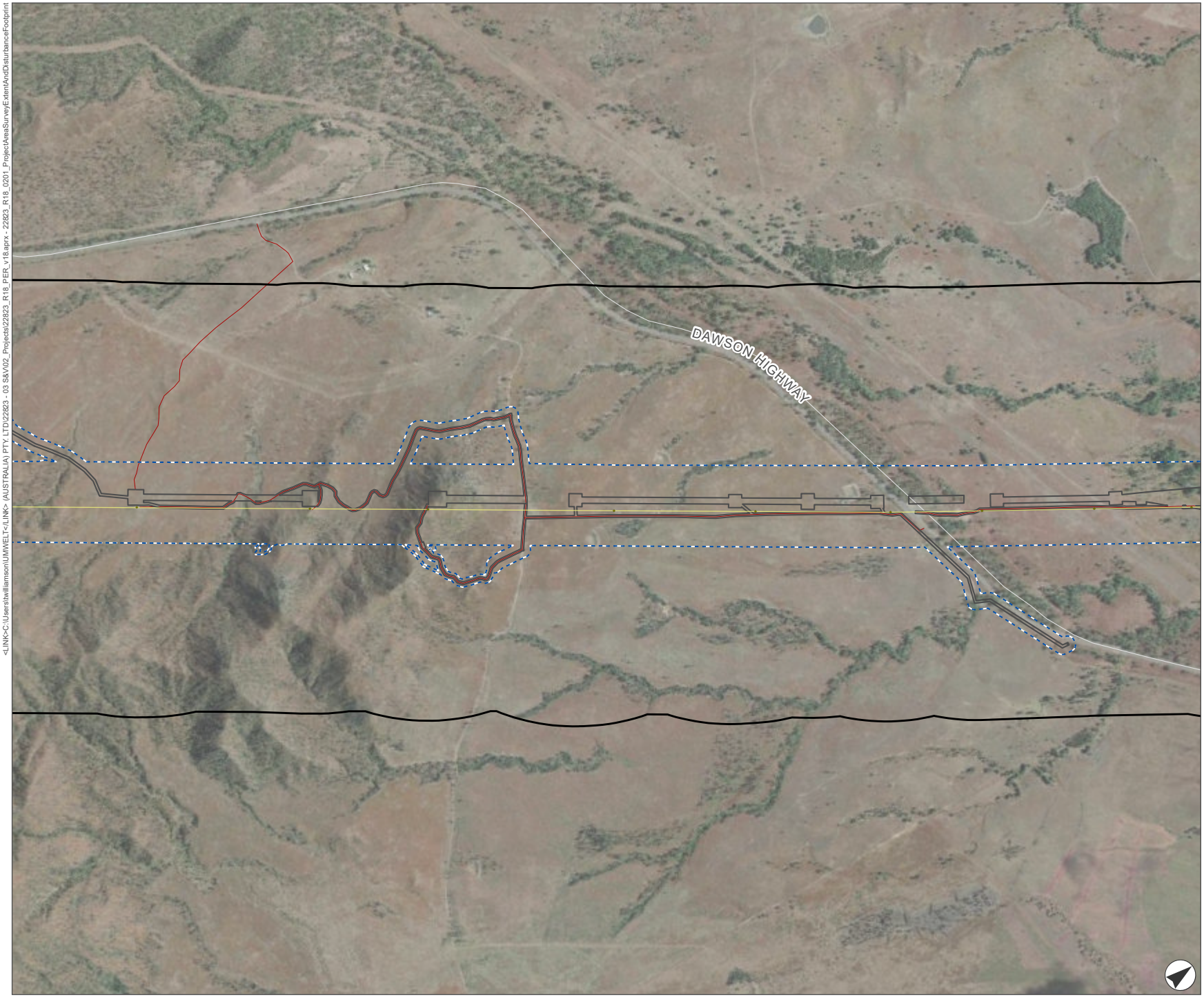


FIGURE 2.1-8

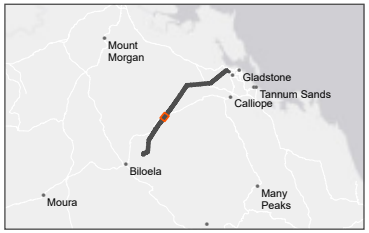
Project Area, Field Survey Extent and Disturbance Footprint Boundaries

Legend

- Roads
- Existing Access Tracks
- Field Survey Extent
- Project Area
- Disturbance Footprint

Existing Transmission Line and Association Infrastructure

- Existing Tower
- Existing Feeder



0 0.5 1

Kilometres

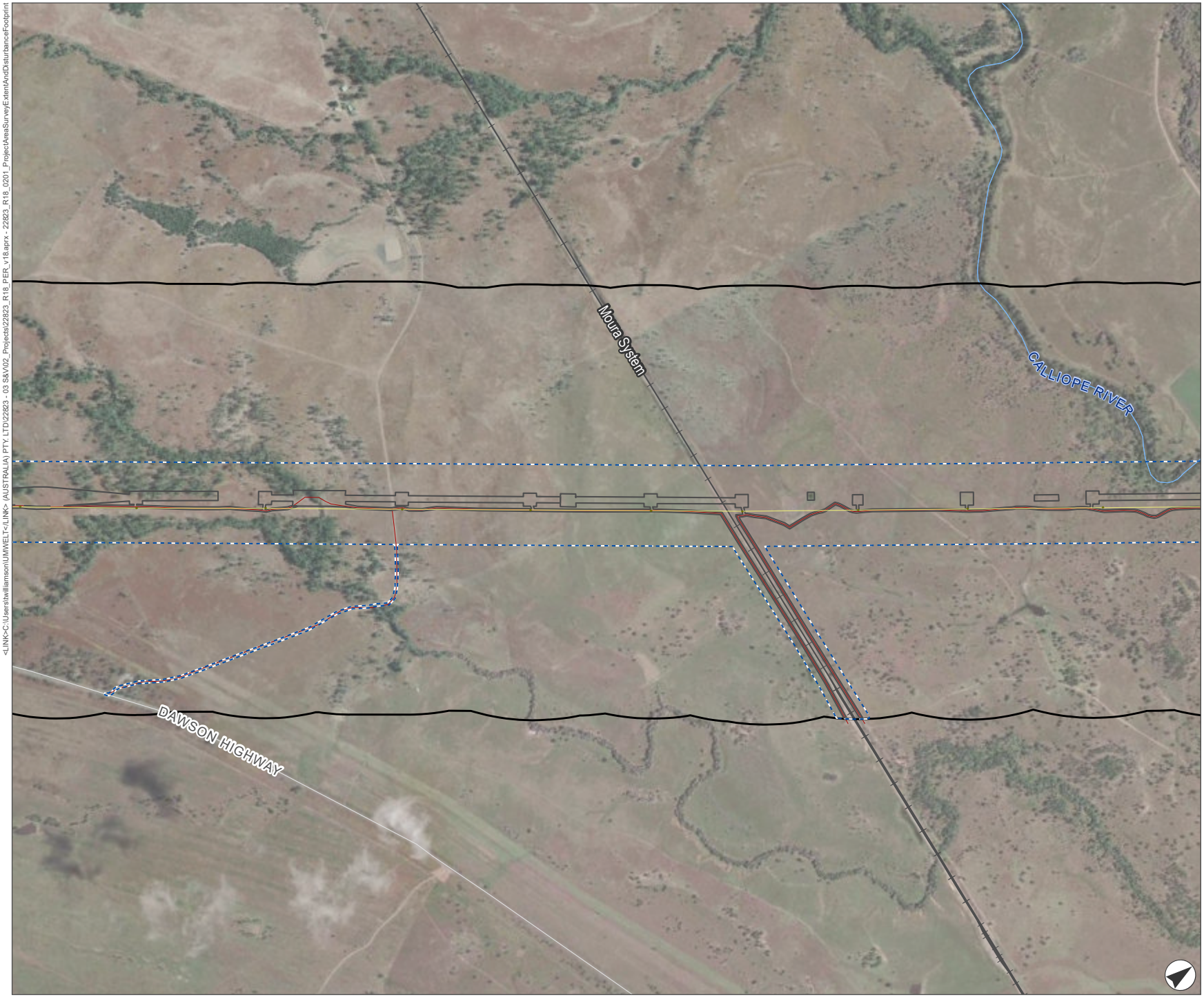
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FIGURE 2.1-9

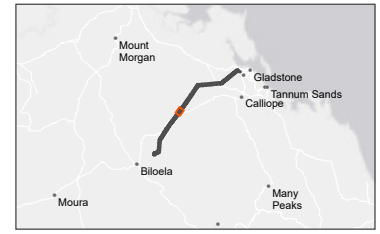
Project Area, Field Survey Extent and Disturbance Footprint Boundaries

Legend

- Roads
- Railway
- Watercourse
- Existing Access Tracks
- Field Survey Extent
- Project Area
- Disturbance Footprint

Existing Transmission Line and Association Infrastructure

- Existing Tower
- Existing Feeder



0 0.5 1

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FIGURE 2.1-10

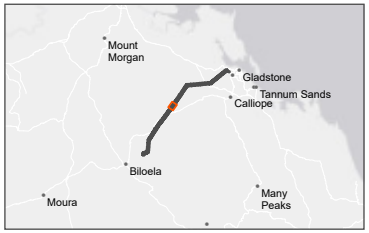
Project Area, Field Survey Extent and Disturbance Footprint Boundaries

Legend

- Watercourse
- Existing Access Tracks
- Field Survey Extent
- Project Area
- Disturbance Footprint

Existing Transmission Line and Association Infrastructure

- Existing Tower
- Existing Feeder



0 0.5 1

Kilometres

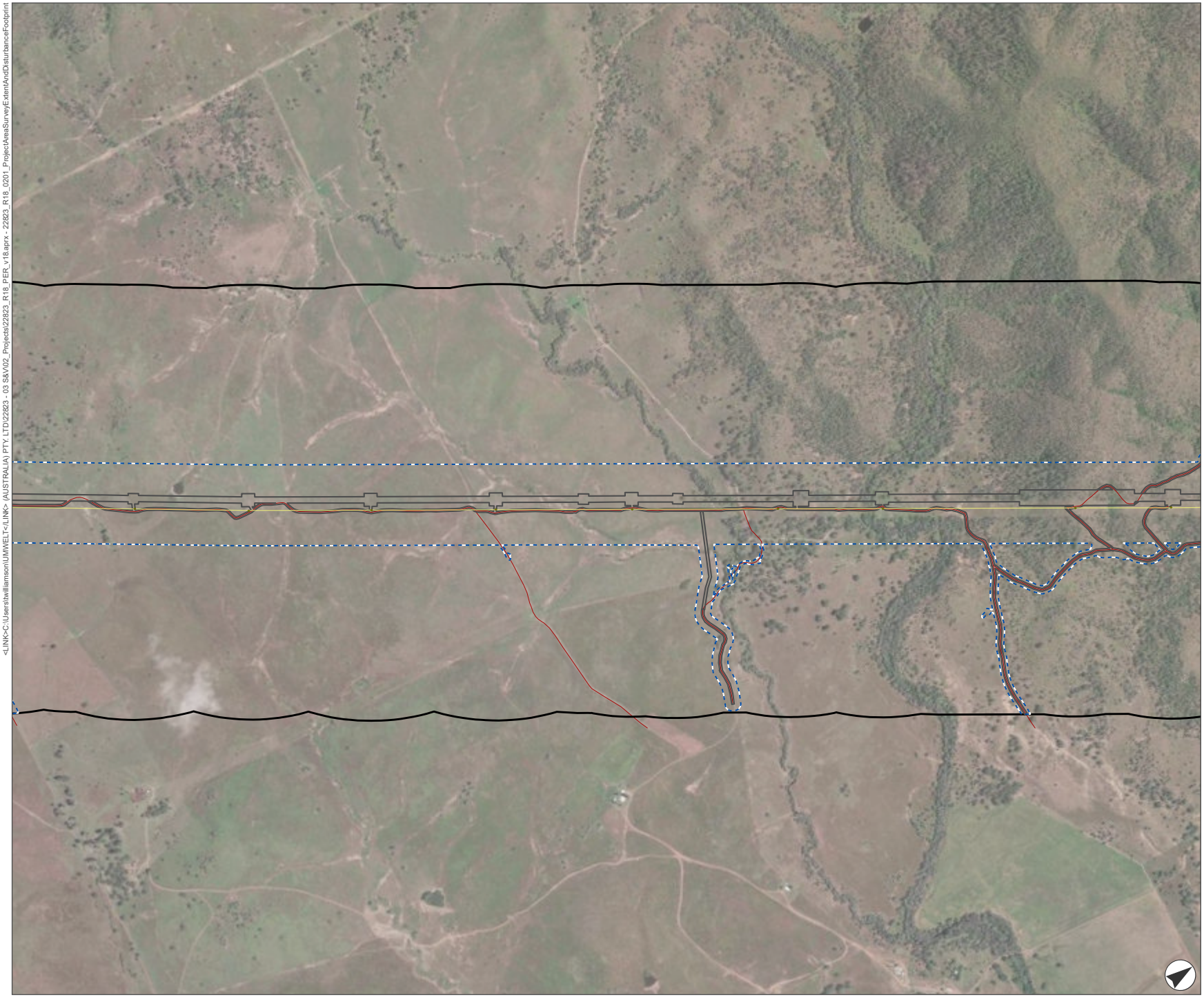
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FIGURE 2.1-11

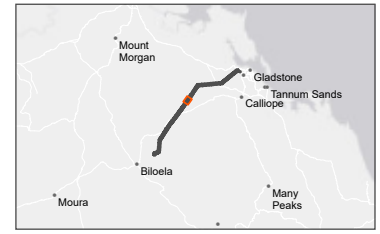
Project Area, Field Survey Extent and Disturbance Footprint Boundaries

Legend

- Existing Access Tracks
- Field Survey Extent
- Project Area
- Disturbance Footprint

Existing Transmission Line and Association Infrastructure

- Existing Tower
- Existing Feeder



0 0.5 1

Kilometres

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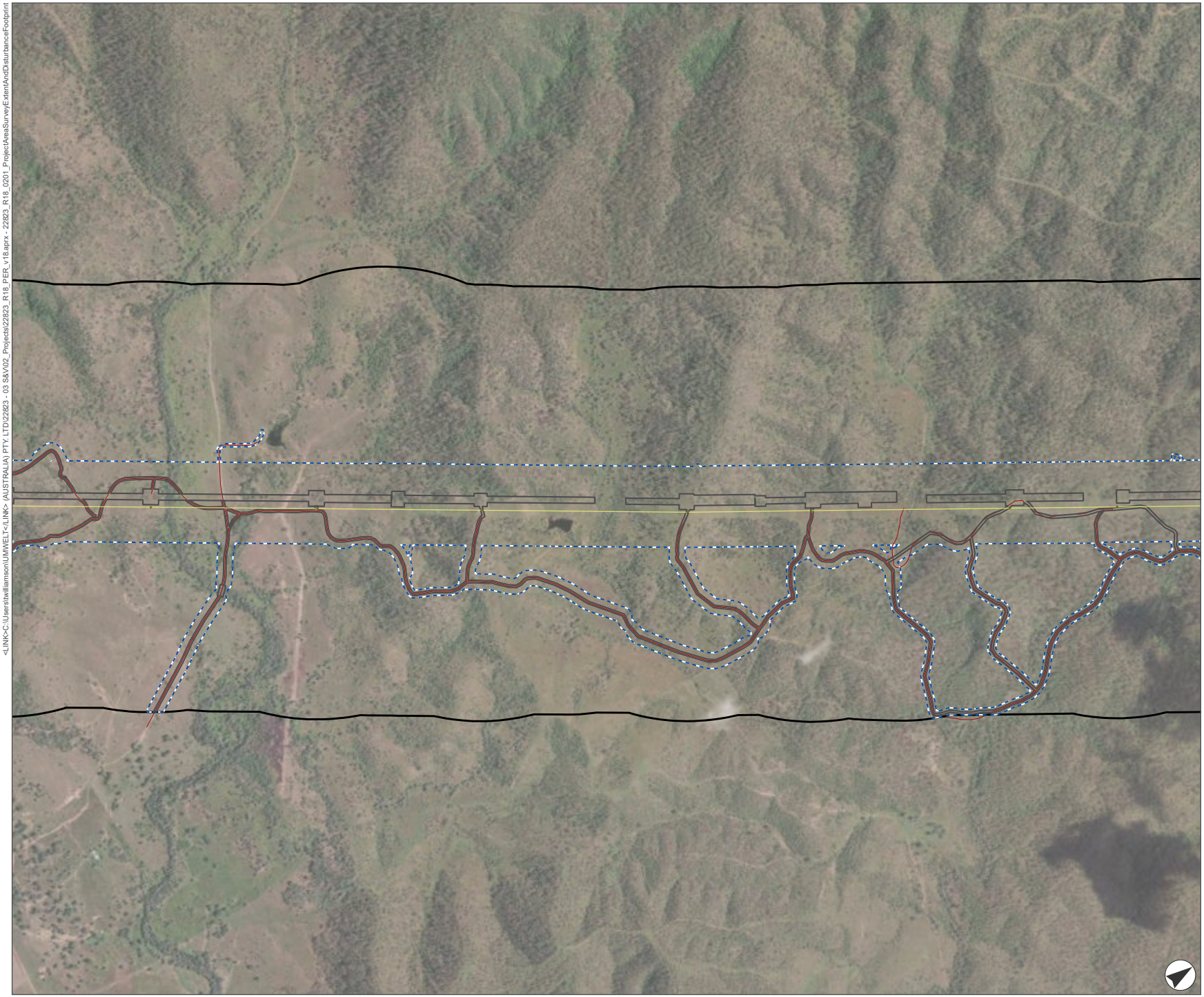


FIGURE 2.1-12

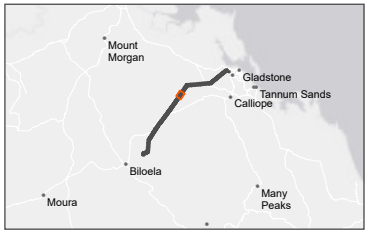
Project Area, Field Survey Extent and Disturbance Footprint Boundaries

Legend

- Existing Access Tracks
- Field Survey Extent
- Project Area
- Disturbance Footprint

Existing Transmission Line and Association Infrastructure

- Existing Tower
- Existing Feeder



0 0.5 1

Kilometres

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FIGURE 2.1-13

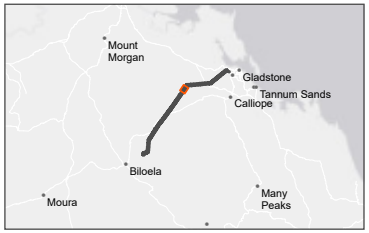
Project Area, Field Survey Extent and Disturbance Footprint Boundaries

Legend

- Existing Access Tracks
- Field Survey Extent
- Project Area
- Disturbance Footprint

Existing Transmission Line and Association Infrastructure

- Existing Tower
- Existing Feeder



0 0.5 1

Kilometres

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FIGURE 2.1-14

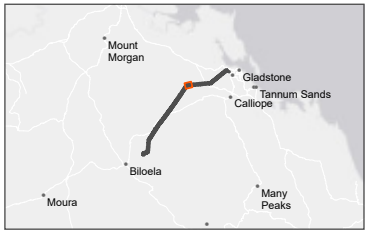
Project Area, Field Survey Extent and Disturbance Footprint Boundaries

Legend

- Existing Access Tracks
- Field Survey Extent
- Project Area
- Disturbance Footprint

Existing Transmission Line and Association Infrastructure

- Existing Tower
- Existing Feeder



0 0.5 1

Kilometres

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FIGURE 2.1-15

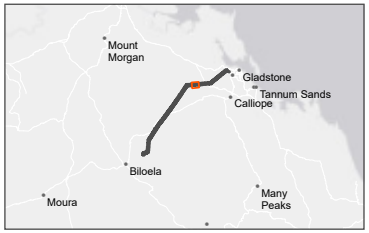
Project Area, Field Survey Extent and Disturbance Footprint Boundaries

Legend

- Existing Access Tracks
- Field Survey Extent
- Project Area
- Disturbance Footprint

Existing Transmission Line and Association Infrastructure

- Existing Tower
- Existing Feeder



0 0.5 1

Kilometres

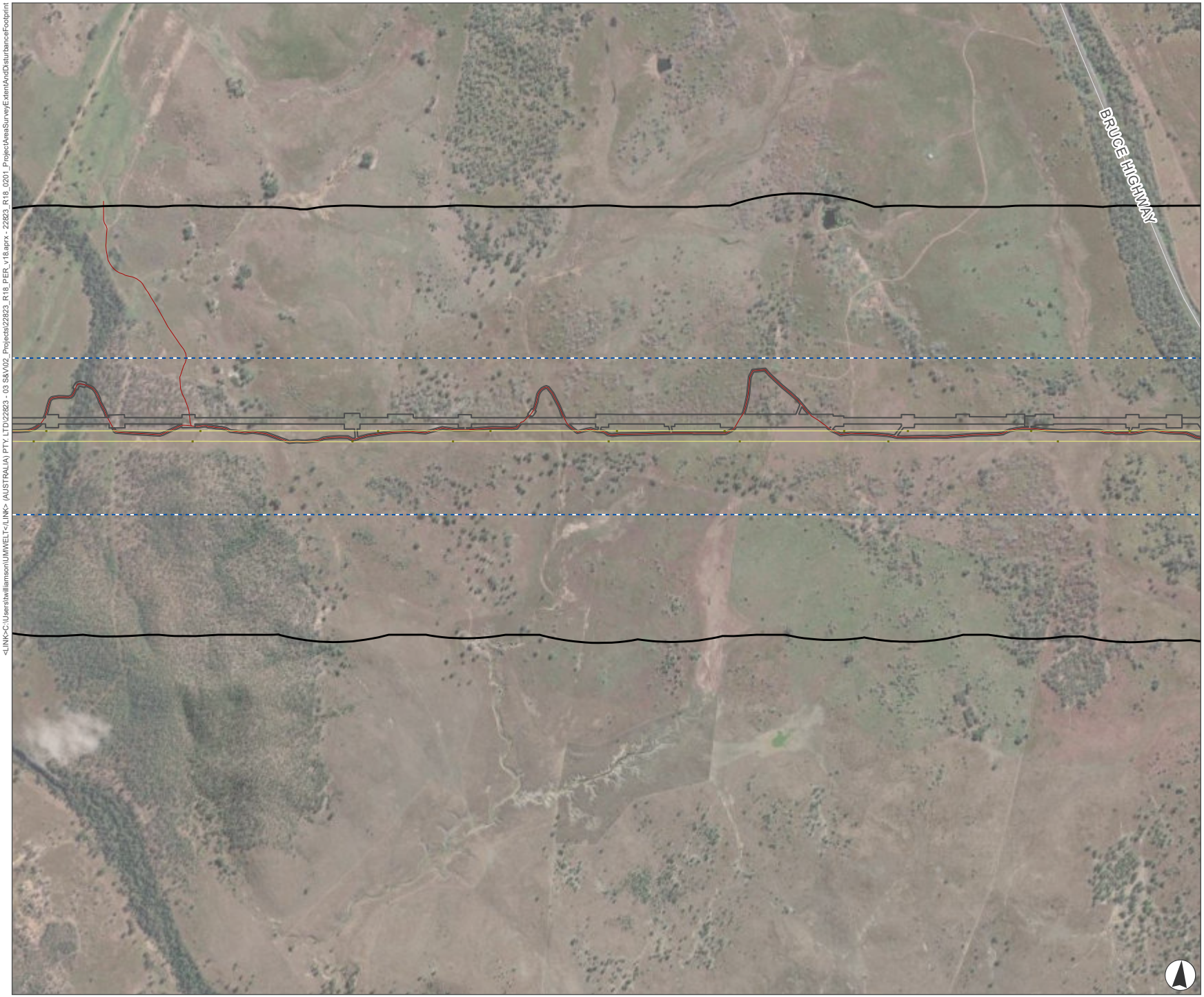
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FIGURE 2.1-16

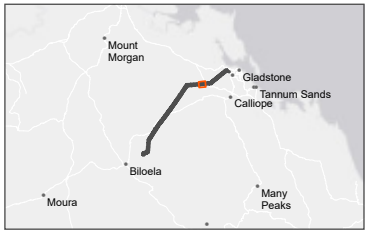
Project Area, Field Survey Extent and Disturbance Footprint Boundaries

Legend

- Roads
- Existing Access Tracks
- Field Survey Extent
- Project Area
- Disturbance Footprint

Existing Transmission Line and Association Infrastructure

- Existing Tower
- Existing Feeder



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Kilometres

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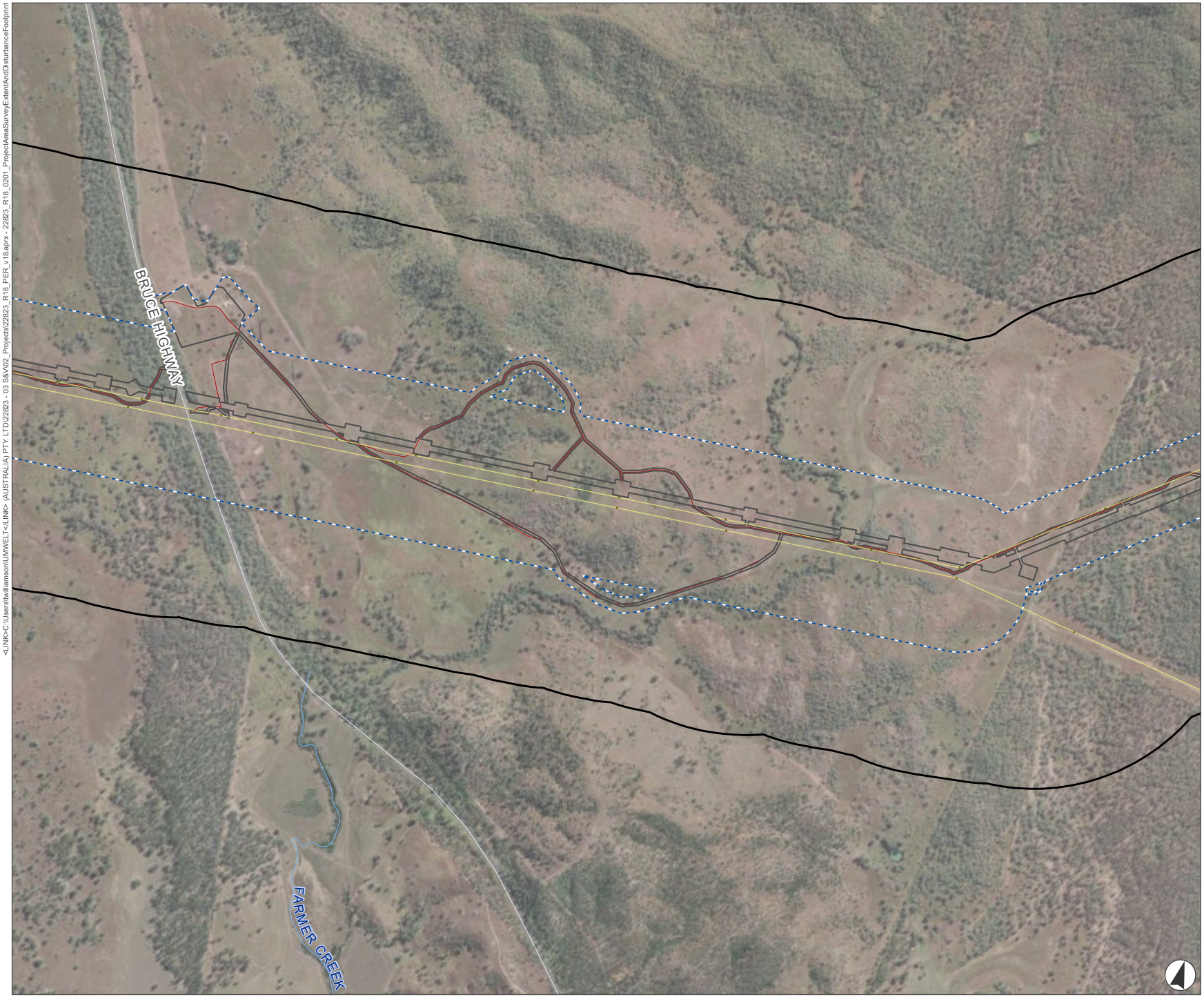


FIGURE 2.1-17

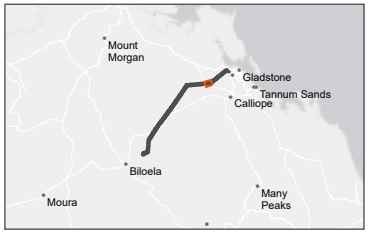
Project Area, Field Survey Extent and Disturbance Footprint Boundaries

Legend

- Roads
- Existing Access Tracks
- Field Survey Extent
- Project Area
- Disturbance Footprint

Existing Transmission Line and Association Infrastructure

- Existing Tower
- Existing Feeder



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FIGURE 2.1-18

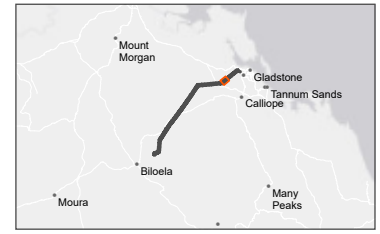
Project Area, Field Survey Extent and Disturbance Footprint Boundaries

Legend

- Existing Access Tracks
- Field Survey Extent
- Project Area
- Disturbance Footprint

Existing Transmission Line and Association Infrastructure

- Existing Tower
- Existing Feeder



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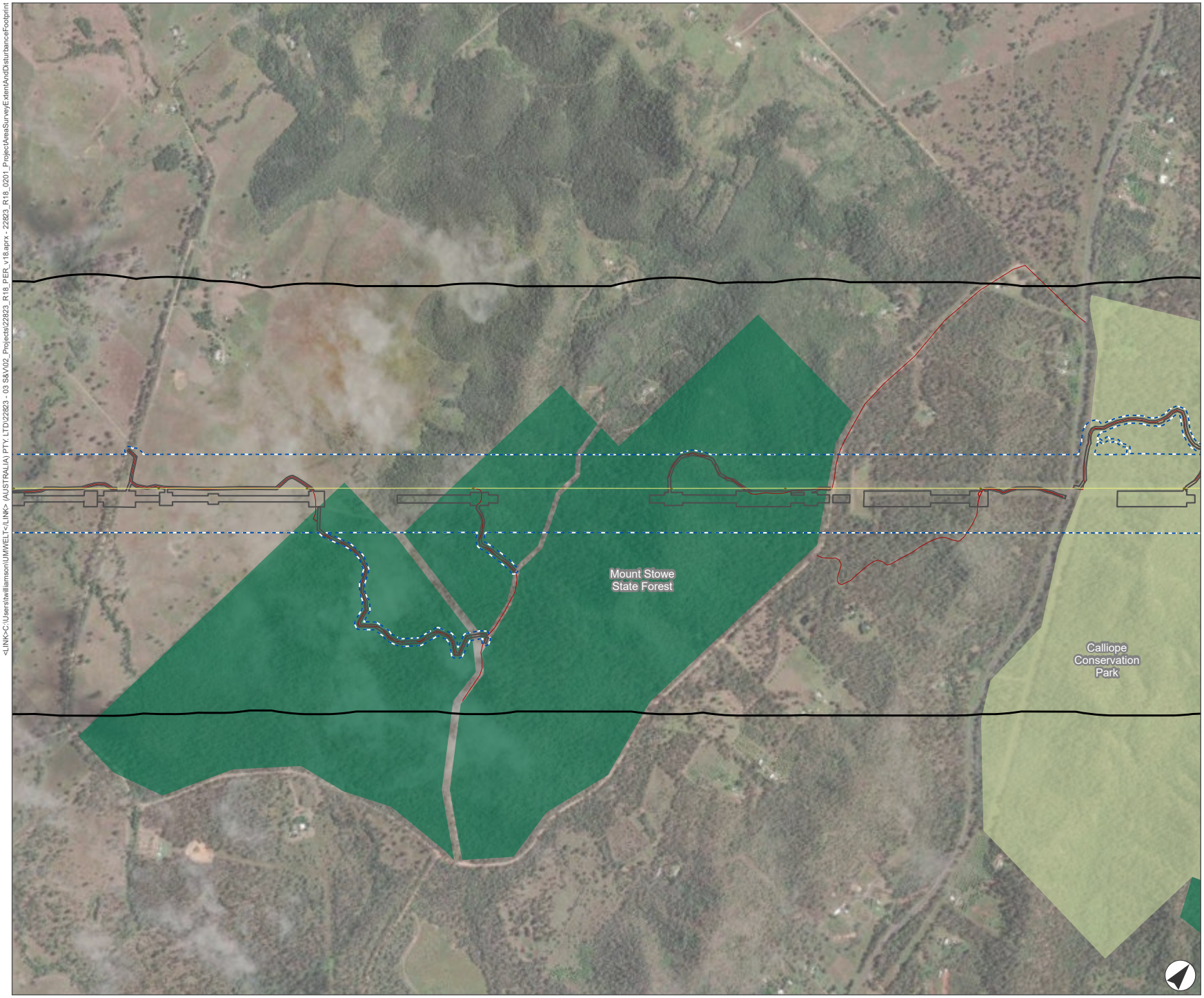


FIGURE 2.1-19

Project Area, Field Survey Extent and Disturbance Footprint Boundaries

Legend

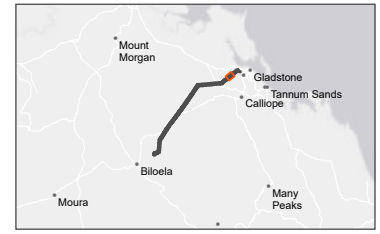
- Existing Access Tracks
- Field Survey Extent
- Project Area
- Disturbance Footprint

Existing Transmission Line and Association Infrastructure

- Existing Tower
- Existing Feeder

Protected Areas

- Conservation Park
- State Forest



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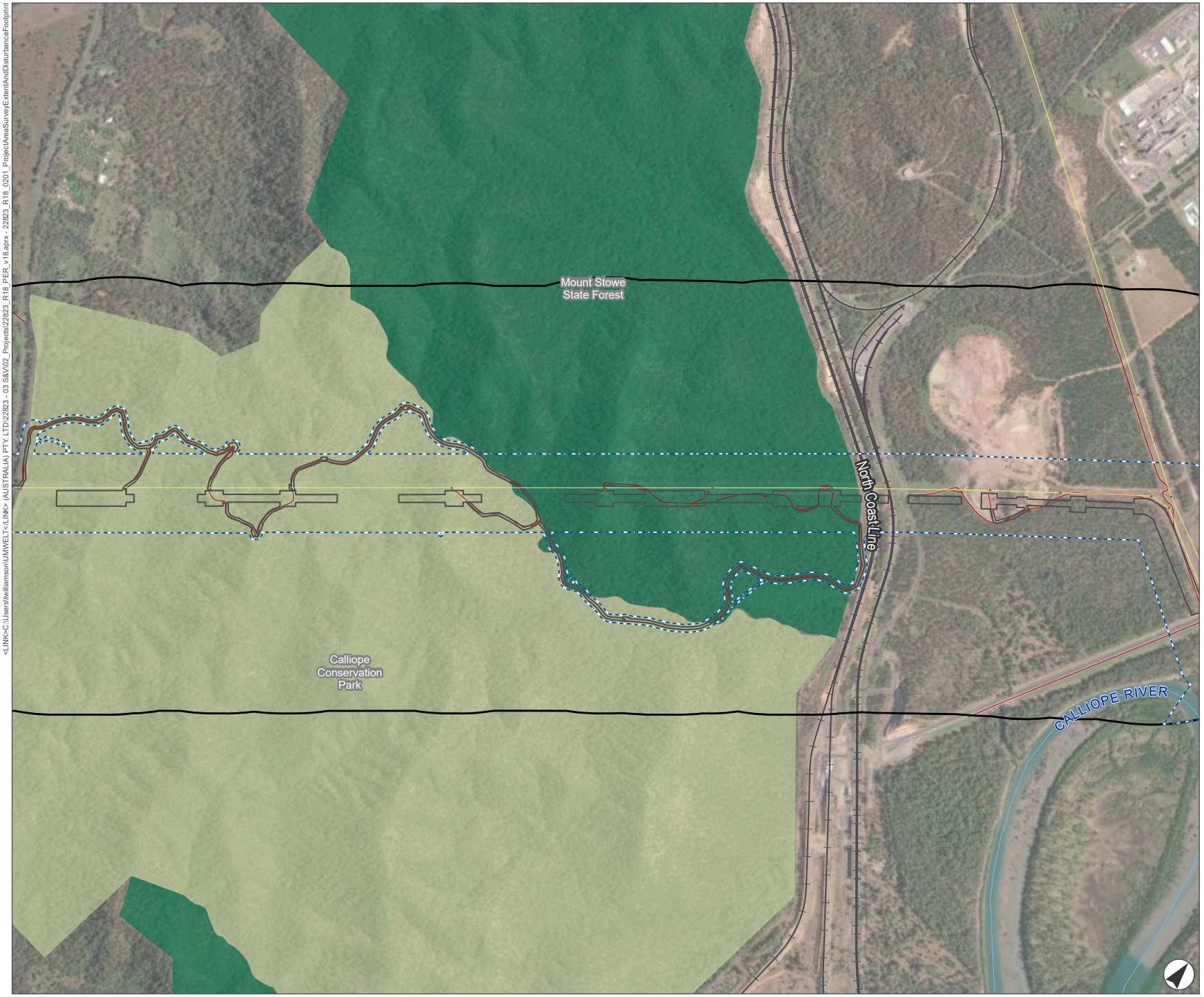


FIGURE 2.1-20

Project Area, Field Survey Extent and Disturbance Footprint Boundaries

Legend

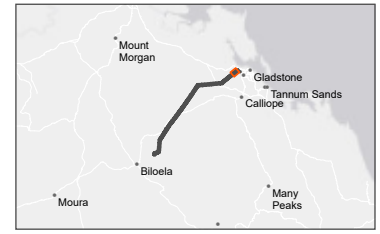
- Railway
- Watercourse
- Existing Access Tracks
- Field Survey Extent
- Project Area
- Disturbance Footprint

Existing Transmission Line and Association Infrastructure

- Existing Tower
- Existing Feeder

Protected Areas

- Conservation Park
- State Forest



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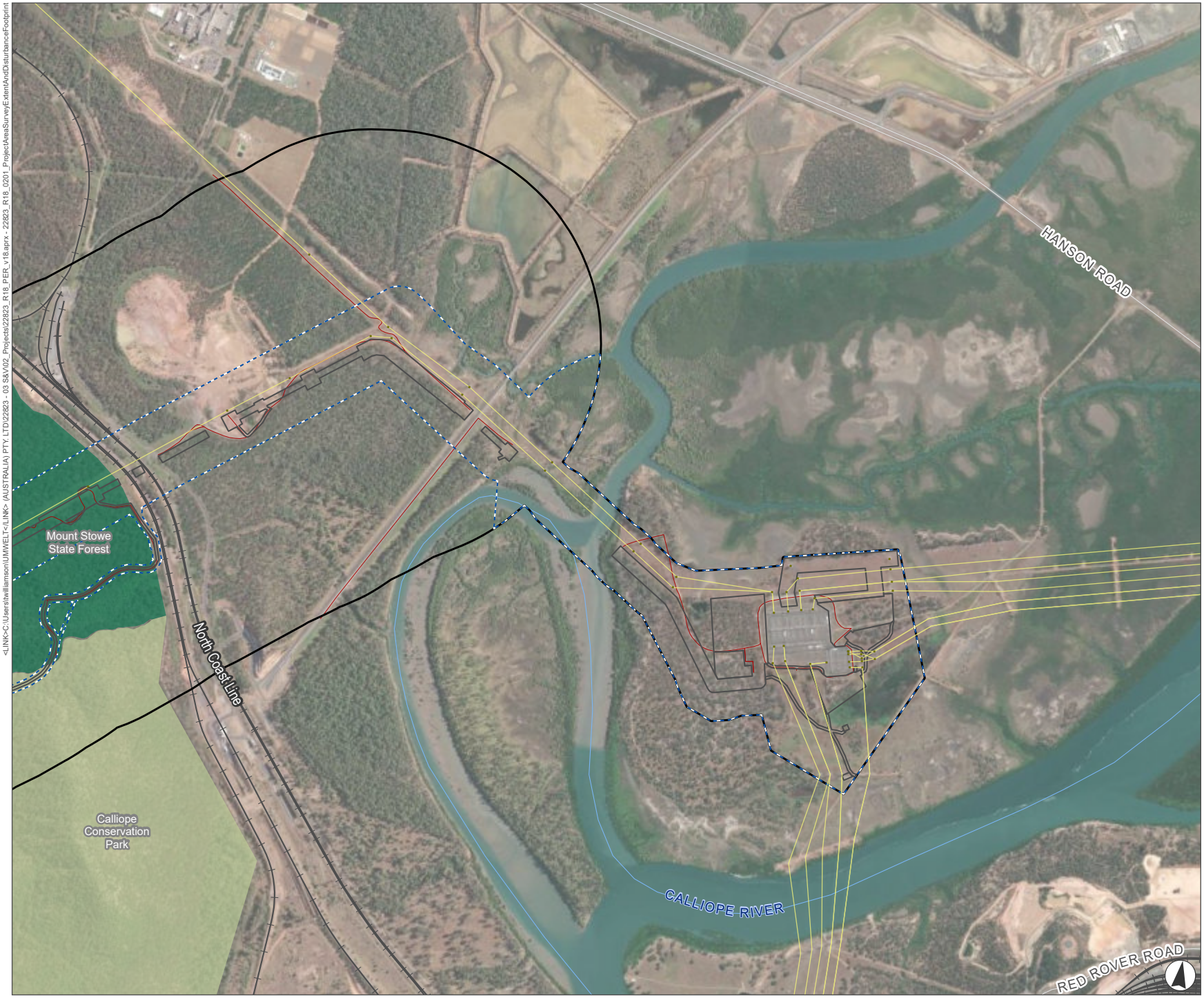


FIGURE 2.1-21

Project Area, Field Survey Extent and Disturbance Footprint Boundaries

Legend

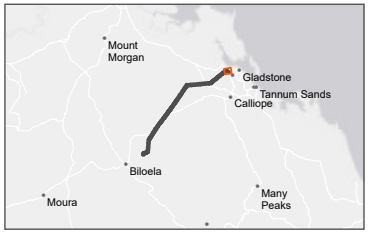
- Roads
- Railway
- Watercourse
- Existing Access Tracks
- Field Survey Extent
- Project Area
- Disturbance Footprint

Existing Transmission Line and Association Infrastructure

- Existing Tower
- Existing Feeder

Protected Areas

- Conservation Park
- State Forest



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2.2.2 Disturbance Footprint

The Disturbance Footprint totals 423.7 ha. This Disturbance Footprint represents the worst-case clearing scenario for the Project Area.

Powerlink has a legal obligation to ensure the safe mechanical and electrical operation and maintenance of transmission assets whilst minimising electrical safety risk. Bushfire mitigation is a key component to achieve this, and prevention is the key focus. For the modelling of Project components, Powerlink has adopted standard dimensions which are then refined in consideration of site-specific factors including vegetation type, vegetation height and maturity, rainfall and growth rates of vegetation, topography, bulk earthwork requirements and tower size to minimise bushfire risk to transmission infrastructure.

The Project Disturbance Footprint has been defined based on the current design, application of the mitigation hierarchy and ground-truthing undertaken up until the submission of the PER. Flexibility with the Disturbance Footprint remains essential to allow for additional micro-siting requirements. This flexibility allows design and construction refinements, avoid sensitive areas, respond to landowner requests, address unexpected finds, manage safety concerns, and mitigate potential impacts arising from ground conditions. Any amendments to the Disturbance Footprint will be assessed by a suitably qualified and experienced person and remain within the Field Survey Extent. It should be noted that amendments to the Disturbance Footprint will not result in an increase in the maximum disturbance area. Any impacts to MNES will remain within the limits defined by relevant approval conditions provided by DCCEEW. The micro-siting process is further detailed in **Section 2.2.2.1.**

The Project components and their disturbance requirements that make up the Disturbance Footprint are outlined in **Table 2.2**. It should be noted that, unless specified otherwise, existing infrastructure noted in **Table 2.2** is included in the Disturbance Footprint.

The Disturbance Footprint is displayed in **Figure 2.1-1** to **Figure 2.1-21**, inclusive. The location and extent of the Project components are subject to change as the detailed design process progresses.

Table 2.2 Project Components

Project Component	Description and Disturbance Requirements	Illustration
Substation–Calvale	• Construction of a new substation bay to enable grid connection of the new transmission line to the Calvale Substation. • Site preparation including infrastructure siting, pre-clearance surveys, vegetation clearing, earthworks and fencing. • Civil works including : ○ Drainage works include drains, pits and culverts to control stormwater flow. ○ Underground cable trenching within the substation includes cable trenches, cable pits and conduits as required for multicore cables. ○ Copper electrical earthing mat will be installed across the site at a depth of approximately 600 mm. ○ Isolated concrete plinths and foundations will be installed (bored or excavated as required). ○ Infrastructure assembly. ○ Aerial, gantry and support structures. ○ Erection of landing beams, conductors and busbars. ○ Establishment of laydown areas. ○ Relocation of existing helipad.	 **Photo 2.1 Calvale Substation**

Project Component	Description and Disturbance Requirements	Illustration
Substation–Calliope River	• The existing Calliope River substation comprises 275 kV and 132 kV switchyards (excluded from the Disturbance Footprint). The 275 kV switchyard currently comprises eight (8) diameters, and this Project seeks to extend the switchyard platform to allow for ultimate expansion of up to 12 diameters, including all civil works and earth grid extensions. • Establish four (4) new diameters within the expansion footprint to connect the new 275 kV double circuit transmission line. • Design and install busbar extension. • Modification of secondary systems as required. • Reconfiguration of Optical Ground Wire (OPGW) fibre network to establish end-to-end connectivity between Calvale substation and Calliope River substation. • Installation of new equipment such as reactors, transformers, synchronous condensers (potentially up to two (2)), and static synchronous compensators (STATCOM). • Relocation of existing helipad. • The existing 132 kV switchyard comprises six (6) diameters. The Project extends the platform including all civil works and earth grid extensions. • Grid connection of the new transmission line to the Calliope River Substation.	 **Photo 2.2 Calliope River Substation**

Project Component	Description and Disturbance Requirements	Illustration
Easement	Transmission lines are constructed and operated within easements over public and private property holdings. The table below identifies the existing easement widths and the easement widening to accommodate the Project. There are sections of the Project alignment that will partially overlap existing easements that are currently cleared as detailed in **Photo 2.3**. The table below also shows the extent of additional clearing required in each section to accommodate the Project. Most of the alignment can be accommodated within existing easements. It should be noted that the spans of easements were determined as either high or low risk based on bushfire risk and then the respective buffer distances were applied.	

Section	Approximate length	Existing easement width including spare capacity	Proposed easement widening	Additional clearing width required to accommodate the Project
A	3.5 km	60–190 m	Minor additional easement of 60 m width required for 450 m length of alignment.	Up to 60 m
B	51.5 km	110 m	Nil	Up to 50 m
C	16.0 km	100 m	40 m (north)	Up to 40 m
D	13.5 km	100 m	Nil	Up to 40 m
E	2.0 km	140 m	Minor widening of up to 20 m required for 400 m length of alignment.	Up to 20 m

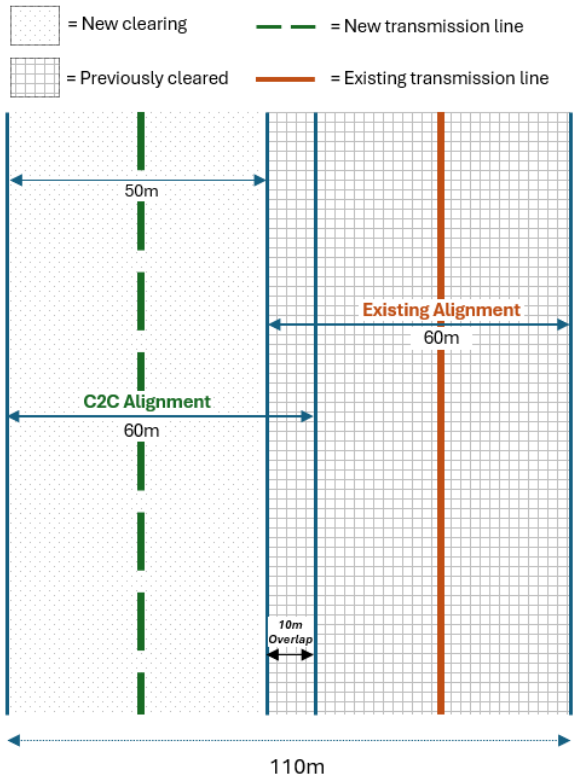


Photo 2.3 **Section B example of overlap between the Project easement and existing easement (Not to scale)**

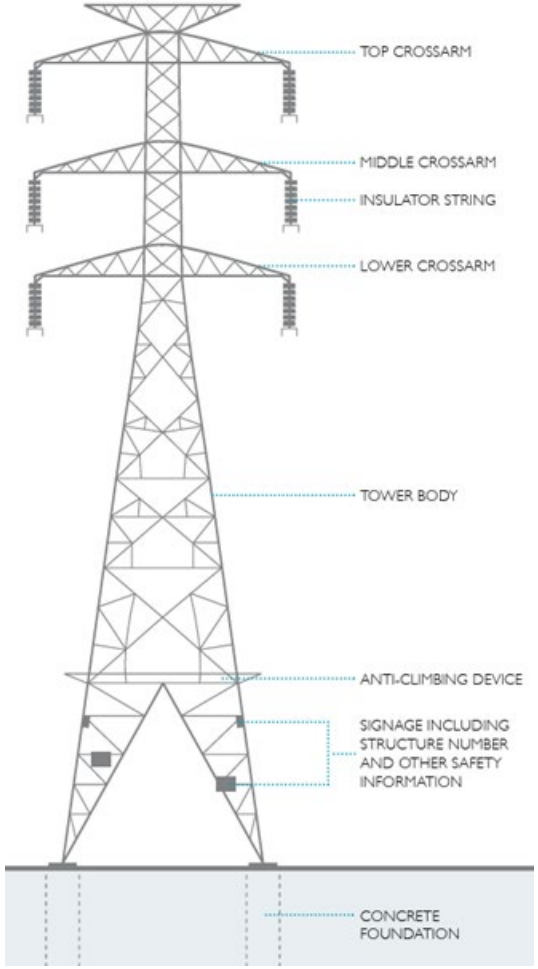
Project Component	Description and Disturbance Requirements	Illustration
Transmission tower	Transmission towers support the conductors (metal wires) above the ground. The structures are self-supporting lattice steel towers.188 towers will be erected as part of the Project.	

Photo 2.4 Typical Transmission Tower Diagram

Project Component	Description and Disturbance Requirements	Illustration
Tower pads	• Tower pads accommodate the transmission towers. • Low risk pad–40 m x 40 m clearing. • High risk pad–50 m x 50 m to 60 m x 60 m clearing. • Sites requiring significant cut and fill–60 m x 70 m clearing. Tower pad sizes vary based on the extent of earthworks required commensurate to the constructability environment. For instance, high risk pads are typically located in areas of steep topography and require large scale earthworks.	 **Photo 2.5 Erected Transmission Tower**  **Photo 2.6 Erected Transmission Tower**

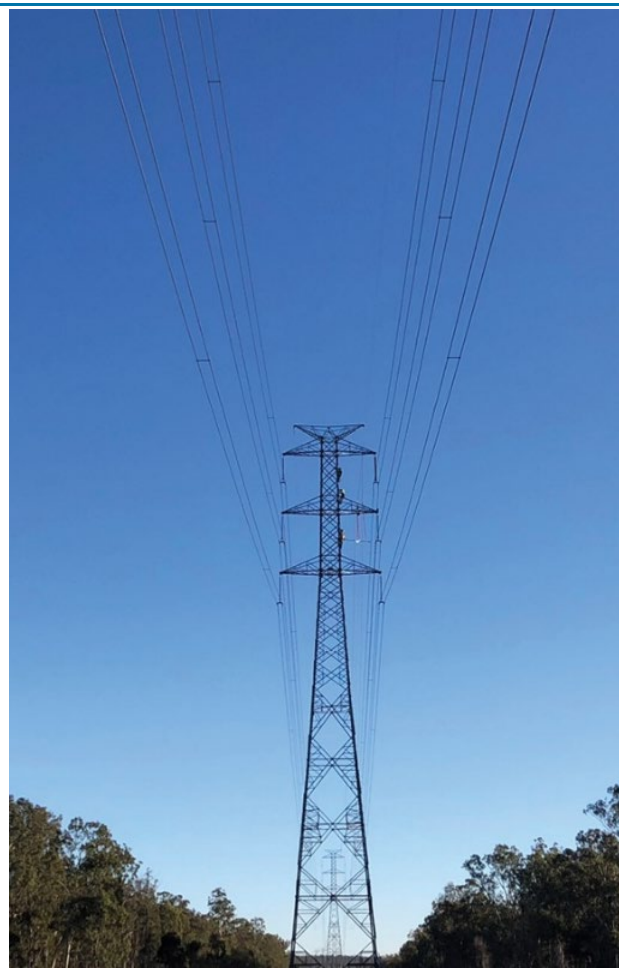
Project Component	Description and Disturbance Requirements	Illustration
Transmission conductors	Transmission conductors carry electricity over large distances. Transmission line spans will utilise 8 m vertical and 7 m horizontal clearance of conductors, relating to bushfire risk and associated risk to transmission infrastructure posed by vegetation, and are categorised into the following categories: • Low risk • High risk. Low risk spans: • 50 m wide clearing in the mid-span which can be determined from PLSCADD and violation vegetation. • 24 m wide clearing in the areas between tower pad and mid-span clearing. High risk spans: • 60 m wide clearing in the mid-span which can be determined from Power Line Systems–Computer Aided Design and Drafting (PLSCADD) and violation vegetation. • 30 m wide clearing in the areas between tower pad and mid-span clearing. • Areas of no clearing (where vegetation can be spanned)–air gap between top of vegetation and bottom of conductor must be a minimum of 1.5 times the height of the vegetation (trees must be at mature height). Areas of no clearing (where vegetation can be spanned)–air gap of 10 m between top of vegetation and bottom of conductor (trees must be at mature height).	

Photo 2.7 Transmission Conductors

Project Component	Description and Disturbance Requirements	Illustration
Access tracks	Access tracks are required to facilitate heavy and light vehicular movement along and adjacent to the Project alignment. The construction of new access tracks and widening of existing tracks will be limited to a 10 m maximum clearing width. Where widening is required at a water crossing the maximum width will be up to14 m. Where required in steep environments, pull up bays (8 m x 25 m) will be established to allow for the safe passing of vehicles along access tracks.	 **Photo 2.8 Existing Access Tracks Near Powerlink Infrastructure**
Laydown areas	Cleared laydown areas are required to accommodate equipment, vehicles and other material that are needed for the construction of the Project. Laydowns areas will vary in size and will be up to 150 m x 300 m of a cleared area.	 **Photo 2.9 Aerial View of Typical Laydown Area**

Project Component	Description and Disturbance Requirements	Illustration
Batching plants	On-site batching plants allow the production of concrete close to the required sites. 60 m x 200 m clearing.	 **Photo 2.10 Concrete Batching Plant**
Conductor brake and winch sites	Cleared area to set up stringing equipment and conductor drums to facilitate stringing activity.	 **Photo 2.11 Conductor Being Fed Through the Line Section and Tensioned from the Ground Using Winches**
OPGW brake and winch sites	Cleared area to set up stringing equipment and OPGW drums to facilitate stringing activity.	

Project Component	Description and Disturbance Requirements	Illustration
Fencing	Strand barbed wire fencing, gates and cattle grids will be installed to reinstate property boundaries and access, where required by Powerlink's arrangements with property owners.	 **Photo 2.12 Barbed Wire Fencing**
Environmental design features	*Note: The disturbance and clearing requirements of the following features are included within the respective component disturbances above.* • Erosion and sediment control measures (e.g. silt fences and check dams) during construction for all relevant components such as tower pads and access tracks to minimise impacts to existing water quality. • Tower pads will include long term surface stabilisation through grass cover. Permanent stormwater management controls (e.g. drains and batter chutes) will be constructed to facilitate stormwater flow in a non-erosive manner. • Access track waterway crossings will be constructed in accordance with the Queensland Government's Accepted Development requirements for operational work that is constructing or raising waterway barrier works, October 2018 version (Department of Agriculture and Fisheries (Qld), 2018) (until 30 November 2026) or September 2025 version (Department of Primary Industries, 2025), to facilitate fish passage along waterways.	

2.2.2.1 Micro-siting Process

Micro-siting refers to the process to make changes to the Disturbance Footprint. The micro-siting process ensures that the Disturbance Footprint remains within the Field Survey Extent to accommodate design and construction refinements, avoid sensitive areas, respond to landowner requests, address unexpected finds, manage safety concerns, and mitigate impacts that arise from ground conditions). Powerlink's micro-siting process is:

1. Need for micro-siting is identified by Powerlink.
2. Proposed change is spatially mapped to enable assessment by a suitably qualified person.
3. Assessment of change must:
    a. Identify any additional areas to existing disturbance that will be impacted and also any areas that will no longer be required to be disturbed within the Disturbance Footprint
    b. Determine if impacts to MNES remain within the limits identified within the approval conditions and also within the assessment
    c. Determine if direct and indirect impacts to MNES are consistent with those identified within the assessment
    d. Determine if changes are within the Field Survey Extent.
4. The proposed change may proceed where the following conditions are met:
    a. Does not result in an increase to disturbance of MNES habitat as defined within the approvals conditions and also within the assessment;
    b. Does not result in any additional direct or indirect impacts to MNES as identified within the assessment; and
    c. Is within the Field Survey Extent.

Action: The Disturbance Footprint must be updated and the change communicated to the Powerlink project team.

5. The proposed change must not proceed where the change:
    a. Results in an increase to disturbance of MNES habitat as defined within the approval conditions and also within the assessment; or
    b. Results in additional direct or indirect impacts to MNES as identified within the assessment; or
    c. Results in disturbance outside the Field Survey Extent.

Actions: Further consultation with the Powerlink project team to understand if proposed changes can be amended or if changes are required, seek variation to approval from DCCEEW.

2.3 Project Activities

2.3.1 Construction

The Project's construction activities are described in the following sections according to each key Project component.

2.3.1.1 Transmission Line

Construction of the transmission line will include the completion of the following activities:

- Site preparation, including set out of boundaries
- Establishment of site office, amenities, washdown facilities and ancillary facilities
- Pre-clearing activities and vegetation clearing
- Access track upgrade and construction
- Installation of gates, cattle grids and fencing
- Earthworks for tower pad, brake and winch sites
- Establishment of laydown areas and temporary batch plants
- Drilling for tower foundations
- Tower foundations set and pour
- Tower structure earthing
- Tower structure assembly and erection
- Pre-stringing activities, assembly of brake and winch sites
- Stringing activities, including draw wire, conductor and OPGW.

Assembly of prefabricated components is usually completed adjacent to the final site. A large mobile crane will be used to erect the towers in sections. Helicopters may also be used to lift sections of towers where required.

Conductor and OPGW stringing are carried out as either conventional or aerial stringing. The determination of methodology is based on several factors such as but not limited to:

- Structure and alignment design, terrain, environmental and cultural heritage constraints, sensitive receptors, land usage and/or landowner constraints, schedule, cost effectiveness or risk.
- Conventional stringing involves the clearing of two or more tracks directly underneath and in line with the structure crossarms. Earth moving equipment (tractor, bulldozer or similar) will then pull steel draw wire across the ground in a slack state from one structure to another down the alignment. The draw wire is then manually raised and placed into the stringing pulleys attached to the cross arms ready for running conductor.
- Aerial stringing is the method of attaching draw wire or specialised rope to either a helicopter or drone which is then flown from one structure to another lowering the draw wire or rope directly into the stringing pulleys. Aerial stringing may be carried out under tension with the assistance of a tensioner or other braking equipment (tesmec puller/tensioner) or in a slackened state where the draw wire or rope is able to be pulled at very low or no tension with the use of a heli-brake or similar and may be pulled across the ground where permitted.
- Stringing will be completed in sections of varying length of up to 10 km between termination structures, depending on constraints, terrain, and access. Specialised equipment including a powerful winch (puller), a braking device (tensioner) and pulleys (stringing sheaves) will be required.
- Site rehabilitation, including the reinstatement of pre-existing topography, topsoil, and fences where disturbed.

- Rehabilitation of all disturbed areas that will not accommodate permanent infrastructure, will be undertaken progressively during construction, where practicable. The short-term goal of rehabilitation is to establish suitable vegetation groundcover that provides long term stabilisation and prevents erosion.

2.3.1.2 Substation

The expansion of the Calliope River Substation (in Section E) will require the following field activities:

- Site preparation including infrastructure siting, pre-clearance surveys, vegetation clearing, earthworks and fencing.
- Civil works including the installation of security fencing, drainage, roads, cable trenches, station earthing, and foundations.
- Drainage works include drains, pits and culverts to control stormwater flow.
- Underground cable trenching within the substation includes cable trenches, cable pits and conduits as required for multicore cables.
- Copper electrical earthing mat will be installed across the site at a depth of approximately 600 mm.
- Isolated concrete plinths and foundations will be installed (bored or excavated as required).
- Infrastructure assembly.
- Aerial, gantry and support structures.
- Erection of landing beams, conductors and busbars.
- Installation of poles associated with required cut-in works to the substation including access tracks.
- Establishment of laydown areas.
- Relocation of existing helipad.
- Installation of new equipment such as reactors, transformers, synchronous condensers (potentially up to two (2)), and static synchronous compensators (STATCOM).
- Site rehabilitation.

The expansion of the Calvale Substation (Section A) will require the following field activities:

- Site preparation including infrastructure siting, pre-clearance surveys, vegetation clearing, earthworks and fencing.
- Civil works including :
    - Drainage works include drains, pits and culverts to control stormwater flow
    - Underground cable trenching within the substation includes cable trenches, cable pits and conduits as required for multicore cables
    - Copper electrical earthing mat will be installed across the site at a depth of approximately 600 mm
    - Isolated concrete plinths and foundations will be installed (bored or excavated as required)
    - Infrastructure assembly

- Aerial, gantry and support structures
- Erection of landing beams, conductors and busbars
- Establishment of laydown areas
- Relocation of existing helipad.

- Site rehabilitation.

2.3.1.3 Materials

Other than the infrastructure components, key materials required for the construction of the Project include:

- Water is required for dust suppression, earthworks, development of access tracks and concrete batching during construction and will be sourced from local dams and existing and new bores in consultation with relevant authorities and landholders, and only at locations where supplies are abundant.
- Quarry materials are required for access tracks, waterway crossings, erosion and sediment controls, foundations as well as ongoing maintenance. These materials include, but are not limited to, rock, gravel, sand and soils. Where available these materials will be sourced from local registered quarries and site won materials.
- Concrete will be required for tower structure foundations and substation construction. Concrete will be sourced from on-site concrete batching plants (**Section 2.3.1.4**) and local concrete suppliers where possible.
- Diesel and unleaded petrol will be required for generators, machinery and vehicles. Generators are required to power site offices and will also be required at the substation locations for power generation.

2.3.1.4 Ancillary Infrastructure

Ancillary infrastructure requirements include:

- Mobile batching plants may be used for construction areas located too far from proposed batching plants and concrete supplies. Mobile batching plants will only be used when the time to travel from batching plants to the start of curing of concrete exceeds the time limits specified by engineering standards.
- Sites for water sourcing and extraction. Pumping equipment will be used to extract water from dams and bores.
- Brake and winch sites.
- Laydown areas. Temporary ancillary infrastructure will be strategically sited within the Project Area where possible. One laydown area is located 1 km away from the centreline of the alignment on a site previously used for the same purpose, on Lot 4 on RN903.
- Four concrete batching plants are anticipated to be required for the construction of the Project. Concrete batching plants will likely be located on Lot 1 on CP890133, Lot 4 on RN903, Lot 36 on CTN260 and Lot 113 on CTN799. In addition to the onsite batching plants, concrete will also be sourced from concrete suppliers in Biloela and Gladstone where possible.

- A mobile site office located within the cleared easement will move in association with Project construction progression.

2.3.2 Operations

2.3.2.1 Commissioning

When a new transmission line is ready to be energised, a series of thorough inspections and commissioning tests are carried out before the line is put into service to verify the integrity of the transmission lines and substation infrastructure.

Coordination of transmission line and substation construction work is required to deliver the network sections for the commissioning plan. Equipment will undergo a series of individual, modular and full system testing and commissioning tests supervised by an independent testing engineer. All electrical equipment supplied will be provided with type test certificates.

For each network portion, the substation equipment will first be tested at the equipment and functional level, followed by a complete substation testing. Once all substation sites for a commissioning portion have been tested individually, overall end system tests will be performed to confirm the correct operation of all protection, control, communications, and SCADA systems.

The transmission lines will undergo final inspection, testing and all temporary earths will be removed prior to the energisation of the line. The network portion will then be progressively energised from end to end, allowing time for transformers and other systems to be 'soak tested' at full voltage.

A series of system tests will be conducted to ensure power quality performance and any required Australian Energy Market Operator (AEMO) testing.

2.3.2.2 Operations

Following the construction and commissioning of the transmission line, the extent of human activity on site will decrease substantially.

During operation, maintenance staff will carry out scheduled inspections of the line, easement and access tracks every two to four years, depending on the risk of vegetation growth. These inspections (patrols) are either by vehicle or helicopter. Maintenance staff will also carry out routine inspections of the substations and detailed maintenance of all plant and equipment at regular intervals. Additional inspections at any Project location may be required as a result of equipment failure, damage, modifications and upgrades.

A summary of the primary activities to be conducted as part of the operation and maintenance phase is detailed in the following sections.

Transmission Line

Inspection of the transmission line and each tower is carried out on each scheduled line patrol, with the main aim being to record the type, density and height of vegetation regrowth. Additional matters of interest include new under-crossings (e.g. distribution powerlines) or other activity or construction within the easement, which may affect operation or maintenance of the line.

Within areas of the Disturbance Footprint identified as having a high or very high bushfire risk, all incompatible vegetation and any vegetation that can grow greater than 3.5 m in height must be removed, however, selective retention of some vegetation may be possible to minimise MNES impacts. Other areas where vegetation may be retained is where the conductor is suspended across a valley or area of high topography, and it can be demonstrated that there will be an appropriate distance of separation between the conductor and the canopy of vegetation. Within areas identified as having a low, medium or potential bushfire risk, vegetation will be maintained so it does not encroach on 6 m from the bottom of the conductor at maximum sag. The tower pads will be retained as a cleared footprint with a 10 m buffer from the tower legs for the life of the asset.

Powerlink's policy is for the landholder to be contacted prior to any vegetation control work on a property and the landholder's agreement obtained regarding the treatment method to be employed. Easement vegetation management is important to ensure the safe operation of the transmission line and will be undertaken in accordance with Powerlink's standards and procedures.

Three techniques for vegetation management are employed:

- mechanical
- hand clearing
- chemical (herbicides).

The technique adopted for each area considers several issues such as landholder requirements, type of regrowth, terrain and the local environmental conditions. Mechanical clearing is usually by a tractor driven slasher or similar vehicle and is suitable for shrubs and smaller trees. It is limited to relatively flat and accessible terrain due to the type of vehicle used.

Hand clearing is labour intensive but allows the vegetation clearing to be quite selective and ensures that disturbance to non-target species is minimised. Hand clearing can be employed in areas where vehicle access is not available. Trimming of larger trees is also an option near urban or in visually sensitive areas.

Chemical treatment may also be used for selective treatment of incompatible vegetation while minimising ground disturbance. The method may be through stump injection, cut stump or overall spray technique and is mostly suitable for regrowth vegetation.

Access Tracks

Maintenance of access tracks is required to ensure that vehicle access to structure sites is available for inspections and structure maintenance. The work will aim to minimise disturbance to natural groundcover, thus reducing erosion potential and subsequent maintenance requirements. Maintenance of access is undertaken in consultation with the appropriate authority and landowner.

Substation

During the routine inspections, the substation infrastructure and items of plant will be inspected for signs of unusual wear, corrosion or damage. Faults and defects will be reported to maintenance staff who will rectify any problems identified.

Substation equipment is designed with a service life of up to 50 years with refurbishment scheduled every 15 years and is very reliable under most conditions. Apart from the detailed visual inspections that maintenance staff undertake, routine maintenance will be carried out periodically depending on the type and make of the item of plant concerned.

Vegetation regrowth control surrounding the substation and under the incoming power supply transmission lines will be undertaken to maintain electrical safety clearances between the conductors and vegetation.

2.3.3 Decommissioning

Typically, the operational life of a transmission line and substation is 50 years.

At the transmission line end of life, it may:

- Be replaced with a transmission line designed for the revised environmental constraints and electrical system requirements at the time.
- Be de-energised, dismantled, removed and the easement may be surrendered to the property owner, if the line was no longer required.

At the substation end of life, it is likely replacement or refurbishment work would occur to bring the equipment to the required level of performance and reliability. If the substation is no longer required, it would be removed, and remediation works undertaken.

Prior to decommissioning, a Decommissioning Management Plan which provides detail regarding the proposed decommissioning works, environmental risks associated with decommissioning and management and mitigation measures will be prepared. This plan will utilise environmental management strategies, practices and technologies current at the time of decommissioning to comply with or exceed regulatory requirements and to appropriately manage environmental issues which may be associated with decommissioning of the substation and or transmission line.

2.4 Project Timing

Powerlink seeks to commence construction of the Project by July 2026 with a view to conclude construction and commence operations by the end of 2028 to ensure continued electricity supply to the Gladstone region. The Project is expected to operate for up to 50 years.

2.5 Project Changes Since Referral

2.5.1 Project Area

The Project Area around the Calliope River Substation was required to be slightly expanded from the Referral Project Area due to inclusion of work associated with the installation of poles required for cut-in works to the substation. This includes associated access tracks and a laydown area to the east of the existing substation footprint. The laydown area coincides with an area proposed to install up to two (2) synchronous condensers as part of the Project.

Figure 2.2 shows the expanded Project Area utilised in the Draft PER compared against the original extent of the previous Referral Project Area.

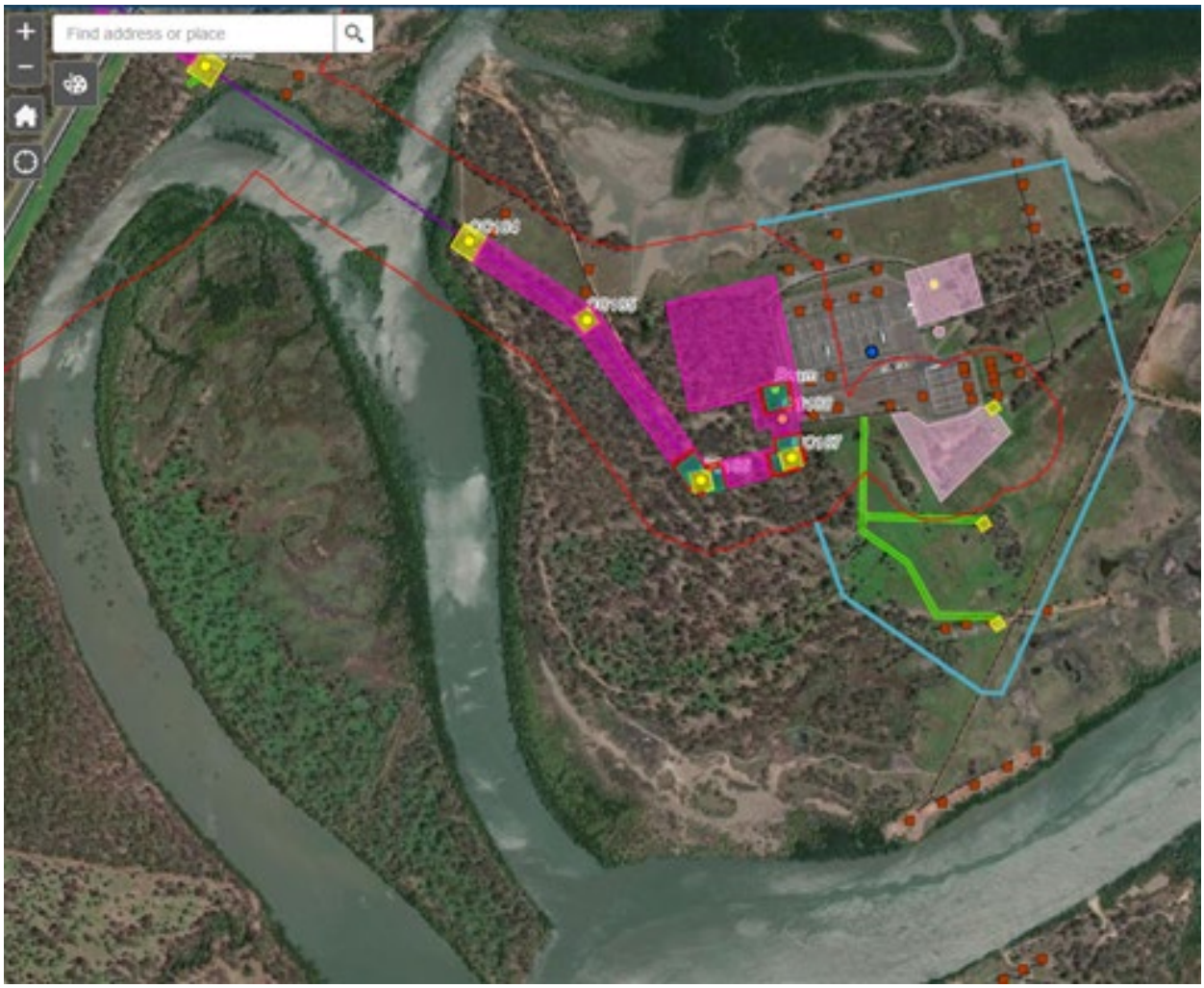


Figure 2.2 **Draft PER expanded Project Area (blue Line) compared against the original extent of the Referral Project Area (red line) at the Calliope River Substation end**

2.5.2 Disturbance Footprint

Table 2.3 details the extent of changes to the Disturbance Footprint since the original Referral in December 2024. The extent of these changes are minimal and do not require a formal variation request as discussed and confirmed with DCCEEW on 18 September 2025.

Table 2.3 **Detail of Project Changes Since Referral**

Description of Change Between December 2024 Referral Disturbance Footprint and Current Disturbance Footprint	Relevant Section
Areas identified where overspanning can occur using latest line layout design, LIDAR and modelled vegetation height	A, B, D, E including Calliope Conservation Park
Removal of access tracks where tracks were proposed both sides of the alignment	B
Removal of a proposed access track within a third party offset site	D
Identification of expansion of access tracks to ensure safety during construction for heavy vehicles	A, B, C, D, E

Description of Change Between December 2024 Referral Disturbance Footprint and Current Disturbance Footprint	Relevant Section
New access tracks to enable heavy vehicles to avoid traversing gas pipelines	B, C
New access track to provide access from alignment to Dawson Highway following advice from the Department of Transport and Main Roads (DTMR)	B
Pull-up bays as part of access track network to ensure safety during construction and remove need to widen existing track	B
Pull-up bays as part of access track network to ensure safety during construction	B, D
Tower pads requiring increased footprint to enable earthworks (cut and fill)	A, B, C, D
Refinement of Disturbance Footprint for clearing of vegetation where only individual trees require removal	B
Removal of watercourse crossings and implementation of alternative routes	B
Identification of site for permanent washdown which requires relocating from Cedar Vale Tee (Tower CC118 will be located where the existing washdown is currently located)	C
Updates to brake and winch sites following draft stringing plan	A-E
Inclusion of a laydown area adjacent to 132 kV substation at Calliope River	E
To facilitate expansion of 132 kV switchyard predominantly to ensure sufficient area is provided for earthworks for both substation expansion and associated drainage, erosion and sediment control measures	E
Access tracks and tower pads for poles required to facilitate reconfiguration of feeders into 132 kV substation to ensure network supply	E (Calliope River substation)
Laydown area outside of substation to comply with safety requirements	Calvale substation

2.6 Project Changes from Draft PER to Final PER

2.6.1 Calliope River Substation

The Disturbance Footprint at the Calliope River Substation required a slight expansion to accommodate modifications to the orientation and layout of the synchronous condensers, including transmission line cut in work. To facilitate transmission line cut in work, the Project Area and Field Survey Extent have been extended 30 m to the north. The original footprint was based on a concept design utilising design information available at the time. Since this time, further information has been obtained from the original equipment manufacturer resulting in the abovementioned modifications to facilitate safe installation and operation. These amendments, including the minor extension of the Project Area and Field Survey Extent are shown in **Figure 2.3**.



Figure 2.3 **Draft PER Project Area and Field Survey Extent (blue polygon) compared against the expanded current Project Area and Field Survey Extent (orange polygon) at the Calliope River Substation end**

Note: The current Project Area and Field Survey Extent incudes the Draft PER Project Area and Field Survey Extent

In addition to the area to facilitate the synchronous condensers, there is an additional area for a laydown, as well as some minor changes to access tracks around the Calliope River Substation. These amendments are also outlined within **Figure 2.4**.

While the additional area results in minor additional area impacts to MNES, the conclusions of the impact assessment remain consistent with that undertaken within **Section 8.0**.



Figure 2.4 **Draft PER Disturbance Footprint (in red background) compared against the current expanded Disturbance Footprint (in hatched green) at the Calliope River Substation end**

2.6.2 Calvale Substation

An alternative alignment and cut in approach was identified at the Calvale Substation, to connect the transmission line into a new substation bay, constructed to the south of the existing Calvale Substation. This results in alignment shift from Calvale Substation to tower CC4 (**Figure 2.5**).

The alternative alignment and cut in approach results in:

- A significant reduction in operational and safety risks associated with cutting into a new substation bay as opposed to an existing brownfield substation bay.
- Minimising risks of disruption to network security (through a reduction in planned outages from the complex staging).

The additional impact area to the south of the Calvale Substation and realignment between the Calvale Substation and tower CC4 result in minor changes in impacts to MNES. The impacts remain consistent with the assessment undertaken within **Section 8.0.**

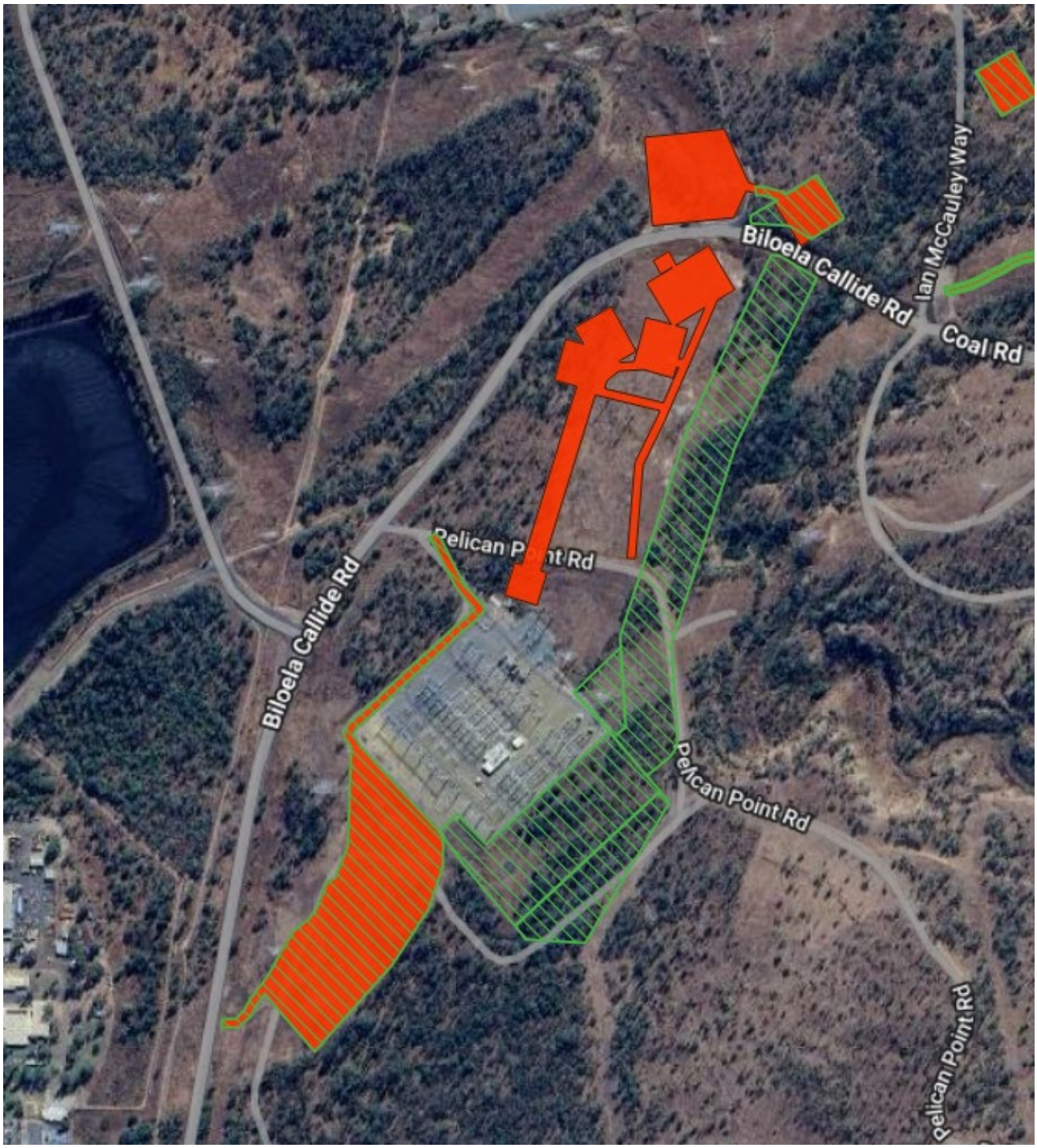


Figure 2.5 **Draft PER Disturbance Footprint (in red background) compared against the current expanded Disturbance Footprint (in hatched green) at the Calvale Substation end**

2.7 Alternatives

The following sections discuss alternatives considered for the Project.

2.7.1 Strategic Objectives

In order to understand why the Project is proceeding as described in the preceding sections, it is important to first consider the underlying strategic objectives of the Project. As discussed in **Section 1.6**, the Project is a foundational part of the Gladstone Project and aims to meet the identified need. The identified need for the Gladstone Project is to ensure the ongoing reliability and security of supply in the Gladstone area to:

- meet the forecast electrical load in anticipation of the closure of the Gladstone Power Station
- support the decarbonisation of major industries
- compensate for loss of essential system services, such as inertia, system strength and voltage control capability, following the closure of Gladstone Power Station.

The Project will support the Commonwealth Government in achieving emission reduction targets by contributing to the transition to clean energy generation. Queensland currently generates 12.3 GW of electricity from fossil fuel sources, approximately 4.7 GW (38%) of which is generated in the Central Queensland region to support local communities and energy-intensive industrial activities primarily located around Gladstone. Over half of the region's fossil fuel generation capacity will be decommissioned by 2035 due to the forecast closures of the Callide B Power Station (2028) and the Gladstone Power Station (2029).

Alternative generation capacity will be required to address the potential shortfall in power generation and to cater for likely future increases in electricity use. Energy generation diversification, particularly the use of decentralised renewable sources, will reduce greenhouse gas emissions contributing to future climate change, and reduce vulnerabilities to the impacts of climate change.

2.7.2 Alternatives Considered

2.7.2.1 No Action

As part of the Gladstone Project PTI [2] process, Powerlink assessed a scenario if the Project was not undertaken (e.g. 'do nothing' base case) (Powerlink, 2025). Powerlink concluded that a 'do nothing' base would not address the identified need and result in major levels of involuntary load shedding to its customers as large quantities of generation capacity would be unable to be dispatched at the central west and/or north of the State even at times when load would need to be disconnected (Powerlink, 2025).

Not undertaking the Project would also result in reduced support for Commonwealth emissions reduction policies and would negatively impact on the transition to clean energy in Central Queensland. Overall, the alternative of taking no action is not feasible as it would result in major involuntary load shedding and undermine both emissions reduction policies and the clean energy transition.

[2] This process allows the Queensland Government to identify and assess PTI projects within a new State-based planning and investment framework, and to direct Powerlink to construct these projects and recover its costs following completion of assessment activities.

2.7.2.2 Alternative Routes Considered

The layout and associated Disturbance Footprint have been developed through numerous design iterations and reviews to minimise, and where possible, avoid impacts on any known site constraints, particularly impacts relating to ecological values and impacts on local communities.

The corridor capitalises on the use of existing spare Powerlink easements in Sections A, B, D and E which co-located adjacent to existing transmission lines. This in turn, reduces impacts compared to alternative locations where no transmission infrastructure and easements exist.

Section C requires the widening of an easement. Powerlink undertook a CSR to identify the appropriate route for Section C. Ultimately the northern side of the existing line was chosen over the southern side as it reduces the level of interaction required for crossing existing transmission infrastructure and minimises the risk of complex outages on Powerlink's transmission network.

The location of tower structures were determined based on engineering design parameters such as topography and stringing distance to ensure the safe and efficient operability of transmission infrastructure. The siting and extent of works required for the structures were then further refined based on the review of environmental constraints and consultation with landholders and traditional owners. Hardstand areas, supporting ancillary infrastructure (e.g. access roads, cabling), and construction areas (e.g. stockpiling, laydown areas) have been selected to balance constructability requirements with the minimisation of impacts on known ecological values.

Given the complexities of the terrain associated with the Project, constructability has also been a significant driver in the location and route selection for access tracks. Where possible, the design has sought to co-locate Project infrastructure including access tracks, transmission structures and cabling to minimise the fragmentation of native vegetation and reduce the overall impact area required to facilitate construction activities.

In addition to strong alignment with Commonwealth policies regarding emissions reductions and renewable infrastructure delivery, the Project Area was selected due to proximity to existing high voltage transmission infrastructure, large areas of previously cleared land, relatively low population density, distance from nearest sensitive land uses, constructability, and commercial viability. Further, existing land uses within the Project Area are generally suitable for coexistence with transmission supply, ensuring that the Project will have minimal amenity impacts to landowners (compared to the construction of a new separate transmission line) following the application of appropriate mitigation and management measures.

2.7.3 Conclusion

Overall, there are no feasible alternatives for the Project. The Project represents a suitable balance between environmental values, local communities and the need to develop a design that achieves minimum performance requirements to deliver viable transmission infrastructure. The co-location of transmission infrastructure is also preferred in avoidance and minimisation of potential impacts to environmental and heritage values.

3.0 Environmental Context

This chapter addresses section 4.1-4.5 of the PER Guidelines and provides a detailed description of the environmental context within the Project Area and surrounding areas. MNES values, including descriptions of vegetation communities are outlined in detail in **Chapter 5**.

3.1 Land Use

The Project Area covers 14,321 ha and extends over 87 km from the Calvale Substation to the Calliope River Substation and is located over two LGAs being Banana Shire and Gladstone Region.

3.1.1 Historic Land Use

Historic land use throughout the Project Area, extending between Gladstone and Biloela (largely including Mount Alma, Wooderson, and Dumgree), across the past 70 years has been described based on the available historical knowledge and aerial imagery. It is acknowledged that Indigenous land management practices occurred across the landscape for tens of thousands of years prior to colonisation, including fire-stick farming and seasonal use of resources, which shaped vegetation and habitat patterns long before European settlement.

Analysis of historical aerial imagery (Q Imagery, 2025) provides clear evidence of progressive land use change across the Project Area.

- Pre-1960s: By the mid-1960s, much of the Project Area, particularly in flatter areas of Mount Alma, had undergone extensive clearing (**Photo 3.1**). Large tracts of remnant vegetation had been removed and replaced with pasture to support cattle grazing, which quickly became the dominant land use across the region.
- 1960–1990: Aerial imagery from this period shows repeated cycles of clearing and re-clearing of both remnant and regrowth vegetation (**Photo 3.2** and **Photo 3.3**). This pattern reflects ongoing efforts by landholders to suppress regrowth and maintain grazing productivity. Land use was strongly oriented around beef cattle production.
- 1990s–Present: Continued management for grazing has remained the primary land use across the area, with regrowth management persisting on previously cleared lands. In some places, scattered regrowth vegetation has re-established along drainage lines and in less intensively managed paddocks, while other areas have maintained a more open pasture-dominated character.

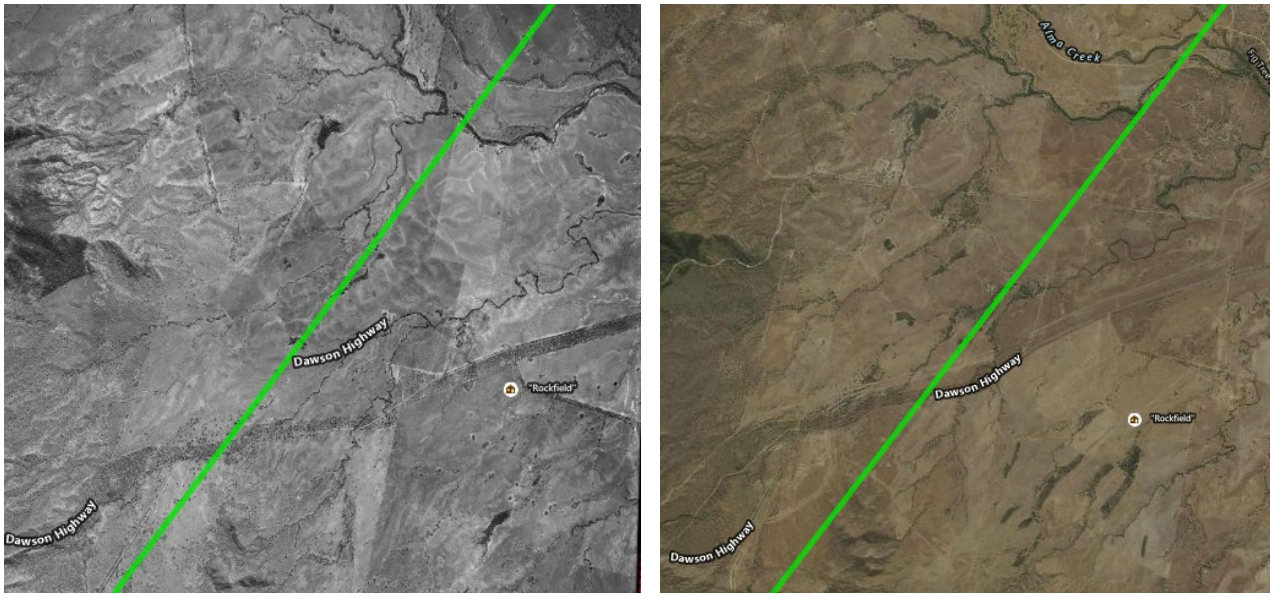


Photo 3.1 **Aerial imagery showing large areas surrounding Section B of the Project Area already cleared prior to 1959 (left) which remain as cleared pasture to present (right), the green line representing the Project alignment**

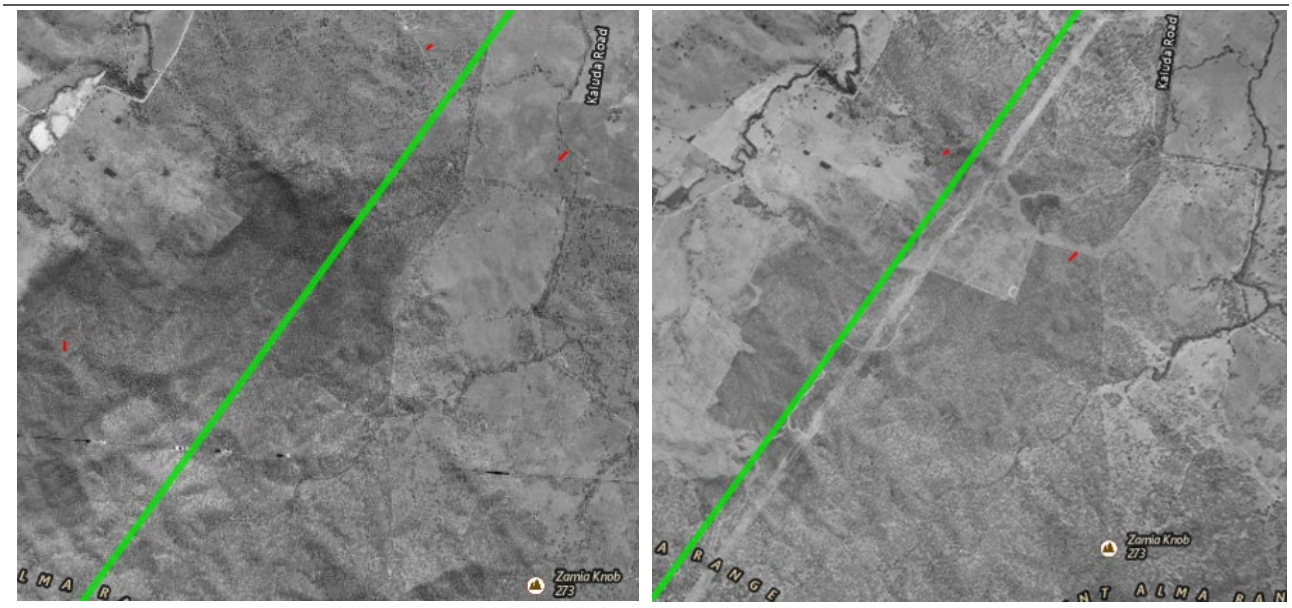


Photo 3.2 **Aerial imagery showing land clearing between 1959 (left) and 1990 (right) along the Section B of the Project Area, the green line representing the Project alignment**



Photo 3.3 **Aerial imagery showing land clearing between 1959 (left) and present (right) along the Section D of the Project Area, the green line representing the Project alignment**

Land use across the Project Area has been dominated by mining uses (near Section A) and industrial / port uses (near Section E), with Sections B, C and D subject to vegetation clearing for grazing, followed by cycles of regrowth suppression and pasture maintenance, particularly in flatter and low-lying areas. This has resulted in a highly fragmented landscape, with remnant vegetation largely confined to less accessible ridgelines and steeper slopes. Relative to the Project Area, these areas of remnant vegetation now predominately occur within Callide Timber Reserve, Calliope Range State Forest, Mount Stowe State Forest and Calliope Conservation Park (**Section 3.5.5**).

3.1.2 Current Land Uses

As detailed in **Table 3.1**, the land uses within and surrounding the Project Area vary.

Table 3.1 **Existing Land Uses within and Surrounding the Project Area**

Section	Land Use
A	Section A comprises land used for mining, grazing, intensive uses (recreation and culture), conservation and natural environments and reservoir/dam. Section A includes the Calvale Substation and associated transmission infrastructure, located within Lot 1 CP890133. Other land uses surrounding Section A include: • Callide Mine (approximately 1 km to the north) • Lake Callide (located 350 m south) • Callide Dam (located 350 m south) • Callide A Power Station (located 300 m north) • Callide B Power Station (located 250 m west) • Biloela-Callide Road (located along the northern boundary of Section A).

Section	Land Use
B	Section B comprises land used for grazing, production forestry, plantation forestry and other minimal use (conservation). Section B includes one existing Powerlink 275 kV transmission line. Land uses surrounding Section B include: • Callide Mine (ML6993 intersects Section B) • Callide Timber Reserve (freehold) (intersecting Section B to the south) • Calliope Range State Forest (intersecting Section B in the centre) • Pipeline infrastructure operated by APA WGP Pty Ltd, Santos Limited and Australia Pacific Liquified Natural Gas (LNG) Gladstone Pipeline Pty Limited (intersecting Section B) • Dawson Highway (intersecting the centre of Section B) • Moura System Railway (intersecting the centre of Section B).
C	Section C primarily comprises land used for grazing with small areas of transport and communication. Two 275 kV Powerlink transmission lines exist within the Study Area. Land uses surrounding Section C include: • Pipeline infrastructure operated by Jemena Gas Pipelines Holdings Pty Ltd, APA WGP Pty Ltd, Santos Limited and Australia Pacific LNG Gladstone Pipeline Pty Limited (intersecting Section C) • Bruce Highway (intersecting Section C).
D	Section D comprises land used for grazing, production native forests, intensive uses, residential and other minimal use (conservation). Section D includes one existing Powerlink 275 kV transmission line. Land uses surrounding Section D include: • Calliope Conservation Park (intersecting Section D to the north) • Mount Stowe State Forest (intersecting Section D to the north) • Rio Tinto Yarwun Alumina Refinery (located 3 km to the north) • North Coast Line Railway (intersecting the north of Section D).
E	Section E comprises land used for conservation and natural environments, mining, other minimal use (conservation) and tidal areas. Section E includes the Calliope River Substation and associated transmission infrastructure, located within Lot 113 CTN799. Land uses surrounding Section E include: • Gladstone Power Station (located 1 km east) • Wiggins Island Coal Terminal (located 2.5 km north) • Curtis Island and LNG Facility (located 8 km north).

3.1.3 Land Tenure

Land tenure across the Project Area includes freehold, State Forest, reserve, National Park and Profit À Prendre. Land parcels vary in size, from 1.3 ha to 2,900 ha within rural areas, and up to 9,630 ha for land associated with Callide Timber Reserve.

Land tenure in each section of the Project Area is detailed in **Table 3.2**.

Table 3.2 Land Tenure in Each Section of the Project Area

Section	Land Tenure
A	• Freehold • Lands lease • Reserve (Lake Callide Park, intersecting Section A to the south-east)
B	• Freehold • Reserve (Callide Timber Reserve, intersecting Section B to the south) • Lands lease • State forest (Calliope State Forest, intersecting Section B in the centre) • Reserve (camping and water)
C	• Freehold • Small areas of Lands lease
D	• Freehold • Lands lease • Conservation Park (Calliope Conservation Park, intersecting Section D to the north) • State Forest (Mount Stowe State Forest, intersecting Section D to the north)
E	• Freehold • Lands lease

3.2 Hydrology

3.2.1 Surface Water

The Project Area falls within the Fitzroy and Calliope drainage basins. Major watercourses classified under the *Water Act 2000* (Qld) (Water Act) that intersect the Project include:

- Callide Creek (intersects Section A).
- Calliope River (intersects Section B and Section E)–being the largest river in the Project Area. It originates near Cederic Mountain in the Don River State Forest and meanders for 100 km and flows into the Port of Gladstone.
- Farmer Creek (intersects Section C).

The Mount Larcom Range confines this broader region to the east, and the Calliope Range to the west geographically. The Calliope River basin's catchment area covers 1,890 km^2, the Project Area within this catchment is only 97 km^2, making up approximately 5% of the catchment area. It collects water from important tributaries such as Oakey Creek and Larcom Creek, with Larcom Creek being the longest contributing creek, draining about 270 km^2 through Section C. Bell Creek intersects near the southern end of Section B and flows west of the Project Area, opposite the Calliope River. Bell Creek is within the Dawson River basin's catchment, which spans 50,776 km^2.

A modified lake wetland is located near Boyles Road, accompanied by natural river wetlands near Mount Alma Road and Fig Tree Road. A natural swamp wetland is located near the Calvale Substation. At the Calliope River Substation, intertidal wetlands containing mangrove and saltpan vegetation are present. Freshwater farm dams of various sizes and water levels are scattered throughout the Project Area. Most have muddy banks with dense, low shrubs, while two feature some fringe aquatic vegetation, including rushes and sedges.

The Project Area crosses unmapped watercourses and drainage features, as defined by the Water Act. Numerous drainage features are mapped and crossed by Section D. The Water Act predominantly identifies a series of first-order streams near the Project Area that are designated as unmapped watercourses, as shown on **Figure 3.1** to **Figure 3.3**. Farmer Creek, Calliope River and an unnamed tributary of Callide Creek in Section A are mapped as defined watercourses. Notably, Larcom Creek is a fourth-order stream at the point where it flows through the Project Area. However, the Water Act does not define Larcom Creek as a watercourse. It is only further downstream (about two kilometres) of Section C of the Project Area that Larcom Creek is defined as a watercourse.

The Calliope River basin's current ecological state reflects a balance between human impact and natural resilience. While the basin has witnessed considerable clearing of native vegetation, estimated at up to two-thirds, riparian zones comprising native flora still exist along major creeks. This riparian vegetation plays a vital role in maintaining in-stream water quality, providing some protection against the impacts of grazing, cropping, and industrial activities within the catchment. Downstream, the Calliope River basin interacts with industrialised and port land uses as well as intensive dredging activities primarily within and around the Gladstone Harbour region.

Within the Project Area, streams that are significant to native fish habitat, fish migration and passage are shown on **Figure 3.4** to **Figure 3.6**. The importance of a stream and potential impact to fish passage from works within the stream are colour-coded:

- Grey – Major risk (tidal)
- Purple – Major risk
- Red – High risk
- Amber – Moderate risk
- Green – Low risk.

The Calliope River's flow regime is freshwater until the Bruce Highway, where a weir is located, and the system transitions to a tidally influenced estuary that discharges into the harbour. As mapped, Section E of the Project interacts within the tidal extent, a major risk waterway. Section D crosses two high impact waterways. Section C crosses one Major risk and three high risk waterways. Section B crosses two major risk and five high risk waterways. Section A includes one high risk waterway.

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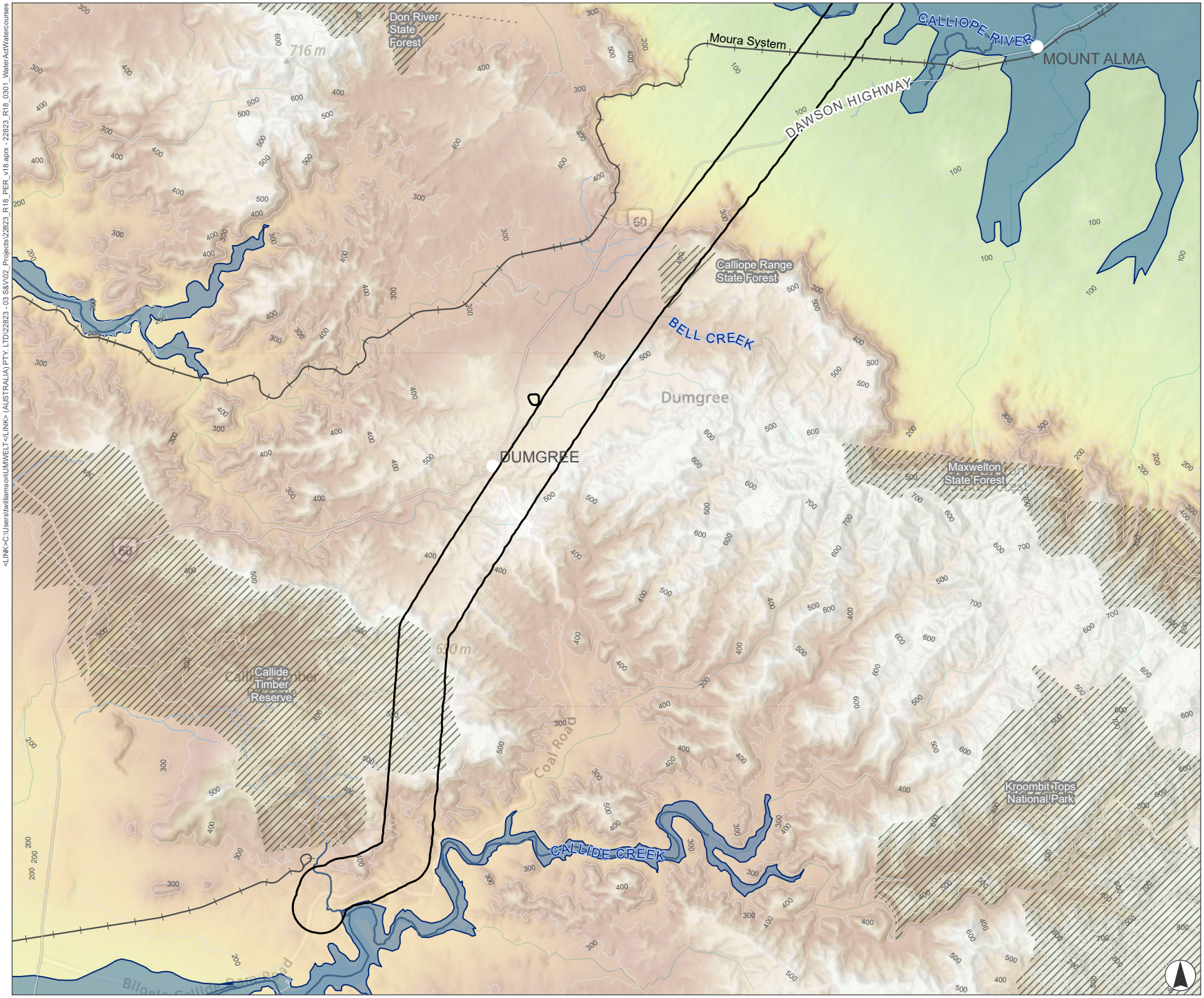


FIGURE 3.1

Water Act Watercourse identification map, Sections A - B

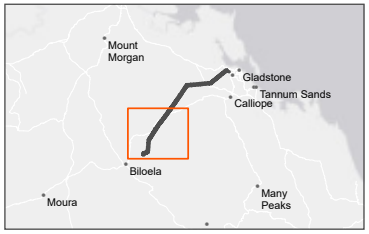
Legend

- Roads
- Railway
- Contours
- Watercourse as defined by Water Act 2000
- Drainage feature as defined by Water Act 2000
- Project Area
- Protected Areas
- Queensland Floodplain Assessment Overlay

Ground Elevation (mAHD)

890.000

58.156



0 2.5 5 7.5

Kilometres

Scale 1:175,000 at A4
GDA 1994 MGA Zone 56

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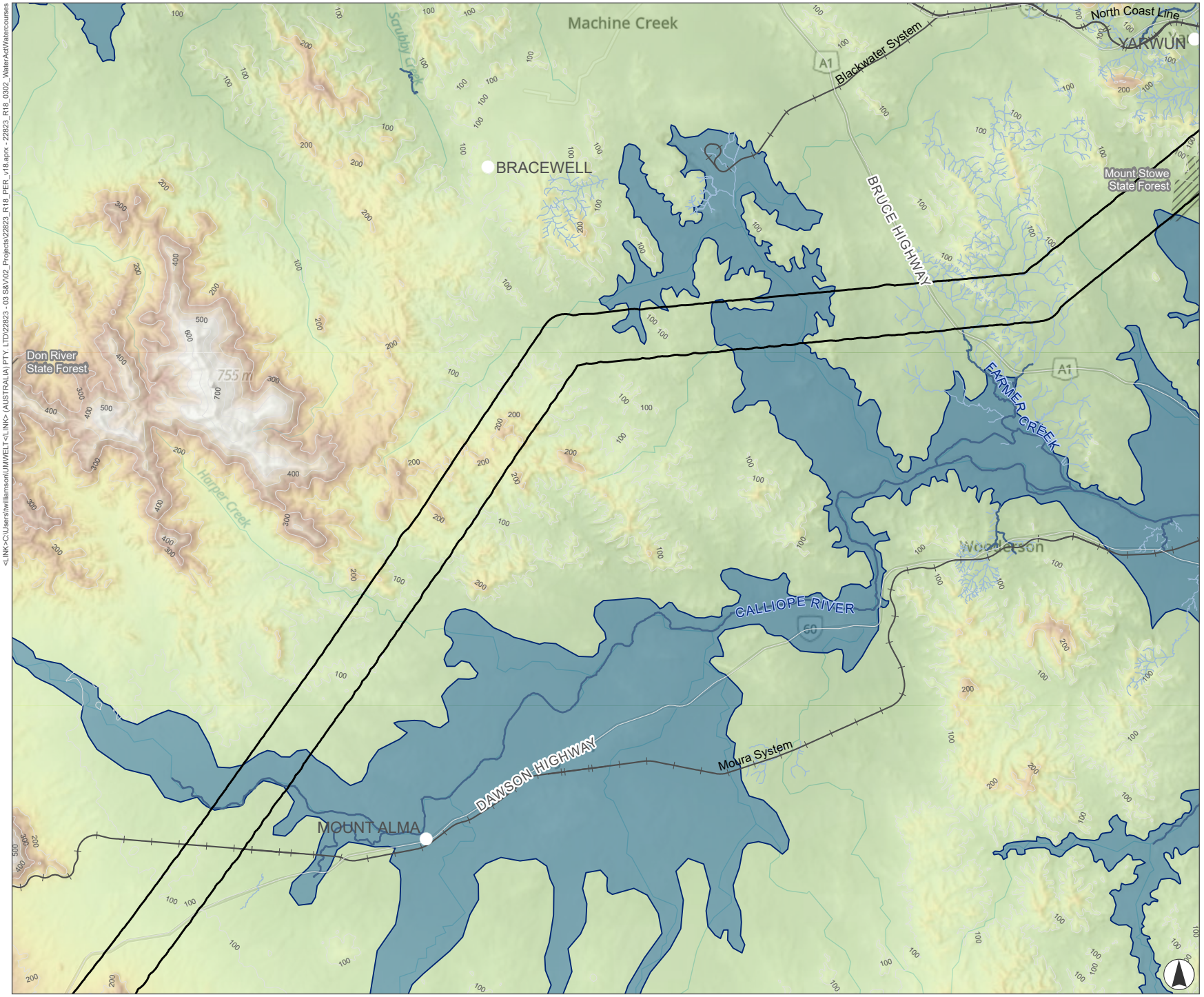


FIGURE 3.2

Water Act Watercourse identification map, Sections B - C

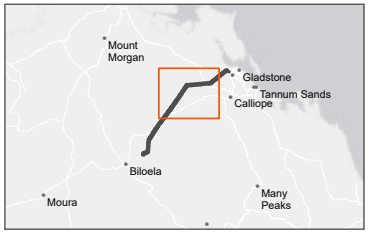
Legend

- Roads
- Railway
- Contours
- Watercourse as defined by Water Act 2000
- Drainage feature as defined by Water Act 2000
- Project Area
- Protected Areas
- Queensland Floodplain Assessment Overlay

Ground Elevation (mAHD)

740.000

10.000



0 2.5 5 7.5

Kilometres

Scale 1:175,000 at A4
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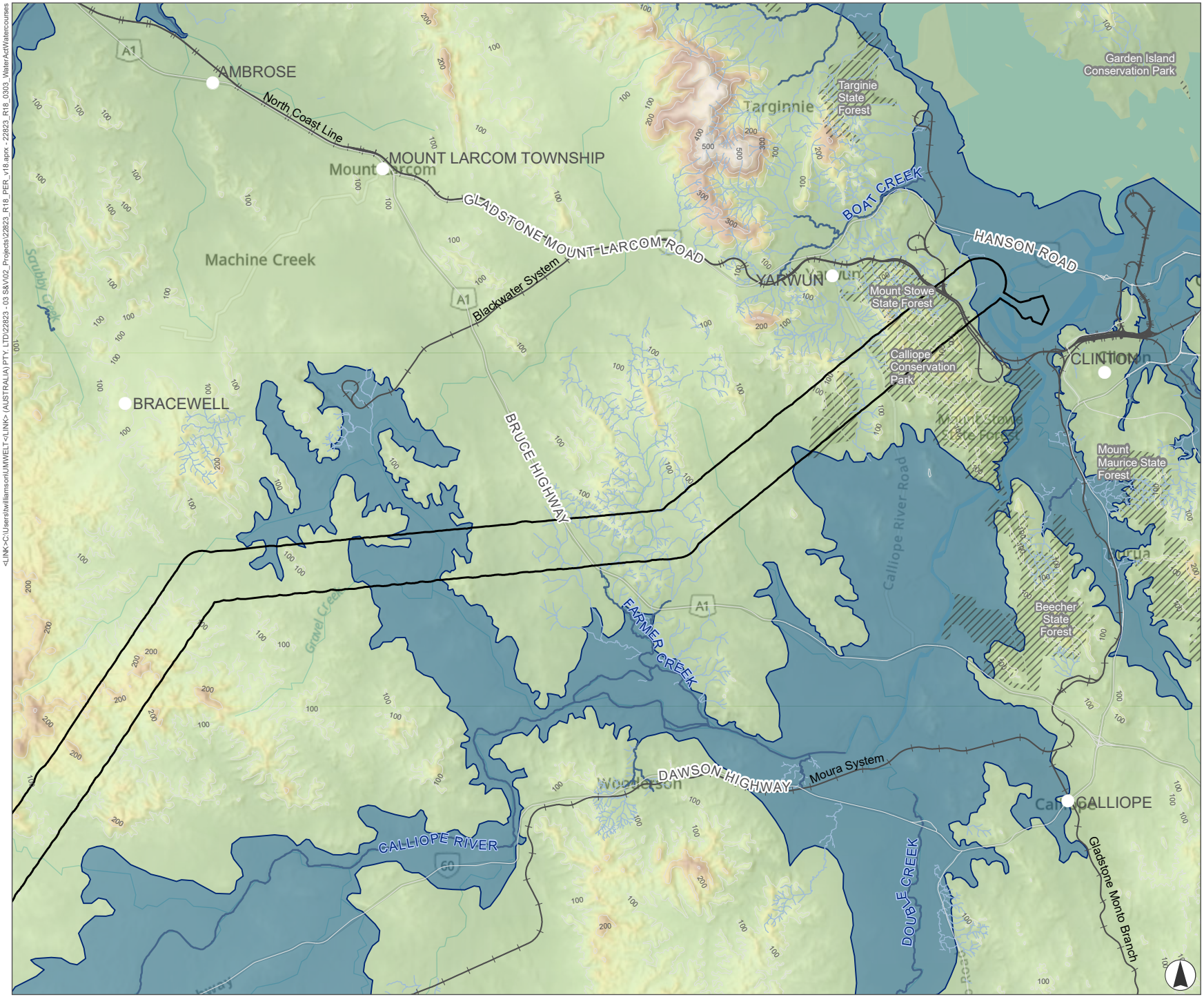


FIGURE 3.3

Water Act Watercourse identification map, Sections C - E

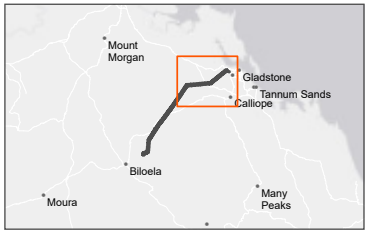
Legend

- Roads
- Railway
- Contours
- Watercourse as defined by Water Act 2000
- Drainage feature as defined by Water Act 2000
- Project Area
- Protected Areas
- Queensland Floodplain Assessment Overlay

Ground Elevation (mAHD)

600.000

10.000



0 2.5 5 7.5

Kilometres

Scale 1:175,000 at A4
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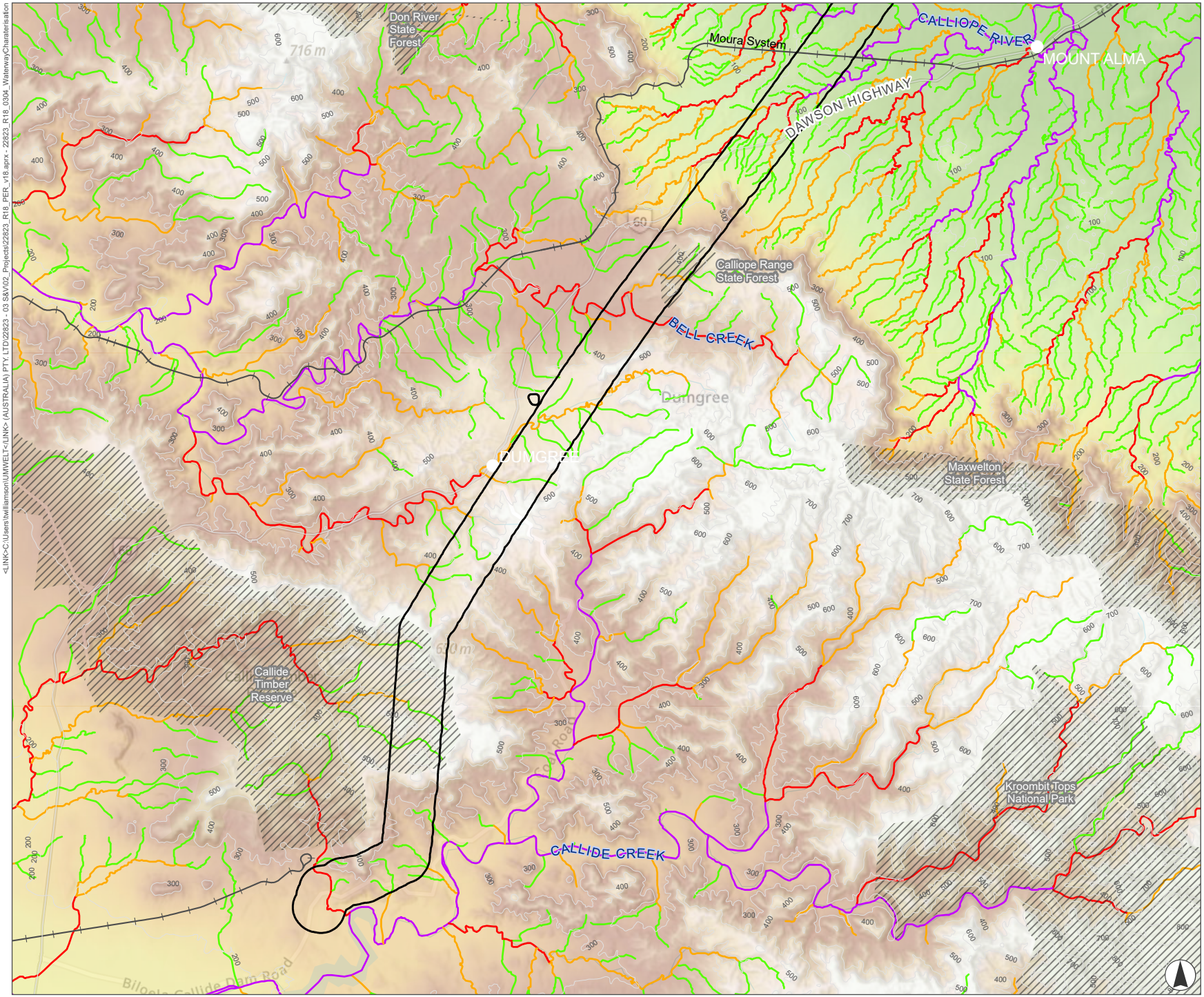


FIGURE 3.4

Waterway characterisation map (waterway barrier works), Sections A - B

Legend

- 50m Contours
- Roads
- Railway
- Project Area
- Protected Areas

Queensland waterways for waterway barrier works

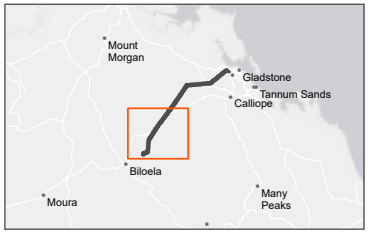
- Major
- High
- Moderate
- Low

Ground Elevation (mAHD)

890.000

58.156

- Town
- Watercourse
- Watercourses



0 2.5 5 7.5

Kilometres

Scale 1:175,000 at A4
GDA 1994 MGA Zone 56

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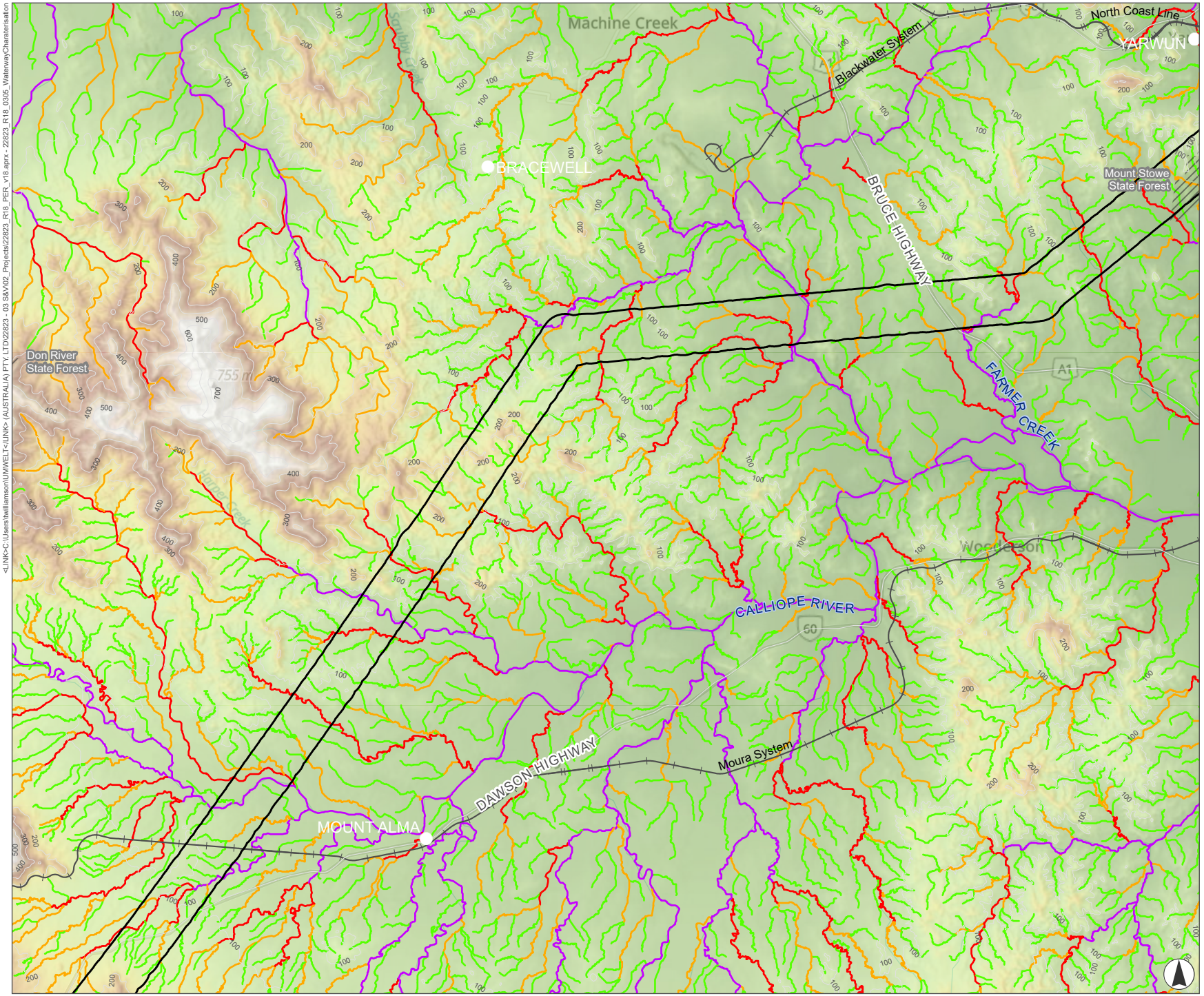


FIGURE 3.5

Waterway characterisation map (waterway barrier works), Sections B - C

Legend

- 50m Contours
- Roads
- Railway
- Project Area
- Protected Areas

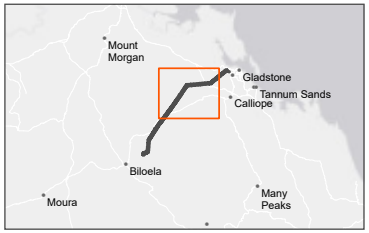
Queensland waterways for waterway barrier works

- Major
- High
- Moderate
- Low

Ground Elevation (mAHD)

740.000

10.000



0 2.5 5 7.5

Kilometres

Scale 1:175,000 at A4
GDA 1994 MGA Zone 56

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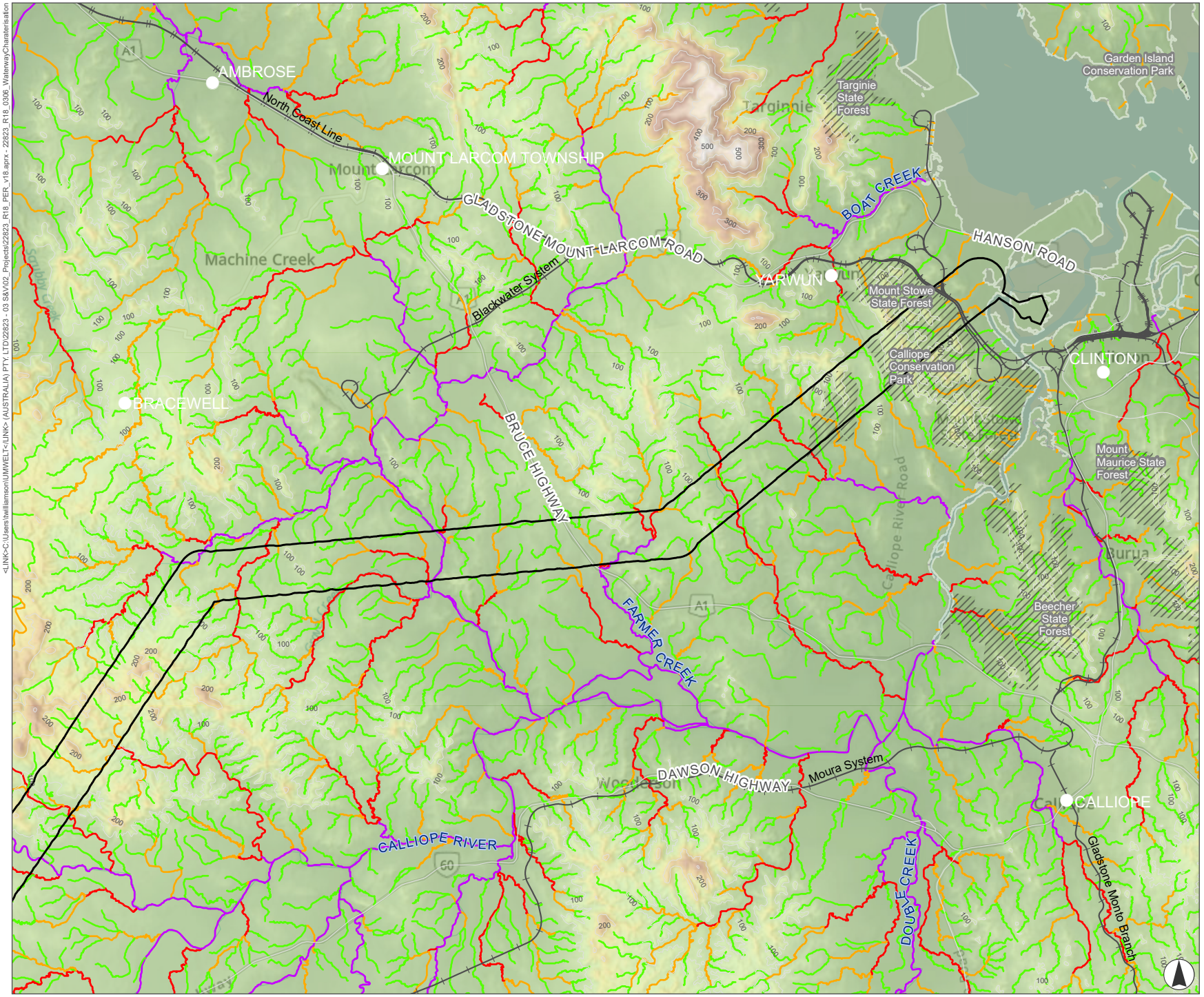


FIGURE 3.6

Waterway characterisation map (waterway barrier works), Sections C - E

Legend

- 50m Contours
- Roads
- Railway
- Project Area
- Protected Areas

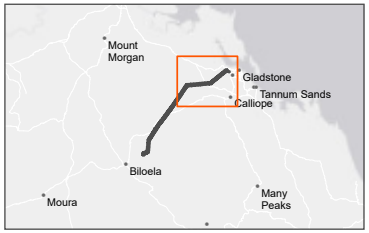
Queensland waterways for waterway barrier works

- Major (Tidal)
- Major (Tidal)
- Major
- High
- Moderate
- Low

Ground Elevation (mAHD)

600.000

10.000



0 2.5 5 7.5

Kilometres

Scale 1:175,000 at A4
GDA 1994 MGA Zone 56

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3.2.2 Flooding

Parts of Sections B, C, D and E are mapped within the Queensland Floodplain Assessment Overlay as containing flood prone areas as shown in **Figure 3.1** to **Figure 3.3**.

The closest active stream gauge to the Project Area is Castlehope (station number GS132001A), located downstream of the Project Area. The Castlehope gauge is the only streamflow gauging station currently in operation in the Calliope River basin. It was opened in 1938 and has a catchment area of 1,288 km^2. The Calliope River at Mount Alma gauge (132002A) operated from 1968 to 1988. It is located in the upper catchment and has a catchment area of only 165 km^2. While flood history was available for the Calliope River at the Castlehope gauge, this dataset provides only regionalised information on typical flood behaviour (**Appendix D**).

3.2.3 Water Plans

Water plans developed under the Water Act set out requirements and frameworks for water availability, water entitlements including take, priorities and mechanisms for future water requirement. The Project Area is located within water plan areas regulated by the Water Plan (Calliope River Basin) 2006 (State of Queensland, 2016) and Water Plan (Fitzroy Basin) 2011 (State of Queenland, 2022).

The Project is mostly located within the Calliope River Basin area and the purpose of the Water Plan (Calliope River Basin) 2006 is to:

- Define the availability of water in the plan area
- Provide a framework for sustainably managing water and the taking of water
- Identify priorities and mechanisms for addressing future water requirements
- Reverse, where practicable, degradation that has occurred in natural ecosystems
- Regulate the capture and use of overland flow (i.e., surface runoff not contained in watercourses).

3.3 Soils and Geology

3.3.1 Geology

Geological units mapped across the Project Area are described in **Table 3.3**.

Table 3.3 Geology

Geological Unit	Dominant Rock Type	Locality
Lochenbar Formation	Mixed volcanic and sedimentary rocks	Section A
Man-made Deposits	Man-made deposits (tailings, landfill, mine dumps etc)	Section A
Youlambie Conglomerate	Arenite-rudite	Section A and B
Rv-YARROL/SCAG	Mixed sedimentary rocks and felsites	Section B
Callide Coal Measures	Sedimentary rock	Section B
Precipice Sandstone	Arenite	Section B
Tb-QLD	Basalt	Section B

Geological Unit	Dominant Rock Type	Locality
Three Moon Conglomerate	Mixed volcanic and sedimentary rocks	Section B
Rocky Point Granodiorite	Granitoid	Section B
Wyalla Granite	Granitoid	Section B
Qa-QLD	Alluvium	Section B, C, D and E
Mount Alma Formation	Arenite-mudrock	Section B, C and D
Erebus Beds	Sedimentary rock	Section C
Rockhampton Group	Sedimentary rock	Section D
Doonside Formation	Arenite-mudrock	Section D
Qr\s-QLD	Colluvium	Section E
Qhe/m-YARROL/SCAG	Miscellaneous unconsolidated sediments	Section E

3.3.2 Soils

A total of 8 Australian Soil Classification (ASC) soil orders occur along the alignment of the Project (Queensland Globe, 2025). These soil orders are listed below, along with their typical qualities in a Queensland context:

- **Hydrosol**–Waterlogged soils, typically grey to greenish-grey, saturated for extended periods. Rare (<1% of Qld), mainly coastal but also occur in inland wetlands subject to periodic inundation.
- **Dermosol**–Loam to clay soils, coloured red, brown, yellow, grey or black. Common in higher-rainfall coastal/sub-coastal regions (e.g. Burdekin delta, Lockyer and Fassifern valleys). Generally fertile and versatile for agriculture.
- **Sodosol**–Texture-contrast soils with sodic, impermeable subsoils. Widespread in inland Qld. Low in nutrients, highly erosion-prone, and susceptible to dryland salinity when vegetation is cleared.
- **Tenosol**–Weakly developed soils with shallow, stony profiles, low fertility, and low water-holding capacity. Defined by minimal B horizon development, sometimes with bleached layers. Widespread, especially inland from Cairns.
- **Chromosol**–Texture-contrast soils with neutral to acid subsoils. Occur extensively west of the Great Dividing Range, particularly in the Western Downs and Maranoa districts. Generally moderate agricultural potential.
- **Kandosol**–Massive earths (red, yellow, grey) with sandy to loamy surfaces grading to porous clay subsoils. Low fertility and water-holding capacity, but support crops under irrigation and grazing around Charleville and mulga country.
- **Rudosol**–Very shallow, stony soils with minimal profile development, low fertility, and poor water retention. Essentially weathered parent material with surface organic matter. Widespread but agriculturally limited.
- **Vertosol**–Cracking clays (brown, grey, black), highly fertile with large water-holding capacity. Characterised by gilgai microrelief. The most widespread soil in Queensland, dominant in Darling Downs and Central Highlands, associated with brigalow forests.

Table 3.4 breaks down the ASC soil units present within the Project Area and **Figure 3.7** illustrates the distribution of soil type across the Project.

Table 3.4 ASC Soil Unit Descriptions Occurrences throughout the Project Area

Soil Order	ASC Unit	ASC Unit Description
Hydrosols	Carpentaria	Marine plains with extensive supratidal flats, bare or with halophytes, and mangrove covered intertidal flats of saline muds, silts and sands, tidal streams, and extratidal flats of grey mottled, saline clays with samphire and marine couch.
Dermosols	Terise	Gently undulating rises and plains on sedimentary rocks with deep, red structured loams and sodic texture contrast soils and eucalypt woodland.
	Fanside	Undulating rises and footslopes below hills on sedimentary rocks and gently undulating colluvial fans of unconsolidated sediments with red structured gradational soils and grey, mottled, structured gradational silty clay loams and eucalypt woodland.
	Muldoon	Shallow to moderately deep, gravelly clay loamy or clayey surface grading to a red or brown structured clay subsoil.
	Carrara	Undulating to rolling low hills and rises on sedimentary rocks with gravelly loams and clay loams and bleached, sodic texture contrast soils and narrow-leaved ironbark woodland in the south.
	Wycheproof	Undulating rises and low hills on sedimentary rocks and greenstone, with saline seepage in lower slopes and drainage lines, with shallow, brown, structured, clay loams and clays and shallow, gravelly, massive loams and ironbark woodland and gum-topped box woodland.
	Moore	Steep to rolling hills and rises on dipping sedimentary rocks; with shallow, gravelly, brown, red or dark, structured clay loams and clays, and softwood scrub.
	Chalmers	Rolling to steep hills overlying acid and intermediate volcanic and steeply dipping volcaniclastic sedimentary rocks with eucalypt woodland on shallow, gravelly structured clay loams and clays.
Sodosols	1	Stream alluvia; level to undulating river terraces and floodplains.
	Lorna	Bleached clay loamy surface over yellowish brown clay subsoil.
	Awoonga	Gravelly bleached clay loamy surface over alkaline mottled brown sodic clay subsoil.
	Nulgi	Broad, level alluvial plains associated with fine grained sedimentary rocks with bleached, silty and loamy surface, sodic, texture contrast soils and sodic, grey cracking clays with gilgai and gum-topped box woodland and blue gum woodland.
	Bouldercombe	Undulating granite country with mostly shallow soils and eucalypt woodland, mainly near Camboon but small areas near Rockhampton.
	Ohio	Strongly undulating volcanic country, mainly with silver-leaved ironbark, in the east and north-east.

Soil Order	ASC Unit	ASC Unit Description
Tenosols	Rundle	Steep to rolling hills on sedimentary rocks with shallow, gravelly loams and clay loams and red texture contrast soils and eucalypt woodland with understorey.
Chromosols	Boyles	Gravelly clay loamy surface over brown or yellowish brown clay subsoil.
	Calliope	Broad level alluvial plains with clay loamy surface, black and brown texture contrast soils and grey or brown cracking clays and blue gum woodland.
	Galloway	Gently undulating rises and plains, isolated low hills and local alluvial flats on granitic rocks with shallow, brown texture contrast soils and silver-leaved ironbark, gum-topped bloodwood woodland, and with bleached sandy surface, sodic texture contrast soils and poplar box woodland.
	Nankin	Narrow alluvial plains and valley flats with blue gum woodland on brown or red texture contrast soils, and brown gradational clay loams and uniform clays.
	Redshirt	Undulating rises on granitic rocks, with shallow, red texture contrast soils and silver-leaved ironbark and gum-topped bloodwood woodland.
	Glassford	Steep to rolling hills on granitic rocks with shallow, brown or red texture contrast soils and massive, coarse sandy and loamy soils, and eucalypt woodland.
Kandosols	Beaks	Gravelly loamy surface grading to a gravelly brown or red clay loamy massive subsoil.
Rudosol	Hillmore	Volcanic country with eucalypt woodlands in the north-eastern quarter.
	Gelobera	Volcanic hills and mountains with eucalypt forest in north-east.
Vertosols	Dakenba	Brigalow country on alluvium, mainly associated with the Dawson River.
	Banana	Undulating plains with softwood scrub, brigalow, and eucalypt woodland, mainly in the north-eastern quarter.

Vertosol and sodosol soils are considered to be more susceptible to erosion due to the dispersive nature of these soils. Rocky soils are associated with the steeper mountain terrain areas.

The Project Area is mapped as having predominant Dermosol soil from Section C to E, Rudosol from Section A to B, and Sodosol in Section A, and other soil types adjacent.

Sections C to E are characterised as predominantly hard-setting Dermosol with undulating rises and low hills on sedimentary rocks and greenstone, with saline seepage on lower slopes and drainage lines, shallow, brown, structured clay loams and clays, shallow, gravelly, massive loams, and ironbark woodland and gum-topped box woodland. The surface drainage is classified as four, and its permeability is rated as three. Dermosol soils are soils other than vertosols, hydrosols, calcarosols and ferrosols that have B2 horizons that have a grade of pedality throughout a major part of the horizon and do not have a clear textural B horizon.

Section A to B is characterised as being predominantly hard-setting Rudosol with volcanic hills and mountains with eucalypt forest in the north-east. The surface drainage is classed as five, and its permeability is three. Rudosol soils have little to no pedologic organisation. They are a pedal or weakly structured in the A1 horizon and show no pedological colour changes apart from the darkening of an A1 horizon. Additionally, there is little to no texture or colour changes with depth.

Section A is characterised by predominantly hard-setting Sodosol with strongly undulating volcanic country, mainly silver-leaved ironbark, in the east and north-east. The surface drainage is classed as three, and its permeability is one. Sodosol soils have a clear textural B horizon and are sodic and not strongly acidic, which can lead to high erosion risk.

The development of erosion and salinity problems on marginal land has led to land management being identified as a high priority to reduce sediment loads being transported by rivers into the Great Barrier Reef.

Acid sulfate soils (ASS) are commonly found in low-lying coastal areas where the natural ground level is less than 5 m AHD. There is a low to very low probability of encountering ASS within most of the Project Area, as the general topography of the area is around 100 m to 600 m AHD. Section E is located within a low-lying area and ASS are a high probability of occurrence according to the ASRIS and Gladstone Regional Planning Scheme mapping.

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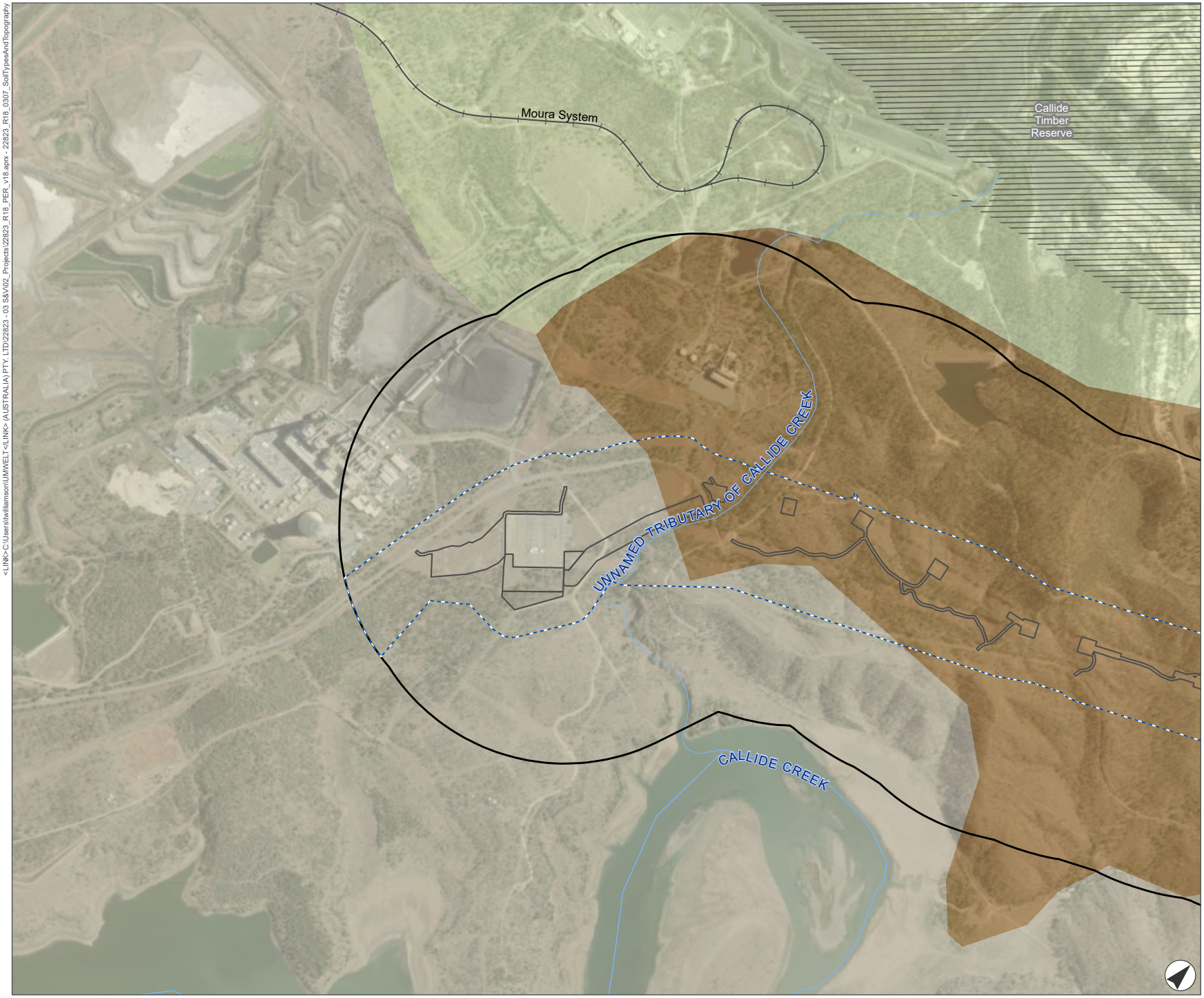


FIGURE 3.7-1

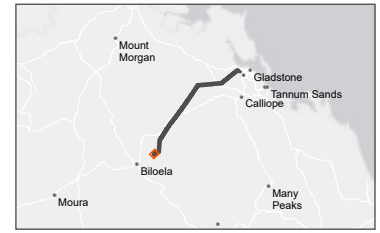
Soil types and Topography within the Project Area

Legend

- Railway
- Watercourse
- Field Survey Extent
- Project Area
- Disturbance Footprint
- Protected Areas

Australian Soil Classification [ASC]

- Rudosol
- Sodosol
- Vertosol



0 0.5 1

Kilometres

Scale 1:20,000 at A4
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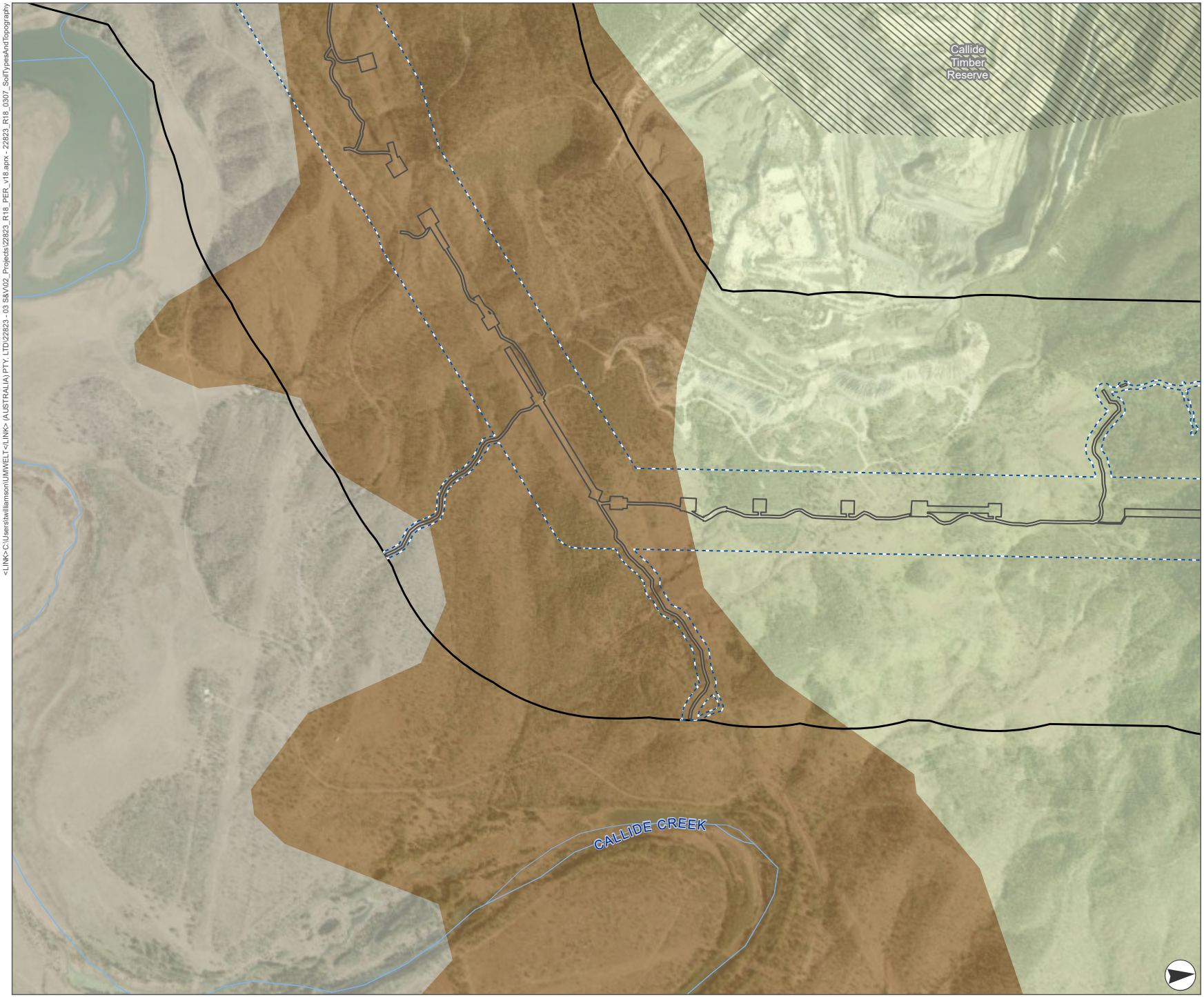


FIGURE 3.7-2

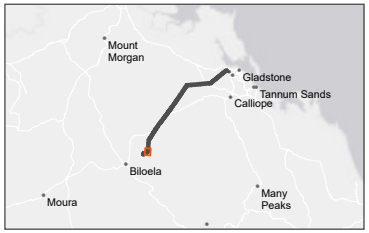
Soil types and Topography within the Project Area

Legend

- Watercourse
- Field Survey Extent
- Project Area
- Disturbance Footprint
- Protected Areas

Australian Soil Classification [ASC]

- Rudosol
- Sodosol
- Vertosol



0 0.5 1

Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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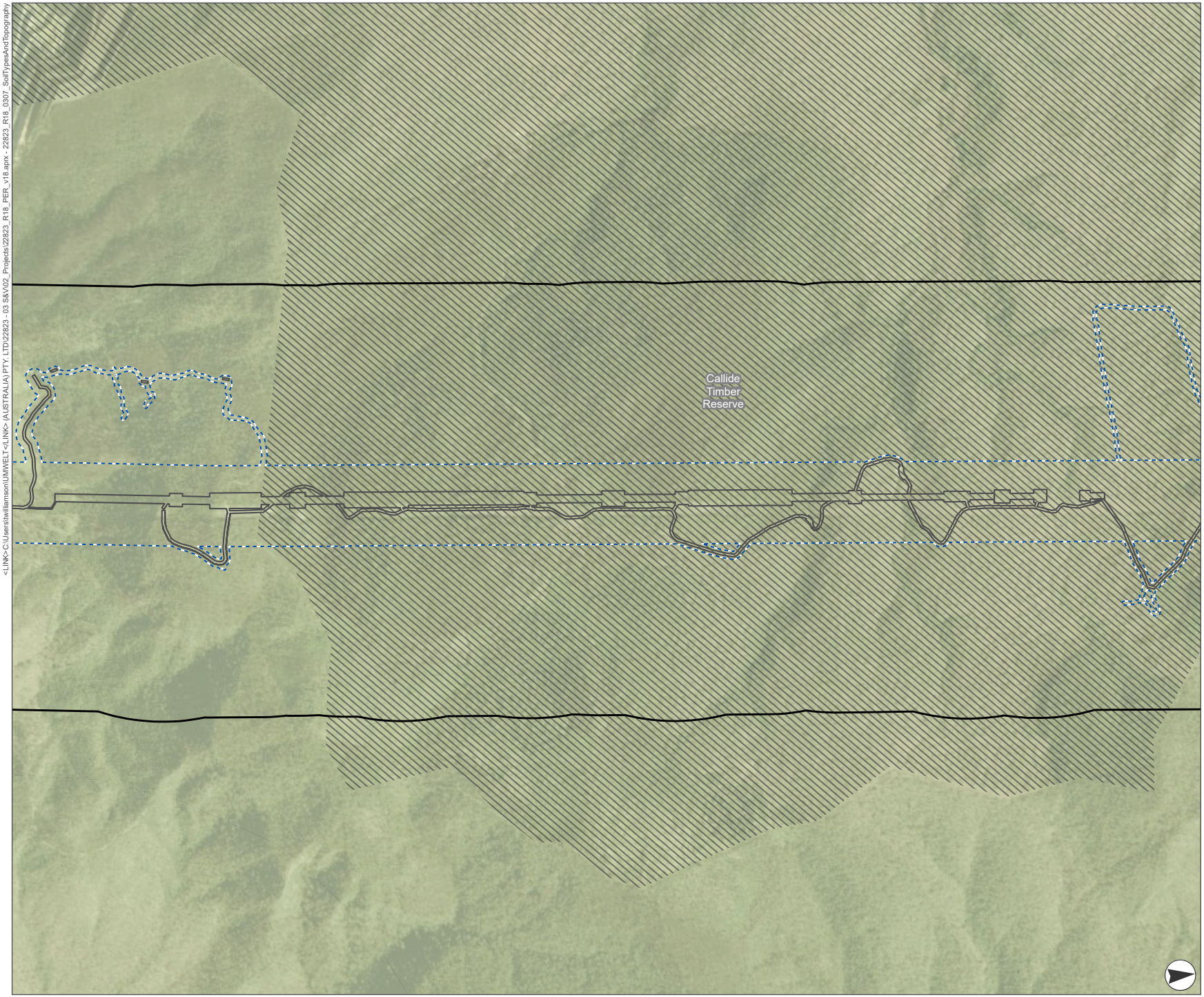


FIGURE 3.7-3

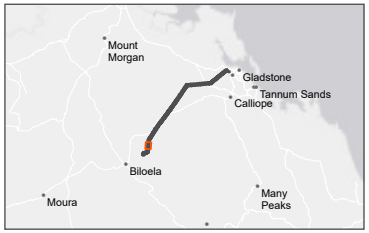
Soil types and Topography within the Project Area

Legend

- Field Survey Extent
- Project Area
- Disturbance Footprint
- Protected Areas

Australian Soil Classification [ASC]

- Rudosol



0 0.5 1

Kilometres

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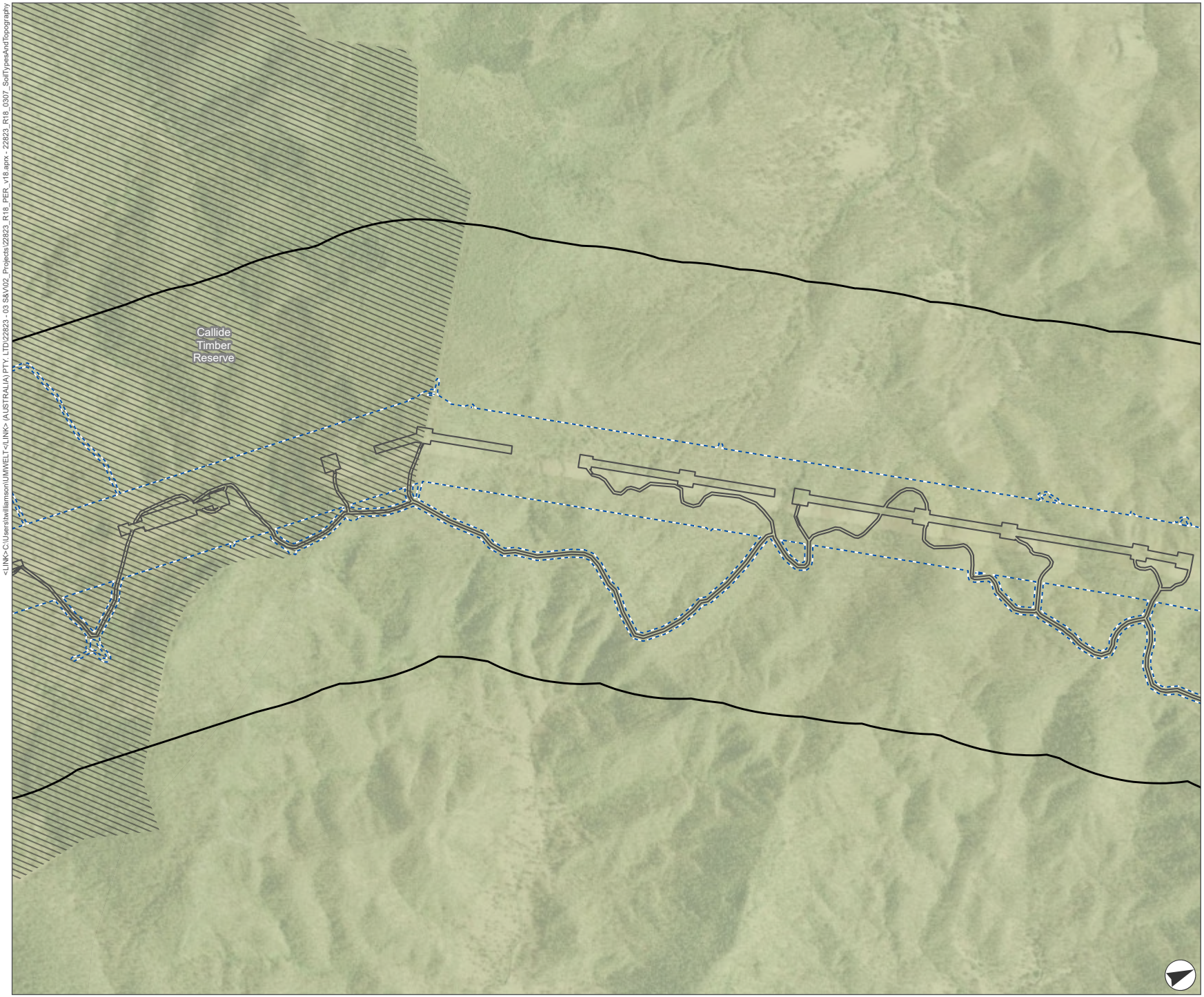


FIGURE 3.7-4

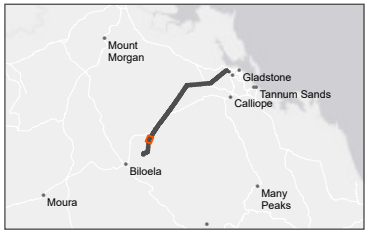
Soil types and Topography within the Project Area

Legend

- Field Survey Extent
- Project Area
- Disturbance Footprint
- Protected Areas

Australian Soil Classification [ASC]

- Rudosol



0 0.5 1

Kilometres

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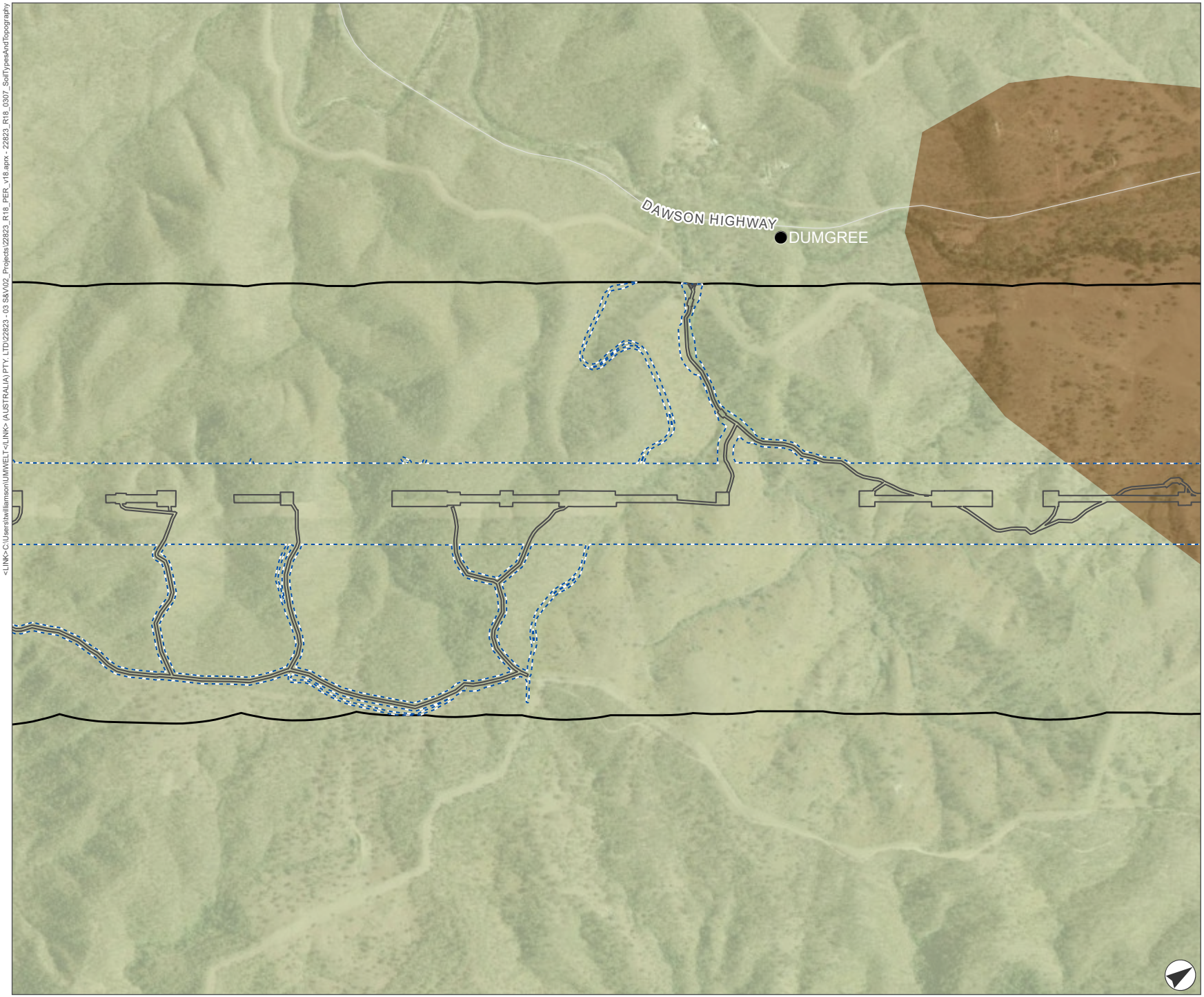


FIGURE 3.7-5

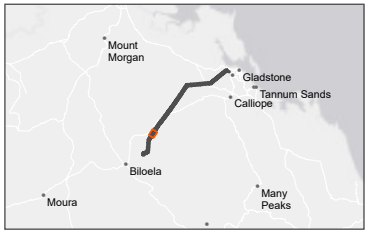
Soil types and Topography within the Project Area

Legend

- Roads
- Field Survey Extent
- Project Area
- Disturbance Footprint

Australian Soil Classification [ASC]

- Rudosol
- Sodosol



0 0.5 1

Kilometres

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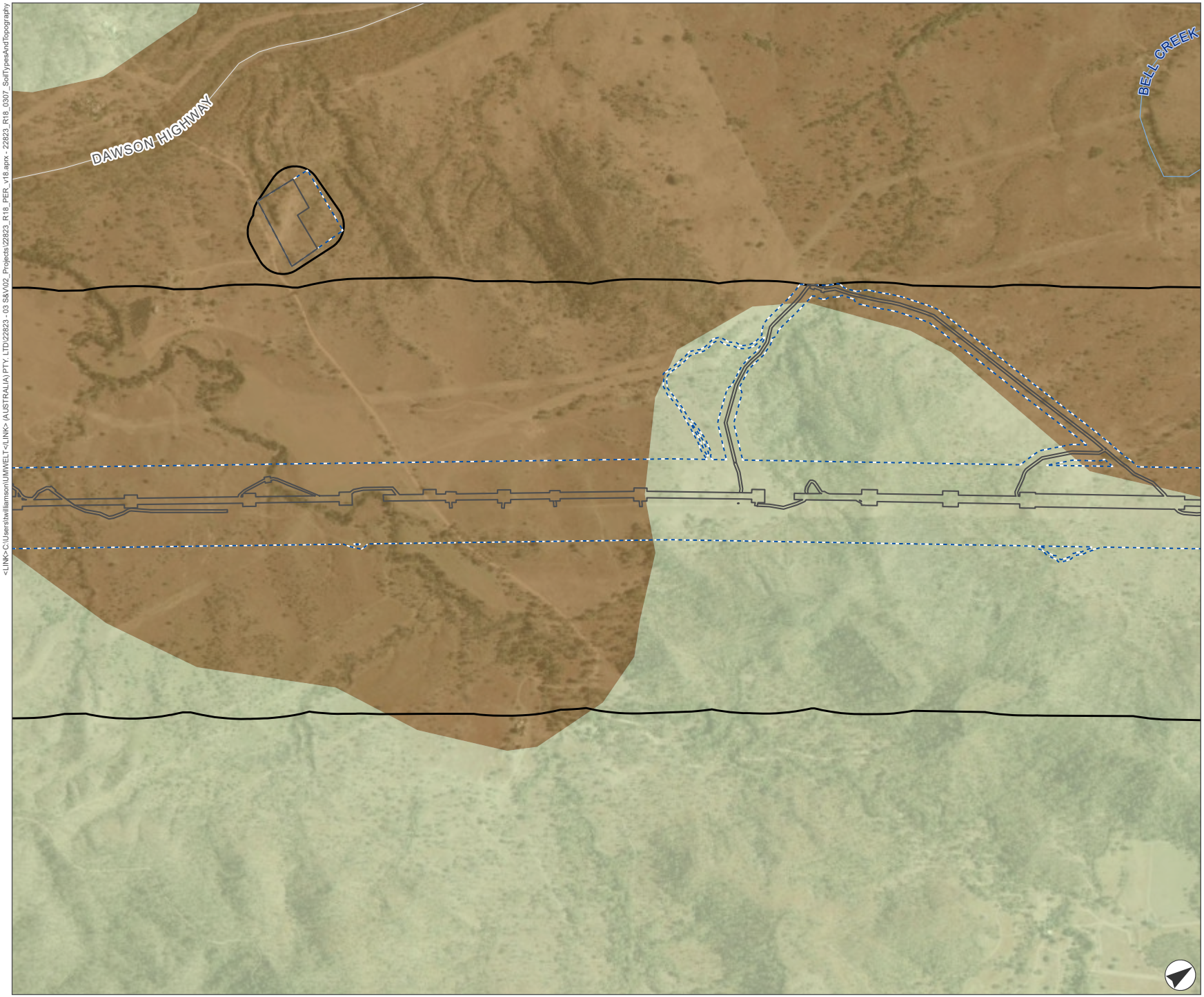


FIGURE 3.7-6

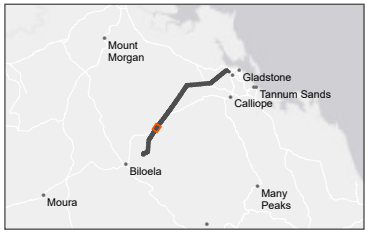
Soil types and Topography within the Project Area

Legend

- Roads
- Watercourse
- Field Survey Extent
- Project Area
- Disturbance Footprint

Australian Soil Classification [ASC]

- Rudosol
- Sodosol



0 0.5 1

Kilometres

Scale 1:20,000 at A4
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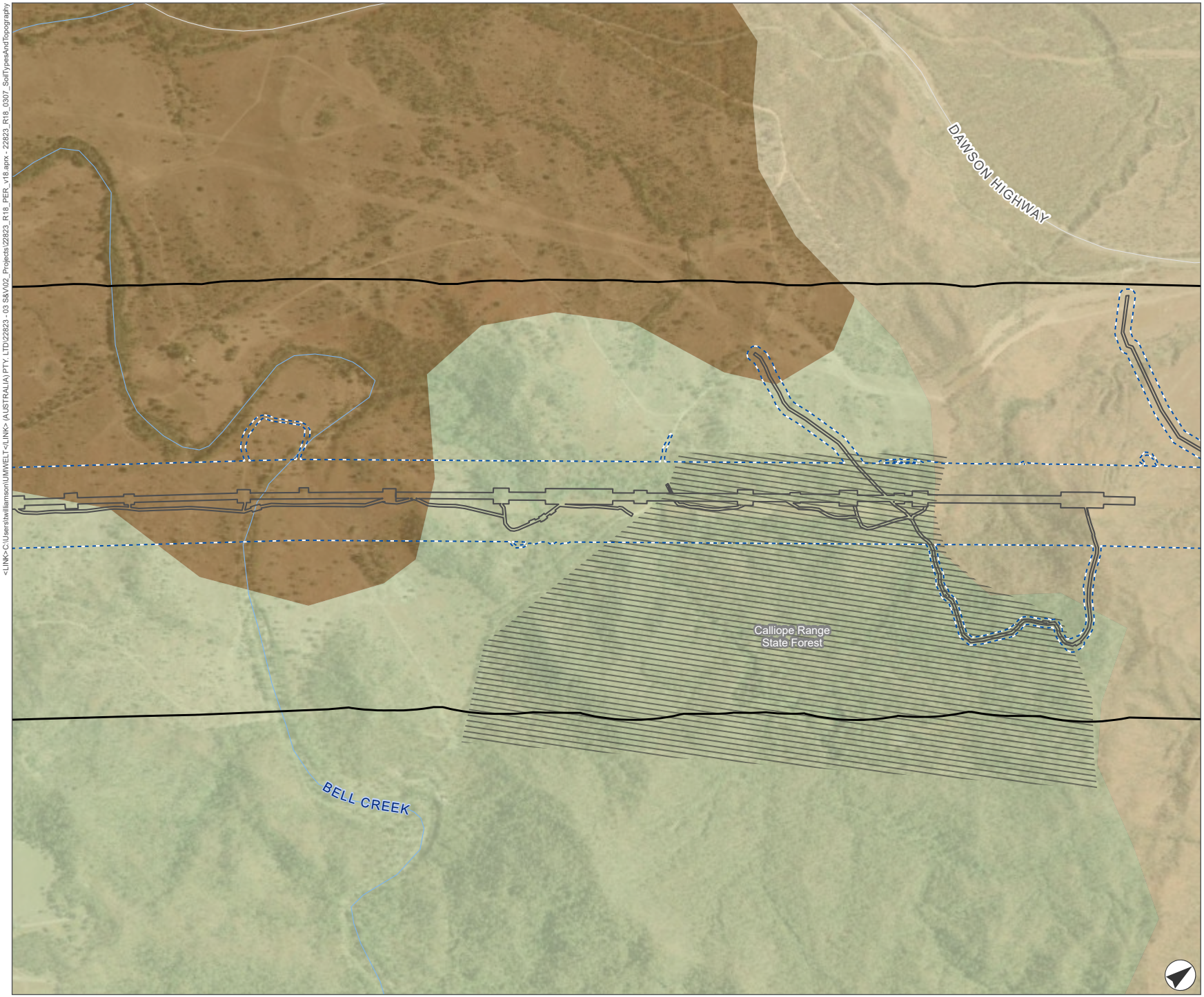


FIGURE 3.7-7

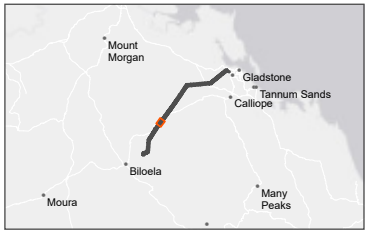
Soil types and Topography within the Project Area

Legend

- Roads
- Watercourse
- Field Survey Extent
- Project Area
- Disturbance Footprint
- Protected Areas

Australian Soil Classification [ASC]

- Chromosol
- Rudosol
- Sodosol



0 0.5 1

Kilometres

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FIGURE 3.7-8

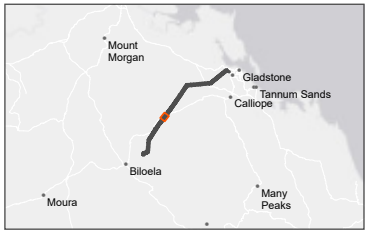
Soil types and Topography within the Project Area

Legend

- Roads
- Field Survey Extent
- Project Area
- Disturbance Footprint

Australian Soil Classification [ASC]

- Chromosol



0 0.5 1

Kilometres

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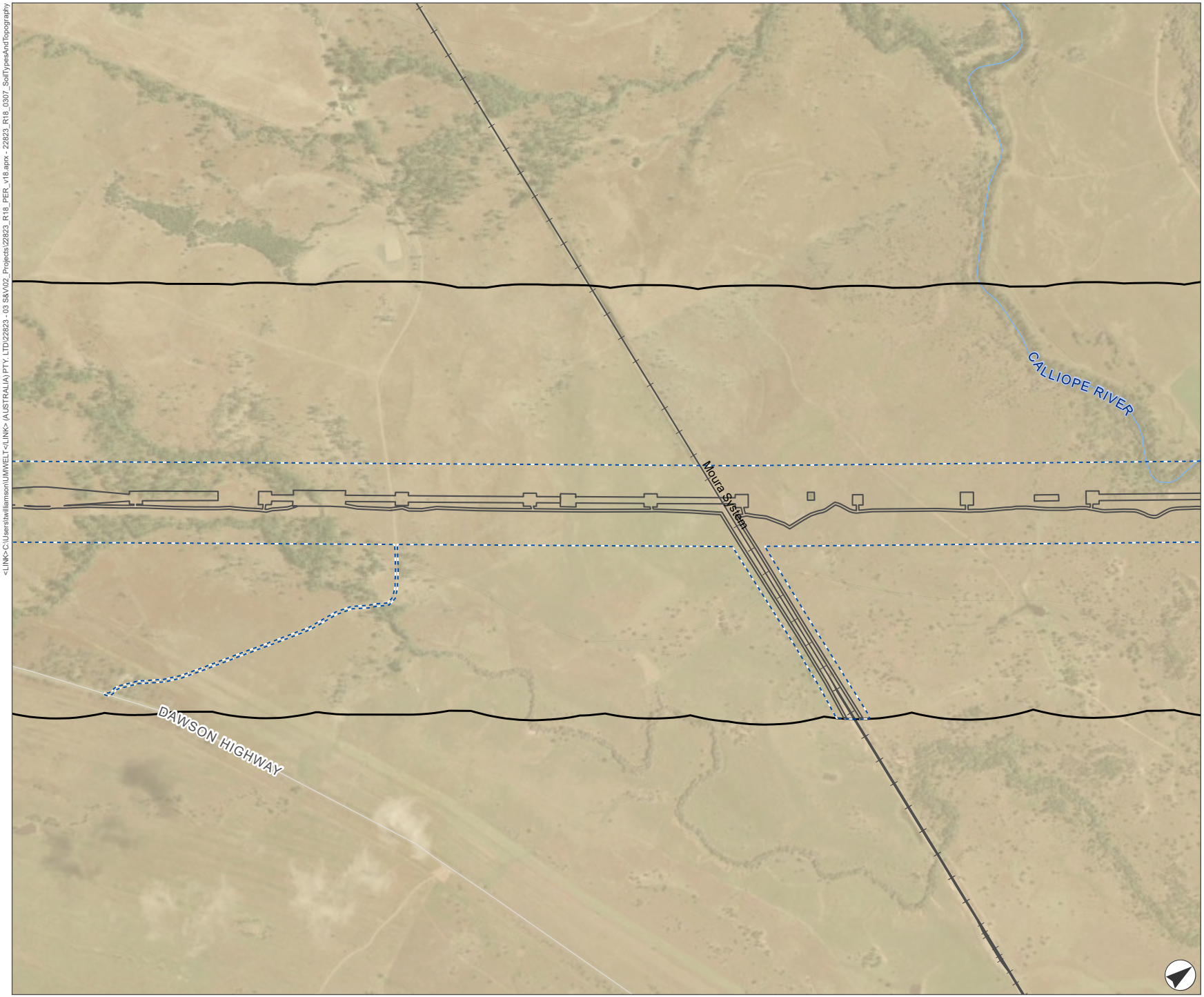


FIGURE 3.7-9

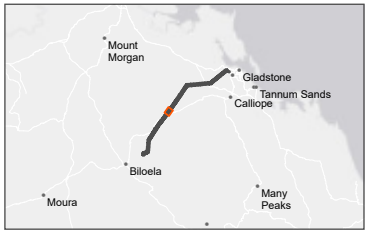
Soil types and Topography within the Project Area

Legend

- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area
- Disturbance Footprint

Australian Soil Classification [ASC]

- Chromosol



0 0.5 1

Kilometres

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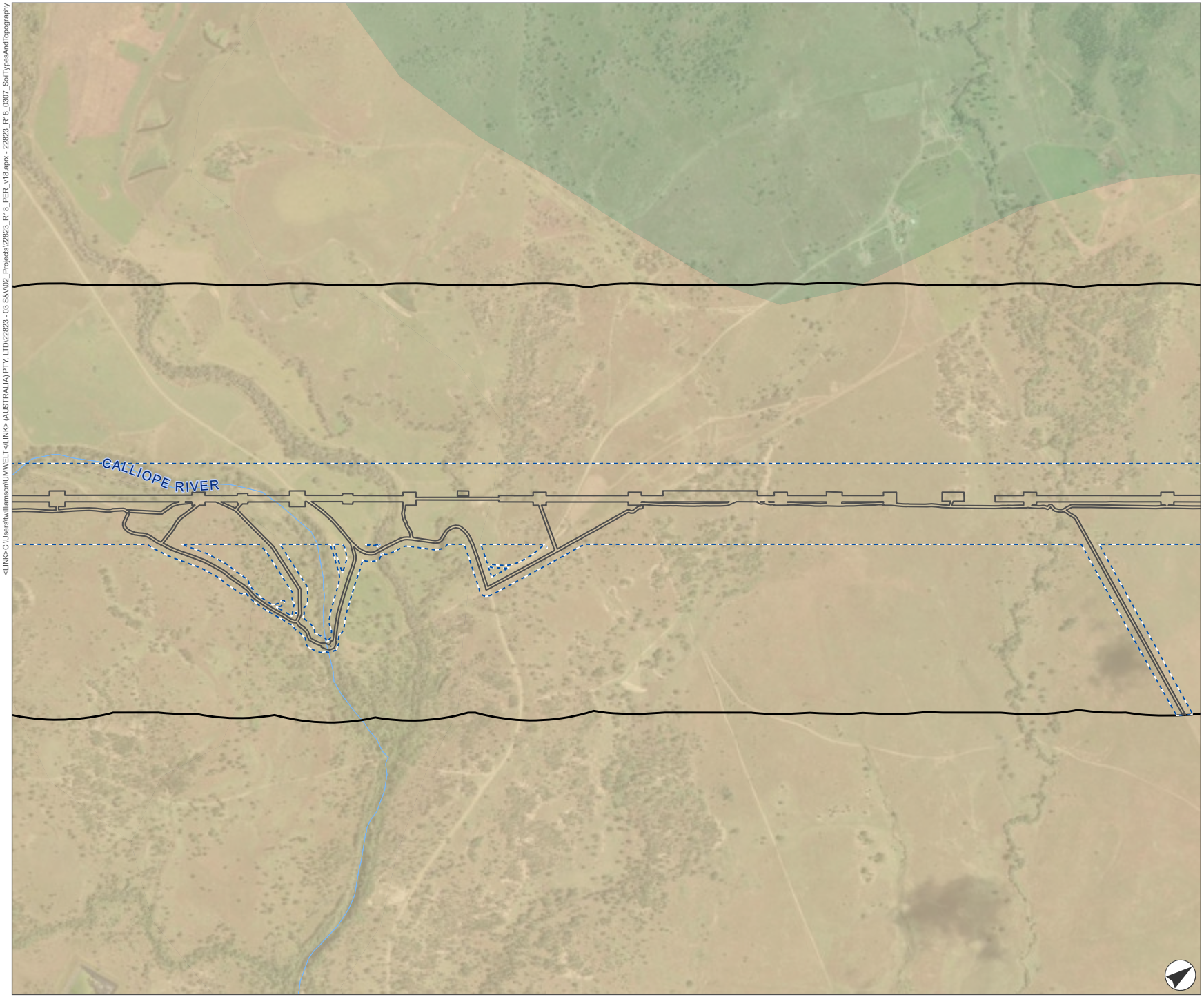


FIGURE 3.7-10

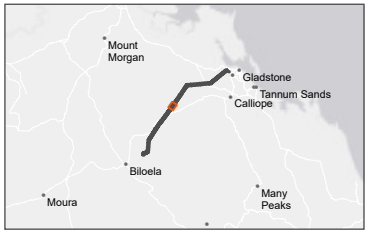
Soil types and Topography within the Project Area

Legend

- Watercourse
- Field Survey Extent
- Project Area
- Disturbance Footprint

Australian Soil Classification [ASC]

- Chromosol
- Dermosol



0 0.5 1

Kilometres

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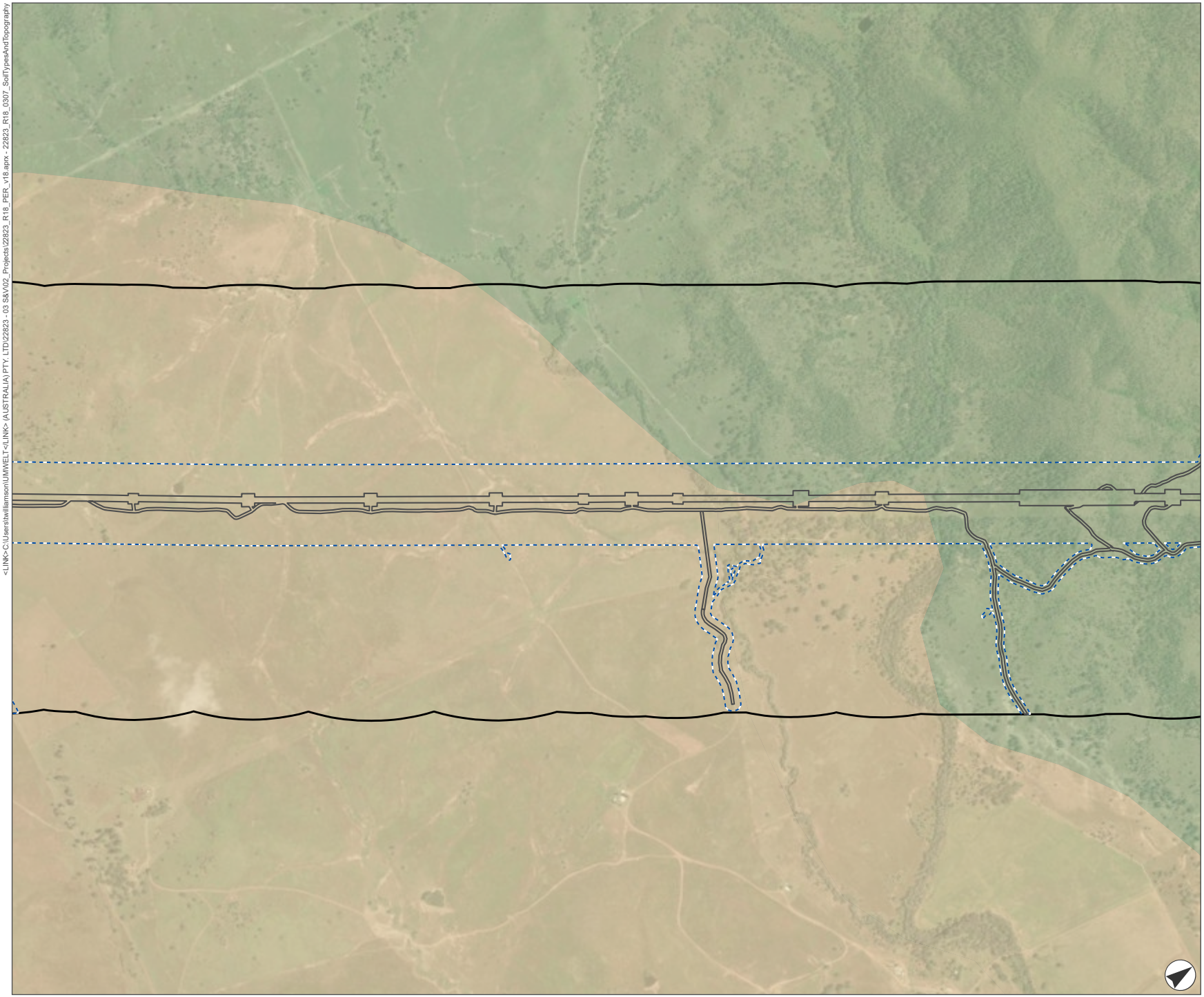


FIGURE 3.7-11

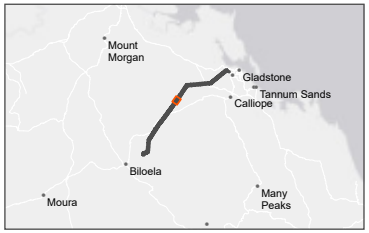
Soil types and Topography within the Project Area

Legend

- Field Survey Extent
- Project Area
- Disturbance Footprint

Australian Soil Classification [ASC]

- Chromosol
- Dermosol



0 0.5 1

Kilometres

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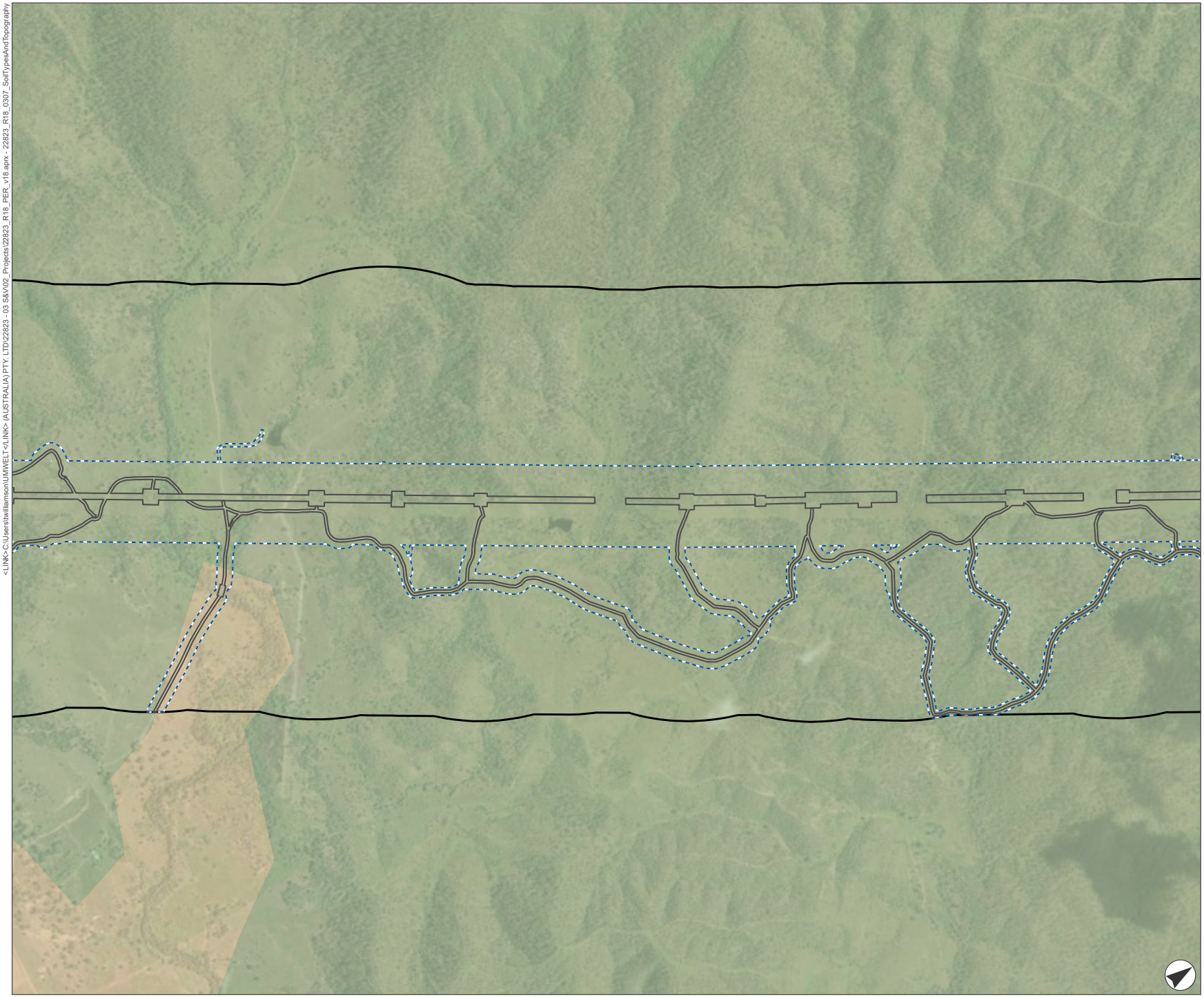


FIGURE 3.7-12

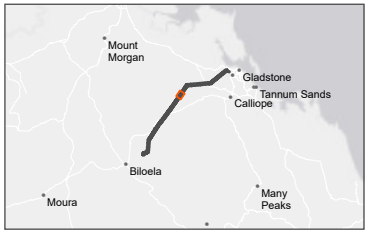
Soil types and Topography within the Project Area

Legend

- Field Survey Extent
- Project Area
- Disturbance Footprint

Australian Soil Classification [ASC]

- Chromosol
- Dermosol



0 0.5 1

Kilometres

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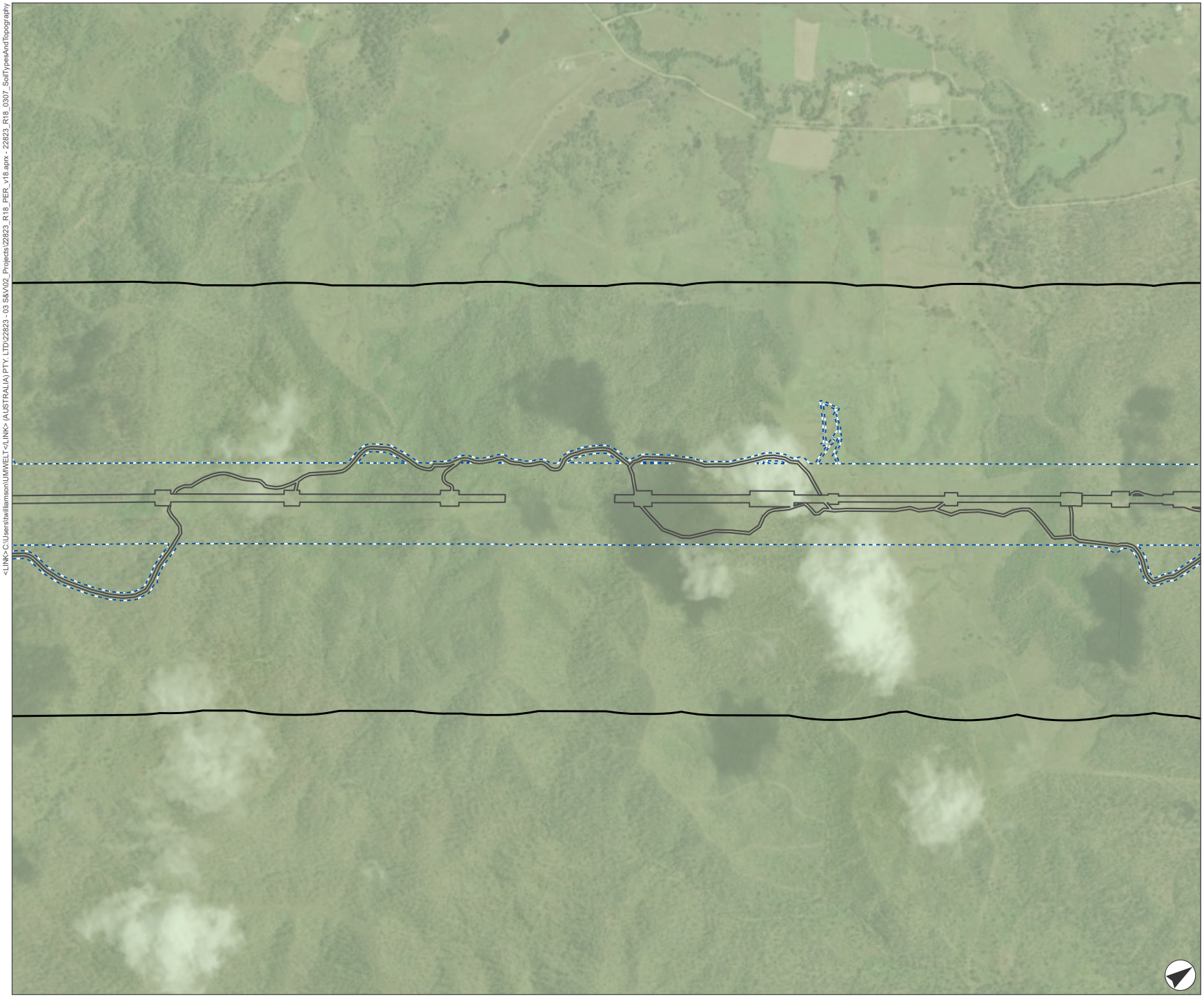


FIGURE 3.7-13

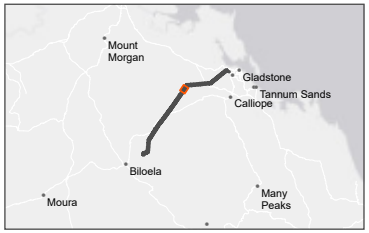
Soil types and Topography within the Project Area

Legend

- Field Survey Extent
- Project Area
- Disturbance Footprint

Australian Soil Classification [ASC]

- Dermosol



0 0.5 1

Kilometres

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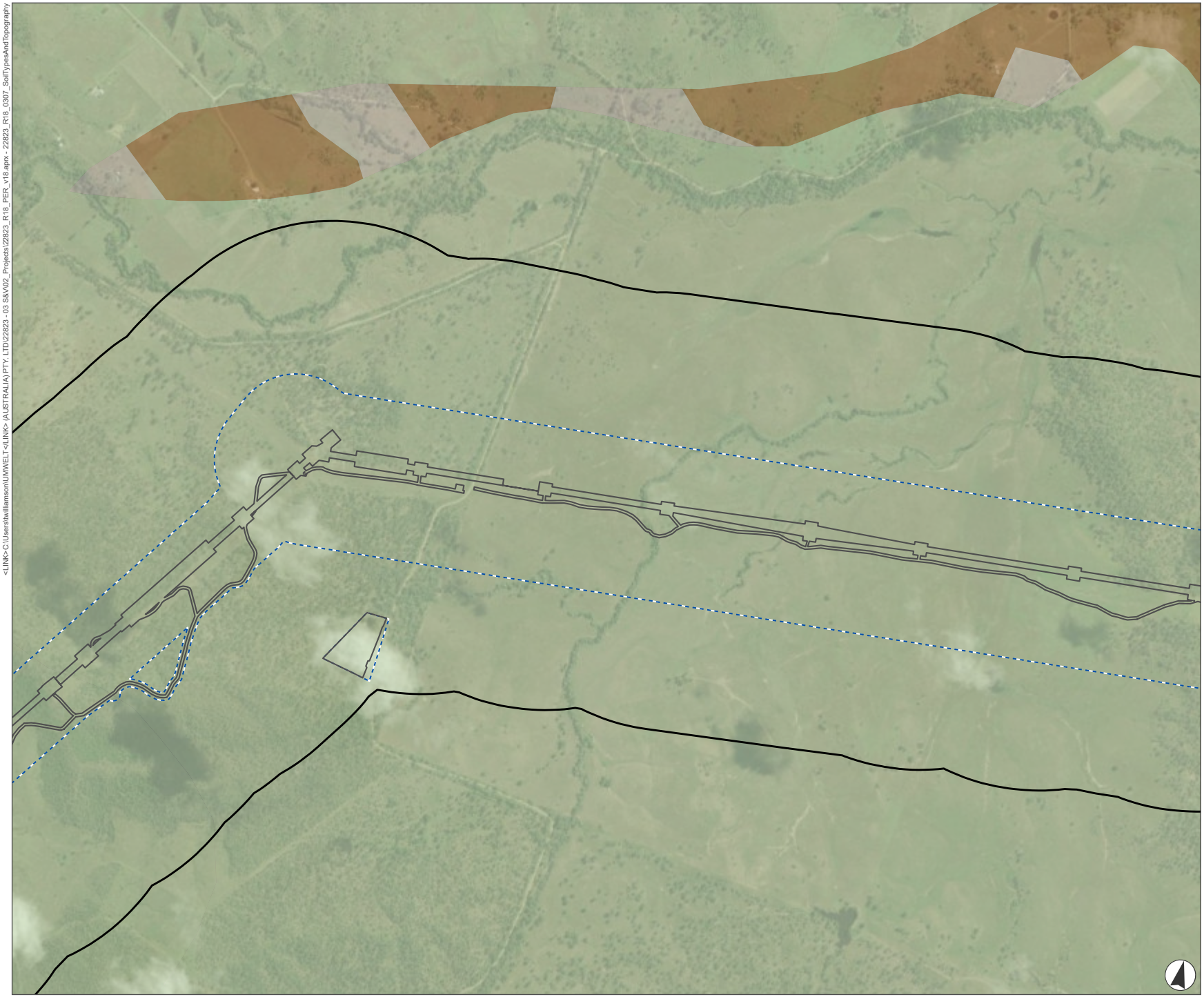


FIGURE 3.7-14

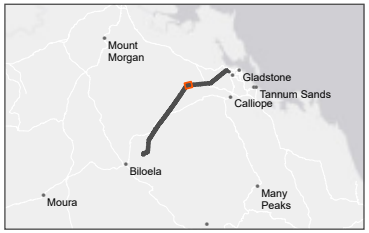
Soil types and Topography within the Project Area

Legend

- Field Survey Extent
- Project Area
- Disturbance Footprint

Australian Soil Classification [ASC]

- Dermosol
- Sodosol
- Vertosol



0 0.5 1

Kilometres

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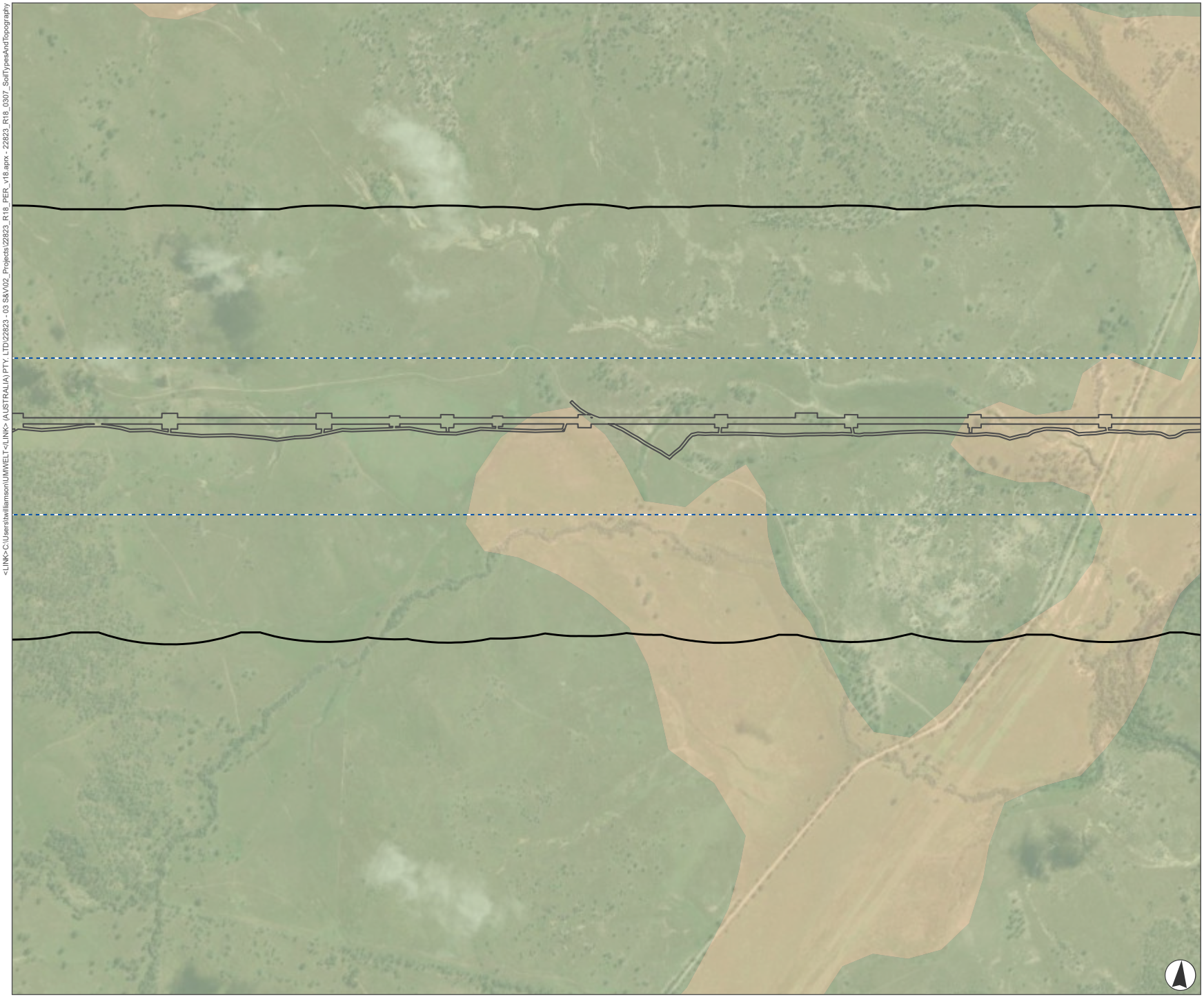


FIGURE 3.7-15

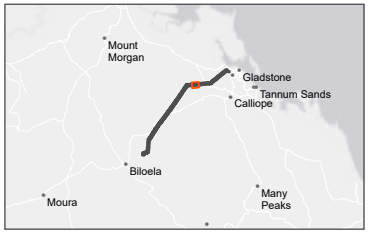
Soil types and Topography within the Project Area

Legend

- Field Survey Extent
- Project Area
- Disturbance Footprint

Australian Soil Classification [ASC]

- Chromosol
- Dermosol



0 0.5 1

Kilometres

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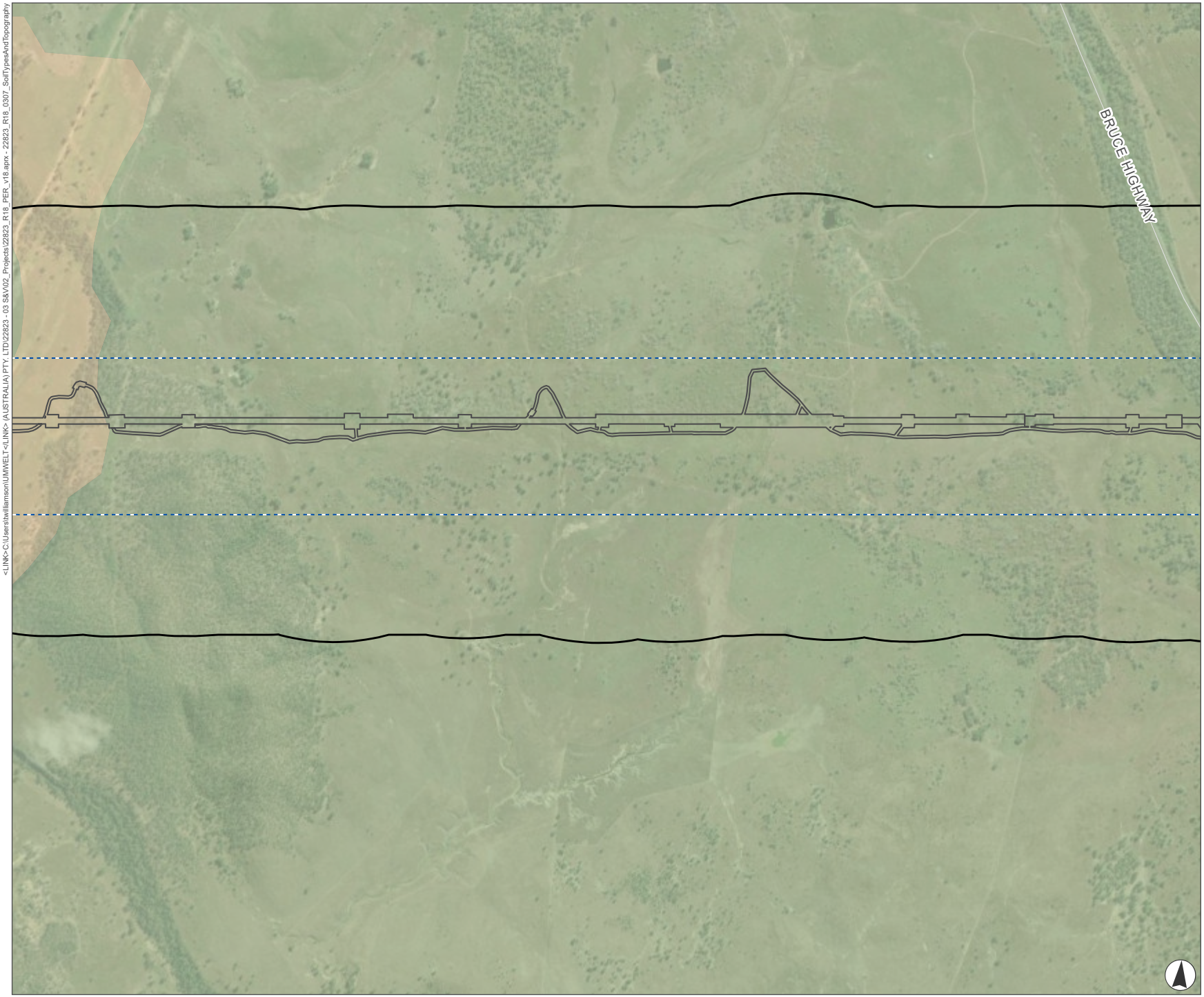


FIGURE 3.7-16

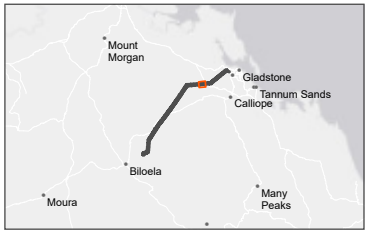
Soil types and Topography within the Project Area

Legend

- Roads
- Field Survey Extent
- Project Area
- Disturbance Footprint

Australian Soil Classification [ASC]

- Chromosol
- Dermosol



0 0.5 1

Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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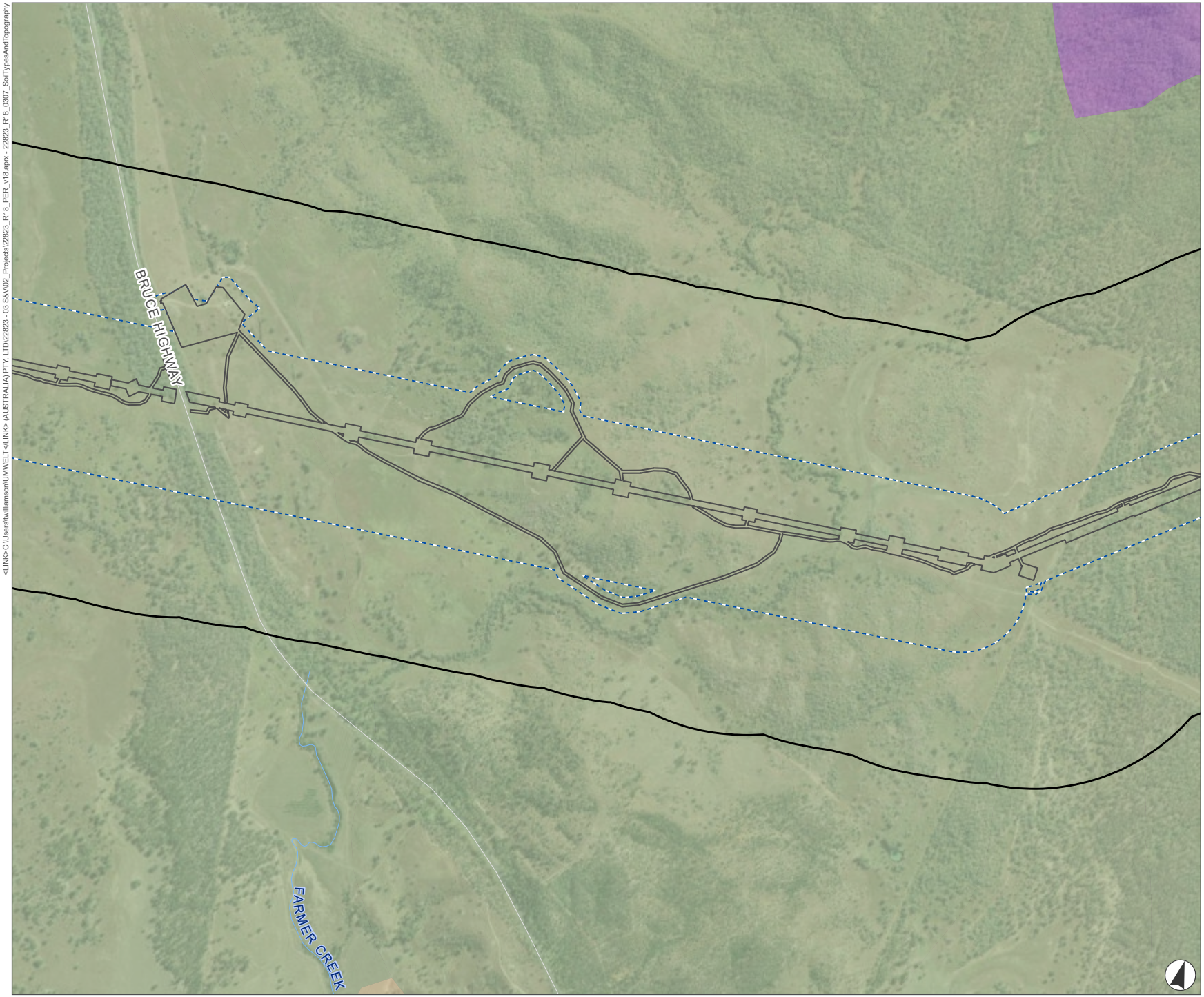
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FIGURE 3.7-17

Soil types and Topography within the Project Area

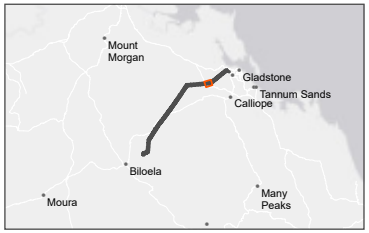


Legend

- Roads
- Field Survey Extent
- Project Area
- Disturbance Footprint

Australian Soil Classification [ASC]

- Chromosol
- Dermosol
- Tenosol



0 0.5 1

Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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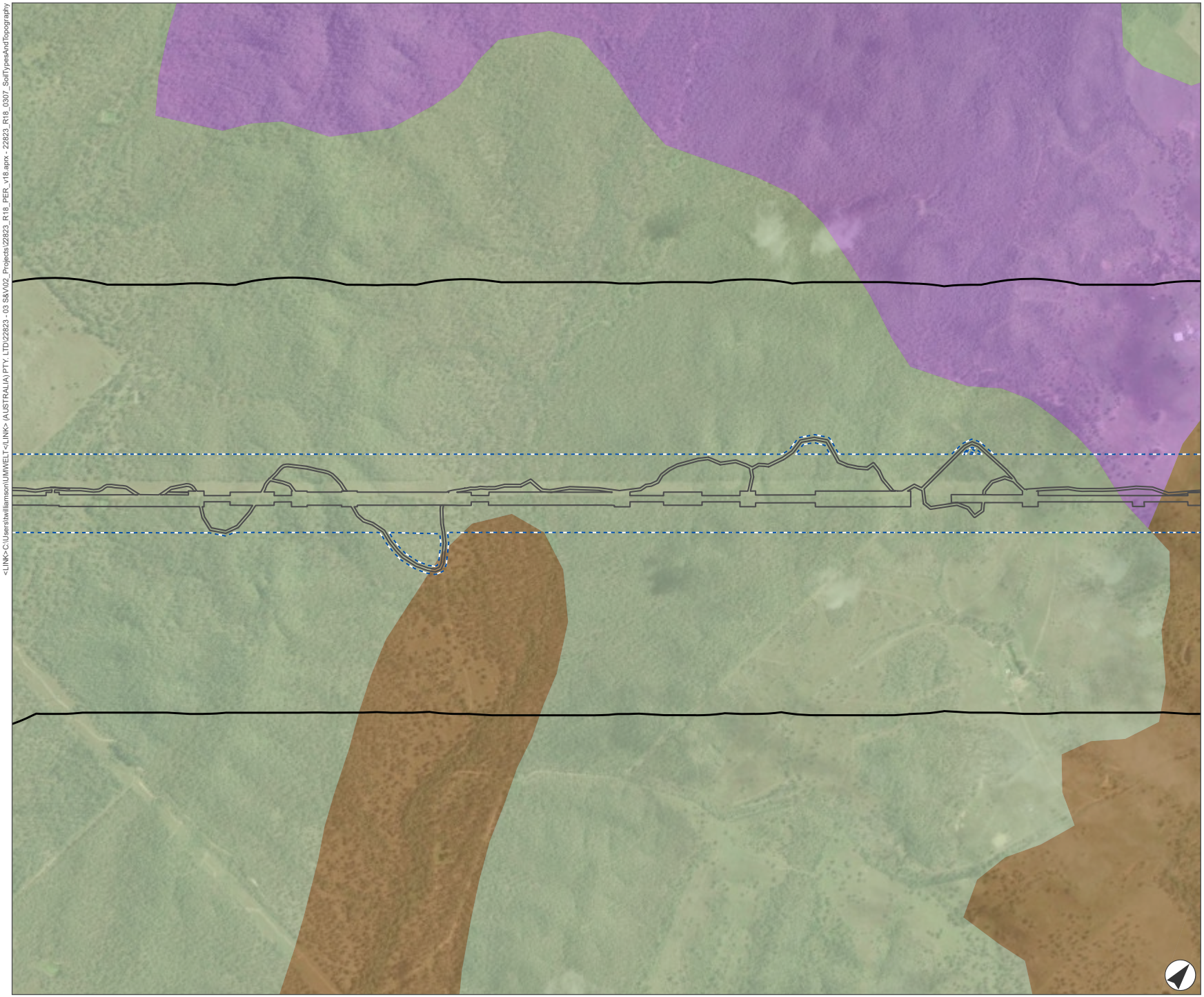


FIGURE 3.7-18

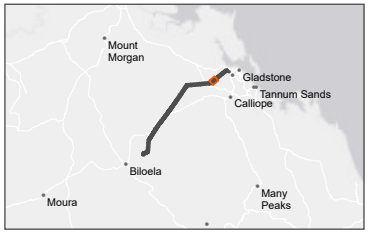
Soil types and Topography within the Project Area

Legend

- Field Survey Extent
- Project Area
- Disturbance Footprint

Australian Soil Classification [ASC]

- Dermosol
- Sodosol
- Tenosol



0 0.5 1

Kilometres

Scale 1:20,000 at A4
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FIGURE 3.7-19

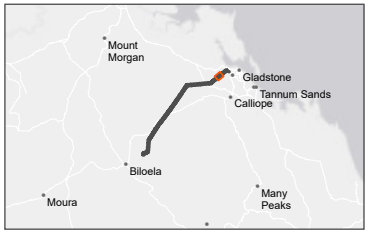
Soil types and Topography within the Project Area

Legend

- Field Survey Extent
- Project Area
- Disturbance Footprint
- Protected Areas

Australian Soil Classification [ASC]

- Chromosol
- Dermosol
- Kandosol
- Sodosol
- Tenosol
- Vertosol



0 0.5 1

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FIGURE 3.7-20

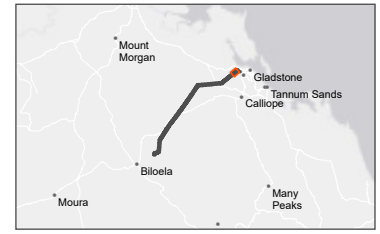
Soil types and Topography within the Project Area

Legend

- Railway
- Watercourse
- Field Survey Extent
- Project Area
- Disturbance Footprint
- Protected Areas

Australian Soil Classification [ASC]

- Chromosol
- Dermosol
- Hydrosol
- Kandosol
- Sodosol
- Tenosol



0 0.5 1

Kilometres

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FIGURE 3.7-21

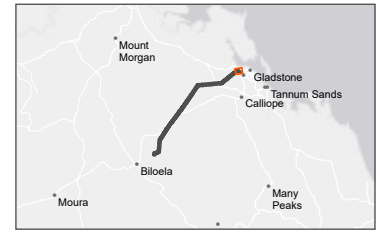
Soil types and Topography within the Project Area

Legend

- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area
- Disturbance Footprint
- Protected Areas

Australian Soil Classification [ASC]

- Dermosol
- Hydrosol
- Kandosol
- Sodosol
- Tenosol



0 0.5 1

Kilometres

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3.4 Topography and Elevation

The topography of the Project Area varies from floodplains along the Calliope River and tributaries (e.g. Section C) and tidal areas on the Calliope River estuary (e.g. Section E) to mountainous ranges (Mount Larcom Range in the east and Calliope Range to the west). Elevation varies as detailed in **Table 3.5** and shown in **Figure 3.7**.

Table 3.5 Topography in Each Section

Section	Topography
A	215 m to 320 m Australian height datum (AHD) with key topographic features including Lake Callide.
B	65 m to 565 m AHD with key topographic features including Callide Timber Reserve, Calliope Range State Forest and Calliope River.
C	25 m to 115 m AHD being relatively flat to undulating overall.
D	15 m to 200 m AHD with key topographic features including Mount Stowe State Forest and Calliope Conservation Park.
E	2 m to 30 m AHD with key topographic features including Calliope River and the inlet to Gladstone Harbour.

3.5 Regional Ecological Context

The following subsections detail the relevant ecological characteristics relevant to the Project Area.

3.5.1 Queensland Bioregions

The Project Area occurs within two Queensland bioregions: the Brigalow Belt (bioregion 11) and Southeast Queensland (bioregion 12). Section A, B, C and the western portion of D occur within the Brigalow Belt bioregion whilst the eastern portion of Section D (east of Calliope River Road) and Section E occur within the Southeast Queensland bioregion.

3.5.1.1 Brigalow Belt Bioregion

The Brigalow Belt is characterised by the tree species *Acacia harpophylla* (brigalow) which forms forests and woodlands on clay soils (Sattler & Williams, 1999). Other large areas in the bioregion are characterised by eucalypt forests and woodlands, grasslands, dry rainforests, cypress pine woodland and riparian communities.

The majority of Sections A to D occur within the Mount Morgan Ranges subregion. This subregion is formed on Palaeozoic rocks of the coastal ranges, forming rugged terrain. The dominant rock types are volcanics, with areas of igneous rocks and small areas of folded metasediments. The vegetation is dominated by *Eucalyptus crebra* (narrow-leaf ironbark) with *Corymbia erythrophloia* (red bloodwood) and *Blakella citriodora* (spotted gum), all of which typically occur in association with steep slopes. Woodlands of *E. melanophloia* (silver-leaved ironbark) are present on the lower slopes and *E. moluccana* (gum-topped box) forms a woodland on colluvial slopes. On alluvial soils, *E. tereticornis* (forest red gum) and *B. tessellaris* (Moreton Bay ash) can be found (Sattler & Williams, 1999). Small parts of Section A extend into the Callide Creek Downs subregion, which is an undulating river valley dominated by low catena Tertiary deposits where *Acacia harpophylla* communities are still dominant (Sattler & Williams, 1999).

3.5.1.2 Southeast Queensland Bioregion

Southeast Queensland is one of the most species rich and diverse bioregions. The region contains a range of varying habitats such as wallum heaths near the coast, rainforests on mountain slopes and valleys, eucalypt woodlands and forest and overlapping brigalow in the west beyond the Great Dividing Range (Sattler & Williams, 1999). The north-eastern part of Section D and all of Section E occurs within the Burnett–Curtis Hills and Ranges subregion. The main vegetation types within this subregion comprise of *Eucalyptus crebra* and *Blakella citridora* woodlands, eucalypt mixed open forest and araucarian microphyll rainforest. The geology varies and incorporates granite ranges and hills in the east, and low rolling hills on old sedimentary rock in the west. The subregion also includes elevated sandstone and the volcanic Kroombit Tops plateau in the northwest (Sattler & Williams, 1999).

3.5.2 Climate

3.5.2.1 Brigalow Belt

The Brigalow Belt lies in the 500–750 mm annual rainfall belt. From east to west total rainfall decreases and rainfall variability and drought events increase. Annual rainfall representing Section A and B, was taken from the Biloela–Valbona weather station (039290) (Bureau of Meteorology, 2025). The mean annual rainfall is 592.1 mm. Rainfall is seasonal, with the months November, December, January and February consistently recording the highest rainfall for the year. Weather data for Sections A and B was obtained from Thangool Airport weather station (039089) (Bureau of Meteorology, 2025). The mean minimum temperature ranges from 5.7° Celsius (C) to 19.9°C, while mean maximum temperature ranges from 23.3°C to 33.8°C.

The annual rainfall data for Section C and the Brigalow Belt portion of Section D was obtained from the Hazeldean weather station (039334) (Bureau of Meteorology, 2025). The mean annual rainfall is 796.7 mm. Rainfall is seasonal, with the summer months of December, January, and February consistently recording the highest rainfall for the year.

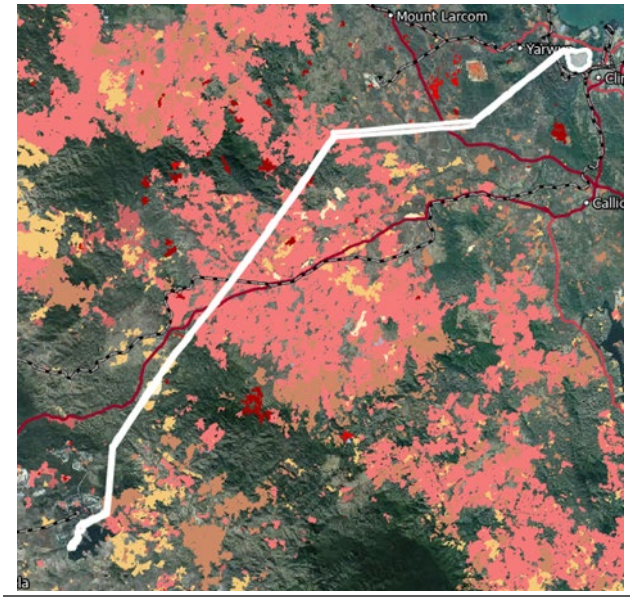
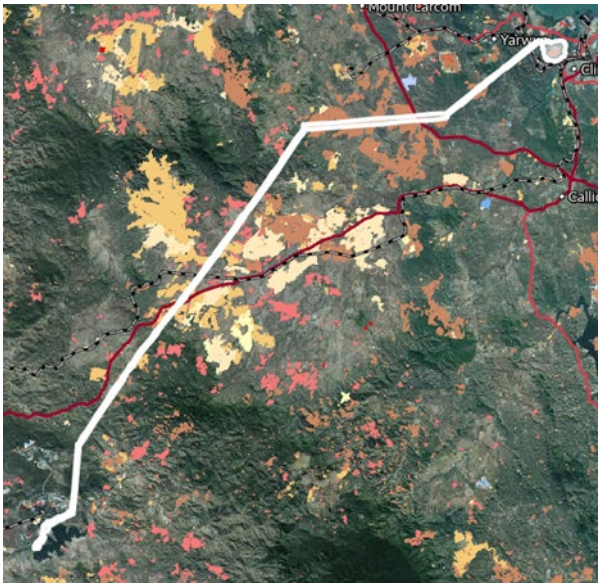
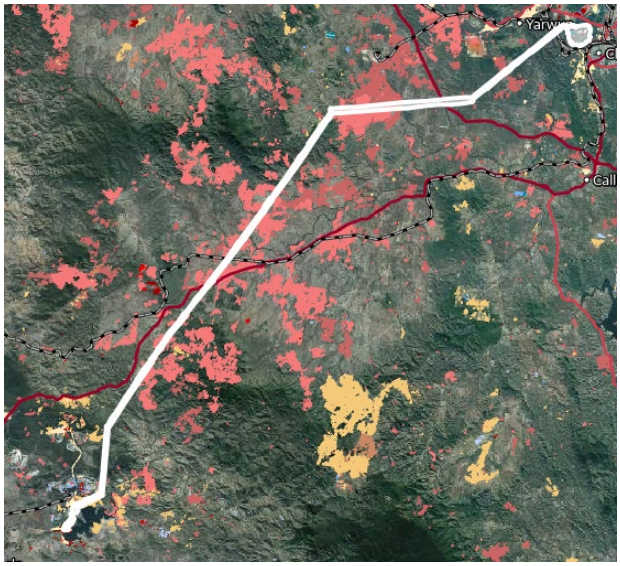
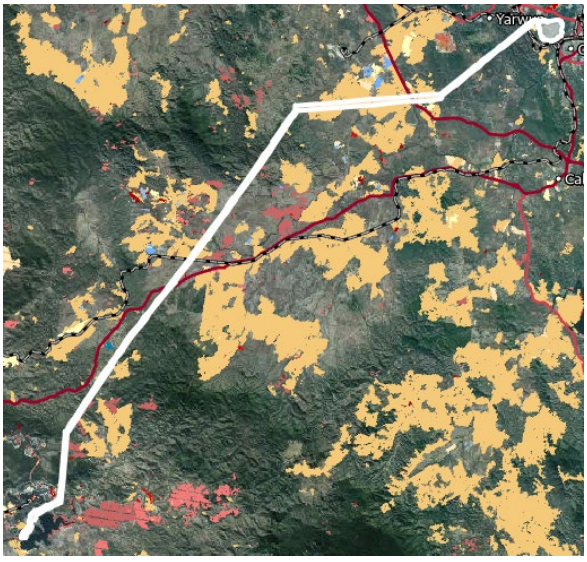
3.5.2.2 Southeast Queensland

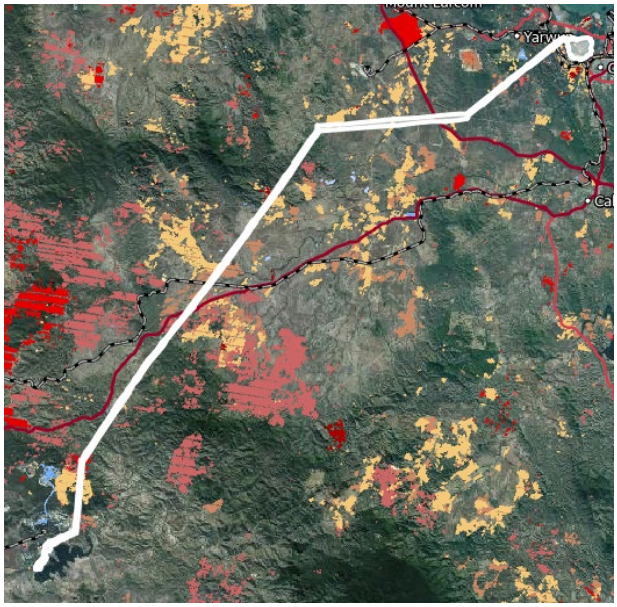
Southeast Queensland bioregion climate is humid and subtropical. Summers are warm and wet, and winters are mild. Rainfall occurs mostly within summer and autumn months. Annual rainfall and temperature data Section D to E was obtained from the Gladstone Airport (039326) (Bureau of Meteorology, 2025). The mean annual rainfall is 851.6 mm. Rainfall is seasonal, with the months December, January, February and March consistently recording the highest rainfall for the year. The mean minimum temperature ranges from 12.1 °C to 23.1°C, while mean maximum temperature ranges from 23.2°C to 30.9°C.

3.5.3 Fire History

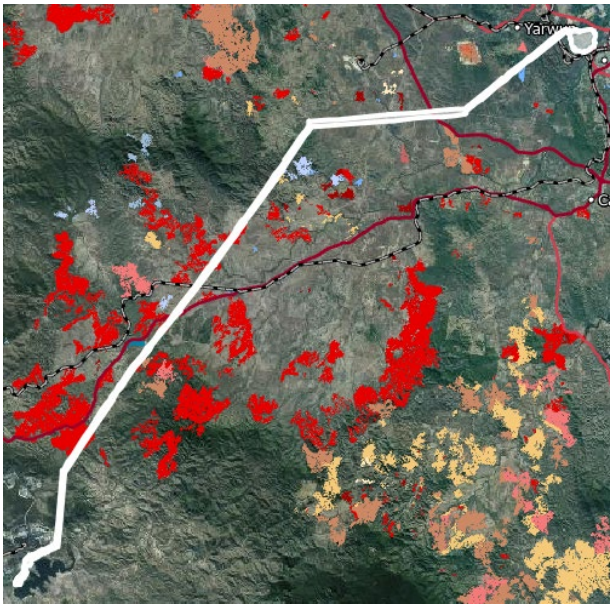
Fire scar mapping within the Project Area (Queensland Globe, 2025) indicates that burns have occurred within the Project Area in all years since the mapping's inception in 1987. Many of these burn events are patchy and have occurred across a small extent of the Project Area, often in areas of non-remnant vegetation. However, broad scale burns in 1992, 1999, 2004, 2011, 2012, 2016, 2018 and 2023 have impacted large swathes of the Project Area as displayed in **Table 3.6**.

Table 3.6 Fire Scar Mapping within the Project Area of Selected Years Between 1992 to 2024 (QGlobe, 2025)

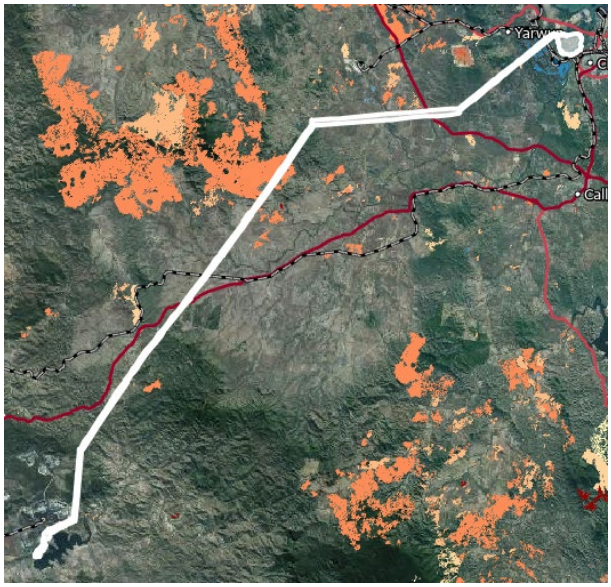
	
1992* Section A and B	1999* Northern Section B and C
	
2004* Section B and C	2011* Section C



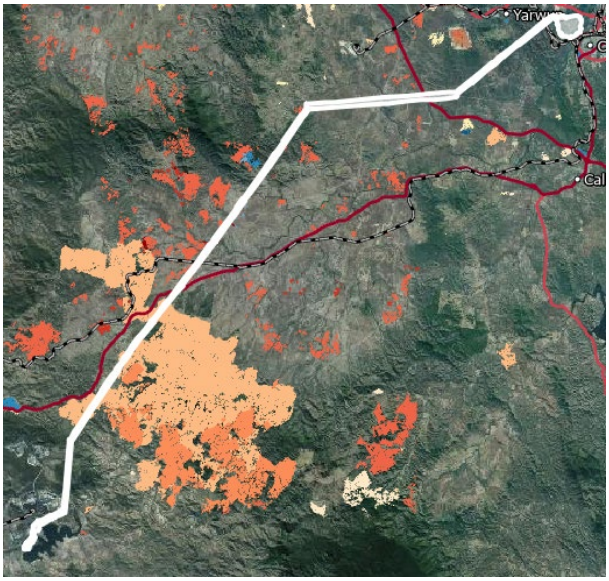
2012* Southern and Central Section B



2016* Southern and Central Section B



2018* Northern Section B

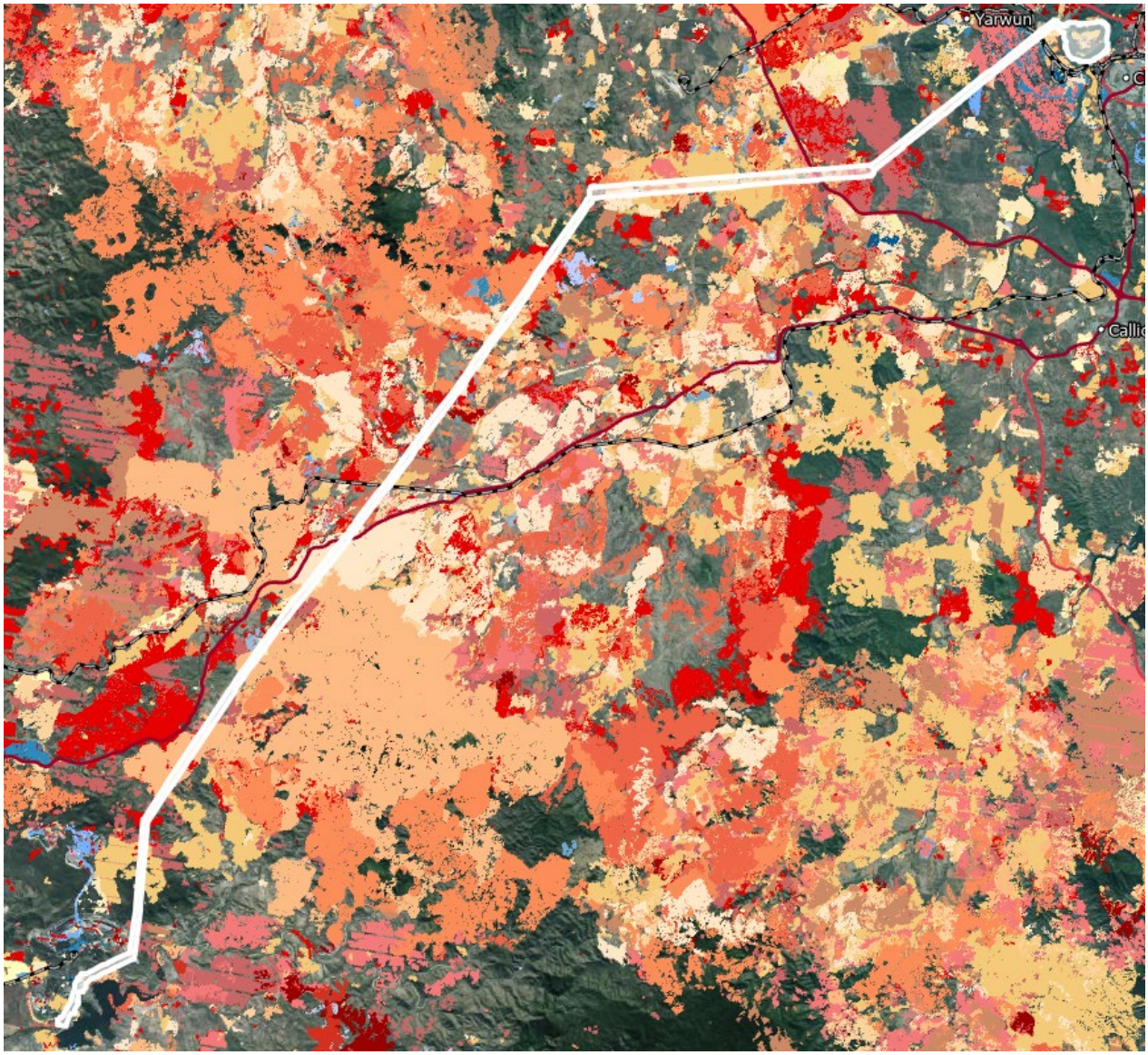


2023* Southern Section B

*Colour variation within mapping is not an indication of burn severity, rather a representation of the time of year in which the burn occurred.

Fires more frequently occur during the hotter months between September to January. Cumulative fire scar mapping from 2010-2024 indicates that some small patches throughout the Project Area have not been burnt in this period. The reason for these unburnt areas may be due to landholder activities, topographic detail (southerly aspects) or specific vegetation communities (vine thicket). As such, they may provider greater climate refuge for certain species of flora and fauna. These patches occur sporadically, including within Section B and Section D (**Table 3.7**). However, as per the Queensland Fire Department Bushfire prone area mapping (Department of State Development, Infrastructure and Planning, 2025), a large portion of the Project Area has a high or very high potential bushfire intensity, frequently coinciding with areas of steep topography and remnant vegetation.

Table 3.7 Cumulative Fire Scar Mapping 2010–2024



2010-2024* Cumulative fire scar mapping

*Colour variation within mapping is not an indication of burn severity, rather a representation of the time of year in which the burn occurred.

3.5.4 Surrounding Environment

The Project Area is located within a wider landscape that includes locations of ecological significance. Protected areas, such as Calliope Conservation Park, Mount Stowe State Forest, Calliope Range State Forest, Maxwelton State Forest, Callide Timber Reserve and Don River State Forest, have landscape scale connectivity to the Project Area. These protected areas are either occurring adjacent to the Project Area or connected by intact tracts of remnant vegetation. Other protected areas, such as Kroombit Tops National Park and Castle Tower National Park, occur within 50 km of the Project Area (**Figure 3.8**). These large, contiguous patches of remnant vegetation provide habitat for native flora and fauna, including threatened species (greater glider (southern and central), yellow-bellied glider (south eastern) and koala.

There are a number of flying fox camps located in proximity to the Project Area, including Biloela (approximately 11 km west of Section A), Calliope (approximately 14 km south of Section D), Gladstone West (approximately 2 km east of Section E), Tannum Sands (Turtle Way, Canoe Point and Curlew Park) and Boyne River (all approximately 28 km south-east of Section E). The camps are known to host red flying-fox (*Pteropus scapulatus*) and black flying-fox (*Pteropus alecto*). Grey-headed flying-fox (*Pteropus poliocephalus*) was recorded in 2021 and 2019 at Calliope, as well as in 2019 at Boyne River. However, northerly contractions of the species range indicate that it occurs sporadically in the Gladstone and Biloela regions and is unlikely to be a regular resident at these camps.

Section E intersects the Calliope River and occurs approximately 2 km upstream of the Gladstone Harbour. A number of terrestrial, freshwater, marine and estuarine habitats occur in and around this area, including corals, mangroves, mudflats, sandy beaches, salt marshes and seagrasses. A variety of species may use these habitats, such water mouse (*Xeromys myoides*), rakali (*Hydromys chrysogaster*) and saltwater crocodile (*Crocodylus porosus*).

The nearby Port Curtis provides similar marine habitat and is part of the Great Barrier Reef World Heritage area. The reef provides habitat for a diversity of marine fauna, including fish, macroinvertebrates, whales, dolphins, dugongs and turtles. EPBC Act-listed marine turtles are known to occur within this area.

Also, within Port Curtis lies the Capricornia Cays International Bird and Biodiversity Area (IBA) (BirdLife International, 2025a), approximately 27 km east of Section E. IBAs are the most important sites for the conservation of birds, as identified by BirdLife International. This IBA was most recently assessed in 2022 and last monitored in 2008. It comprises 11 small, low-lying islands, totalling approximately 241.0 ha. Three qualifying species are known to this IBA; brown booby (*Sula leucogaster*), wedge-tailed shearwater (*Ardenna pacifica*) and black noddy (*Anous minutus*). The largest island, North West, is dominated by *Pisonia grandis* low closed forest, which small areas of *Argusia argentea* low woodland. The next two largest islands, Masthead and Heron, and similarly vegetated, but with a cover of foredune vegetation communities.

Another IBA lies approximately 27 km north of Section D; the Fitzroy Floodplain and Delta IBA (BirdLife International, 2025b). This IBA was recognised in 2009 and was most recently assessed in 2019 to ensure IBA criteria are still met. The IBA consists of two contiguous wetland areas within the Fitzroy River catchment: the Fitzroy floodplain and delta, and the Hedlow Wetlands to the north of Rockhampton. The Fitzroy floodplain, which extends north-west from Rockhampton, largely consists of cleared and grazed floodplain that generally extends to the banks of dissecting streams, but in some places is bordered by remnant woodland along drainage channels or punctuated by heavily disturbed sedgeland and aquatic macrophytes associated with lagoons.

The Fitzroy delta is a 15 km wide strip of wetland that extends approximately 60 km south-east from Rockhampton. The Hedlow Wetlands include Lake Mary, Green Lake, Hedlow Creek and an extensive area of ephemeral floodplain, swamps and permanent small lakes formed in a basin between the coastal hills and ranges north and north-east of Rockhampton. The habitat types found at the site include freshwater lagoons, woodlands and sedgelands, saline coastal flats, mangrove forests, intertidal sand and mud flats, seagrass beds and open marine and estuarine waters.

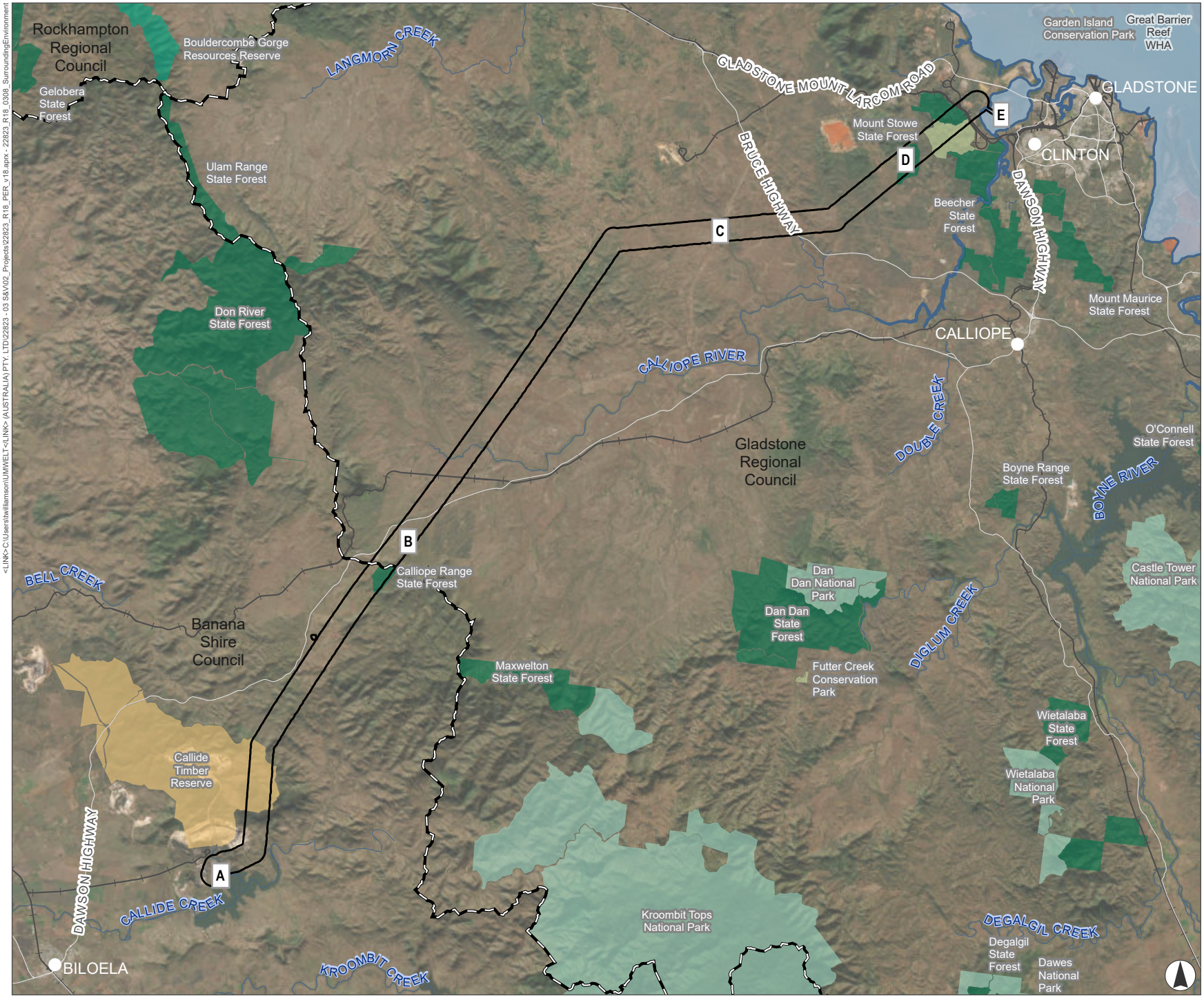


FIGURE 3.8

Surrounding Environment

Legend

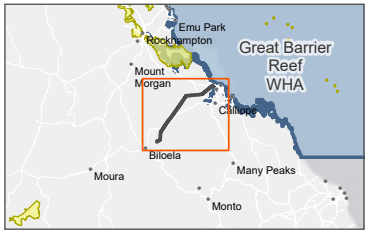
- Town
- Roads
- Railway
- Watercourses
- Local Government Area (LGA)
- Project Area
- BirdLife Important Bird and Biodiversity Areas (IBAs)

Protected Areas

- Conservation Park
- National Park
- Resources Reserve
- State Forest
- Timber Reserve

World heritage areas of Queensland

- Great Barrier Reef



0 5 10

Kilometres

Scale 1:375,000 at A4
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3.5.5 Biodiversity Connectivity

Review of Biodiversity Planning Assessment–Brigalow Belt mapping (Department of Environment and Science, 2018) indicates there are biodiversity corridors of either State or regional significance mapped within all sections of the Project Area (**Figure 3.9**).

A portion of Lake Callide and the upstream environment of Callide Creek is contained partially within Section A and is designated as a biodiversity corridor of regional significance. Lake Callide is part of Callide Creek which flows into Kroombit Creek, approximately 16 km to the west. Kroombit Creek originates at Kroombit Tops National Park and provides connectivity in the form of a riparian corridor in a northwest and south eastly direction.

The southwestern portion of Section B is intersected by a major biodiversity corridor of State significance. This particular corridor links Kroombit Tops National Park to the south-east within the Callide Timber Reserve (within Section B) to the Don River State Forest to the north. This corridor connects large areas of contiguous vegetation associated with Great Dividing Range facilitating broader-scale connectivity in a northwest and south easterly direction. Several protected areas are associated with this connectivity corridor beyond the above-mentioned including Ulam Range State Forest, Gelobera State Forest, Bouldercombe Gorge Resources Reserve to the north, and Cania Gorge National Park, Pine Mountain State Forest and Dawes National Park in the south. This corridor provides further east-west connectivity from the Great Dividing Range into to the coast near Malborough in the north and Tannum Sands and Agnes Waters in the south.

In addition, a smaller regionally significant biodiversity corridor associated with the Calliope River where it meanders through Section B in a northwest and southeasterly direction eventually heading northeast where the Calliope River reaches Gladstone. Scrub Creek and Larcom Creek both intersect Section C and are associated with regionally significant biodiversity corridors. These creeks also link together outside of Section C and flow south to the Calliope River (as a State significant biodiversity corridor) approximately 5 km to the south of Section C.

Section D is associated with a major biodiversity corridor of State significance linking numerous State forests and conservation reserves including Calliope Conservation Park, Targinie State Forest, Scrubby Mountain State Forest, Rundle State Forest and Rundle National Park in the north and, Beecher State Forest and Mount Maurice State Forest in the south. In addition, the biodiversity corridor of State significance skirts the passage between Curtis Island and mainland Queensland.

Section E is largely contained within a biodiversity corridor of State significance associated with the mouth of the Calliope River. In addition, this State significant biodiversity corridor is linked to the major State significant biodiversity corridor in Section D.

Several barriers to fauna movement currently exist within the Project Area. Most significant are the large areas of cleared land present within the existing transmission line easement. Much of the alignment is disconnected with large patches of non-remnant areas isolating habitat fragments inhibiting fauna movement between patches. Although disturbance associated with the easement has reduced the extent of continuous vegetation, some connectivity persists where vegetation remains, particularly along watercourses, drainage features, and steeper terrain. Additional barriers include farm tracks, roads, fences, and electrical infrastructure such as transmission lines, all of which can hinder local-scale movement of fauna, particularly cover-dependent reptiles and small ground-dwelling mammals. For arboreal species, larger gaps are likely to exceed the gliding capacity of some gliders, restricting dispersal. Field surveys also recorded instances of flying-fox collisions with barbed wire fences, all of which resulted in injury or death.

Despite barriers to local-scale movement, the Project Area remains functionally connected to the broader landscape. Nearby State forests and national parks provide extensive areas of relatively intact habitat, which are likely to support regional-scale connectivity. These areas may facilitate dispersal and gene flow for more mobile species such as birds, bats, and wide-ranging mammals that are capable of crossing open country or linear disturbances. For less mobile fauna, including reptiles, small mammals, and some arboreal species, connectivity is more limited and largely dependent on retained riparian corridors and remnant patches of vegetation that act as stepping stones between habitats.

3.5.5.1 Landscape Connectivity

The Project Area is embedded within a broader network of biodiversity corridors of State and regional significance. These mapped corridors extend across the Brigalow Belt and provide structural and functional linkages between large tracts of habitat, including Kroombit Tops National Park, Cania Gorge National Park, Dawes National Park, Rundle National Park, and multiple State Forests and Conservation Parks. Such linkages are critical for maintaining ecological processes at a regional scale, including the dispersal of mobile fauna, genetic exchange between populations, and the capacity of species to shift ranges in response to disturbance or climate change.

The Project largely follows existing cleared easements and modified lands, which reduces the risk of additional fragmentation at a regional scale.

3.5.5.2 Local Connectivity

At the local scale, connectivity within the Project Area is already constrained by a mosaic of cleared agricultural land, existing infrastructure, and fragmented remnant patches. Within this context, retained riparian vegetation, drainage lines, and areas of steeper terrain provide the principal pathways for fauna movement. These features act as stepping stones or linear conduits that allow species with limited dispersal capacity to persist within a modified landscape.

3.5.5.3 Fauna Movement

Patterns of fauna movement within and around the Project Area vary according to species mobility and habitat dependence. Highly mobile species such as birds, flying-foxes, and large macropods are likely to maintain movement across the landscape despite the presence of linear infrastructure, although risks remain for aerial species through potential collision with wires. For bats and birds, transmission lines represent a localised barrier, with larger-bodied or flocking species at risk of collision.

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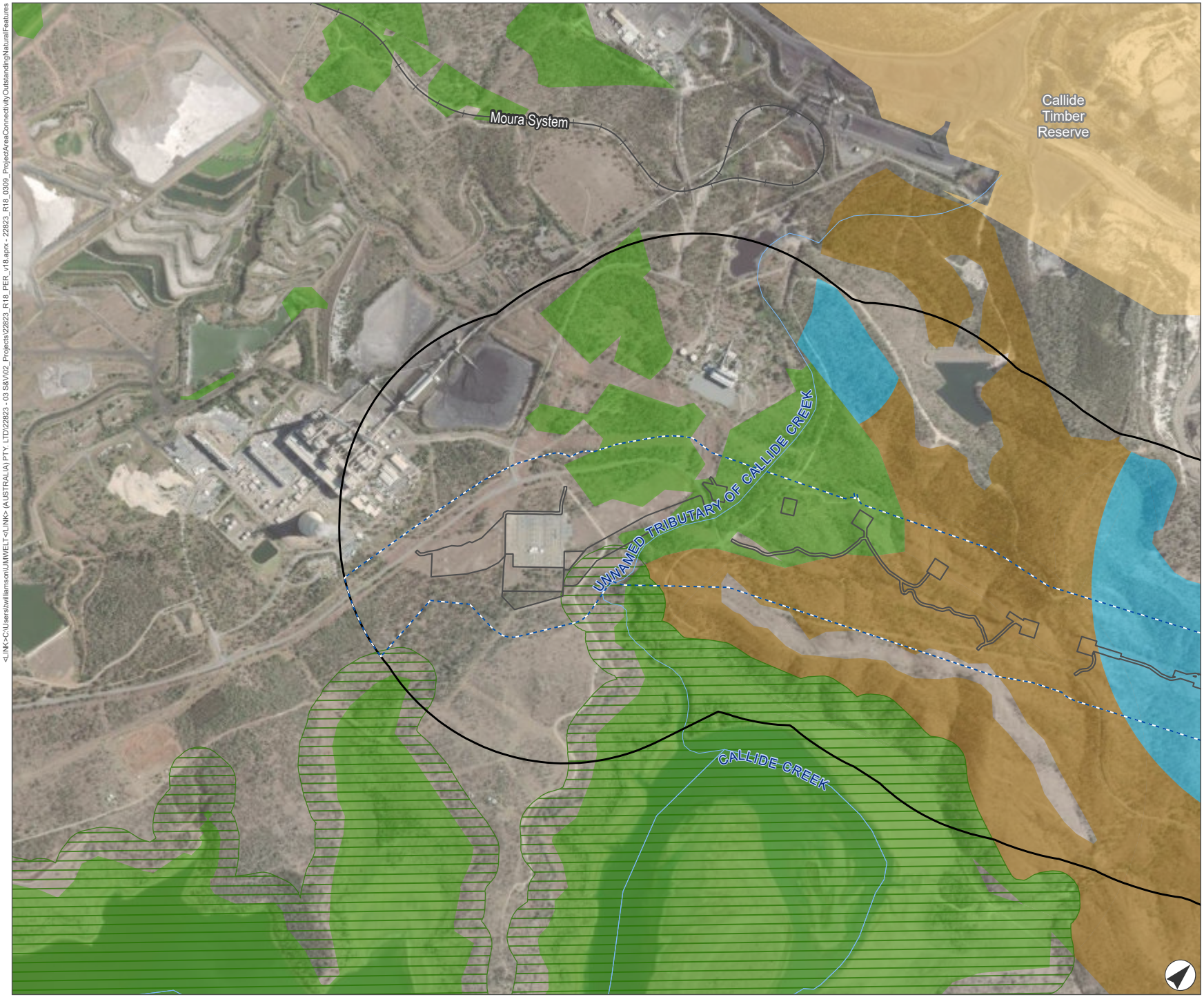


FIGURE 3.9-1

Project Area Connectivity and Outstanding Natural Features

Legend

- Railway
- Watercourse
- Field Survey Extent
- Disturbance Footprint
- Project Area

Biodiversity Corridors

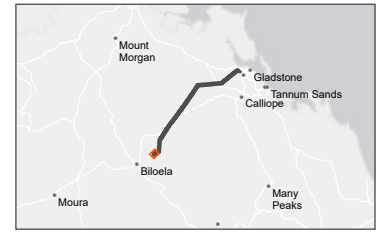
- Regional

Biodiversity significance

- State Habitat for EVNT taxa
- Regional
- Local or Other Values

Protected Areas

- Timber Reserve



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Kilometres

Scale 1:20,000 at A4
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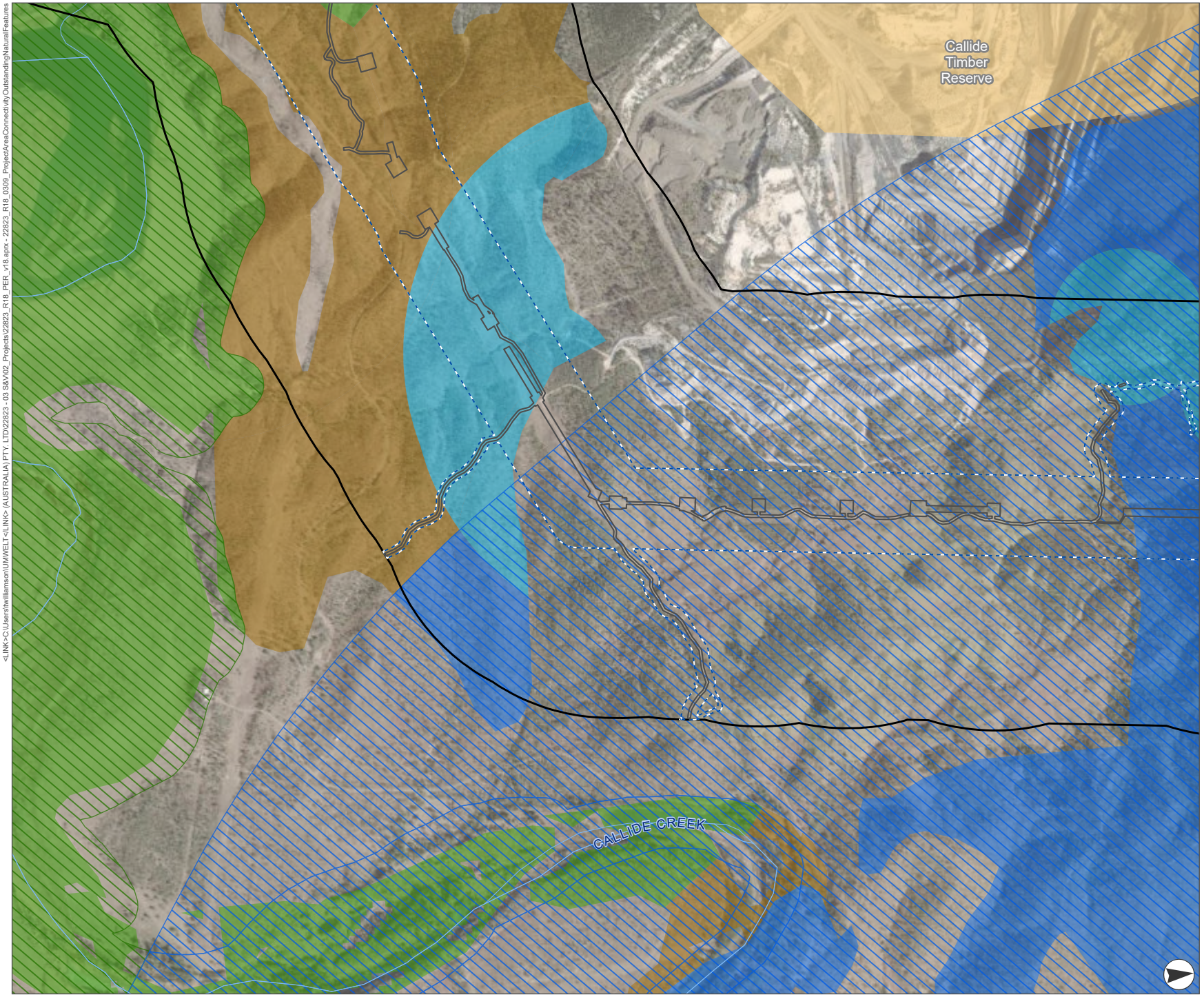


FIGURE 3.9-2

Project Area Connectivity and Outstanding Natural Features

Legend

- Watercourse
- Field Survey Extent
- Disturbance Footprint
- Project Area

Biodiversity Corridors

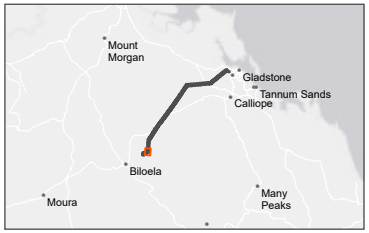
- State
- Regional

Biodiversity significance

- State Habitat for EVNT taxa
- State
- Regional
- Local or Other Values

Protected Areas

- Timber Reserve



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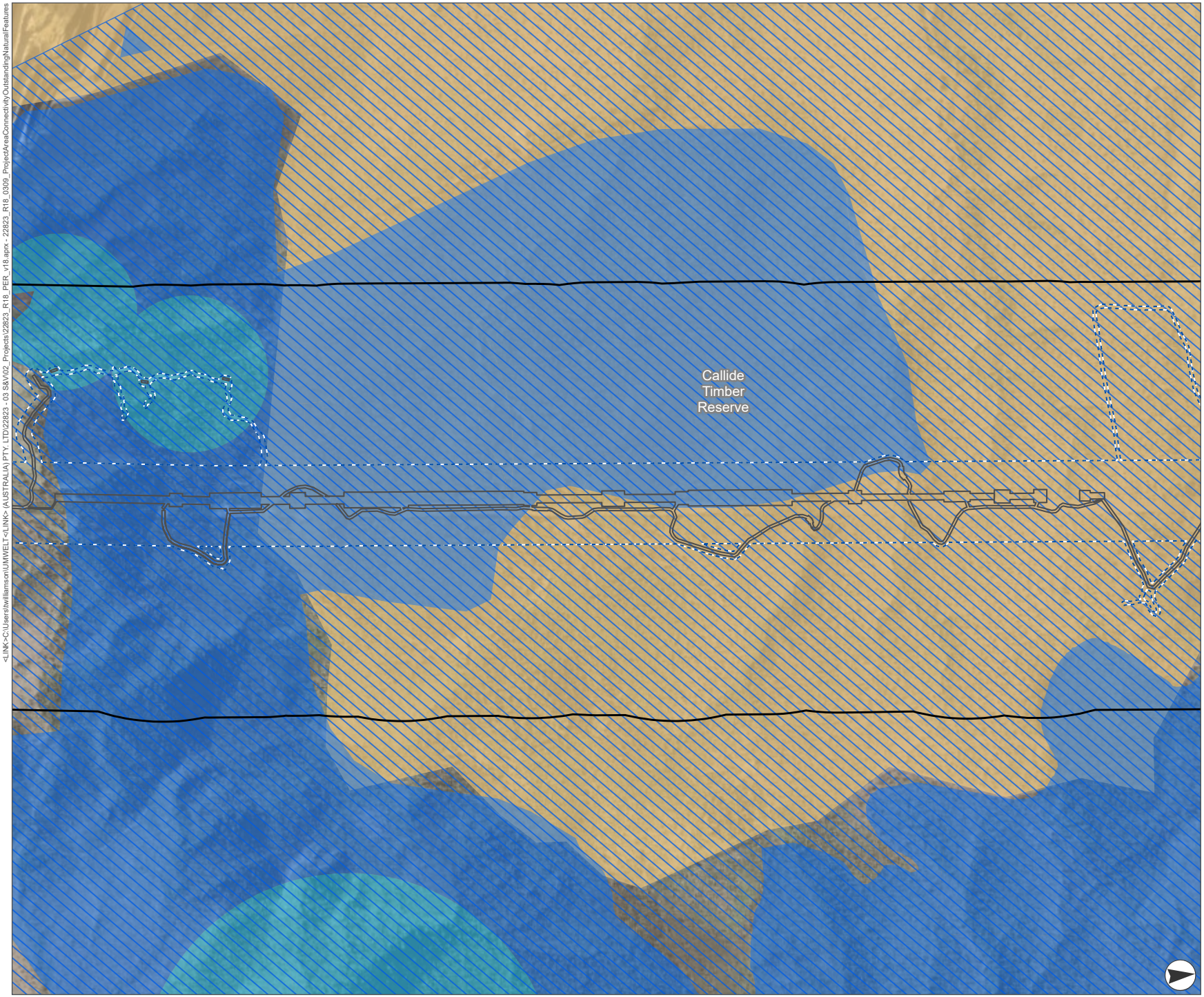


FIGURE 3.9-3

Project Area Connectivity and Outstanding Natural Features

Legend

- Field Survey Extent
- Disturbance Footprint
- Project Area

Biodiversity Corridors

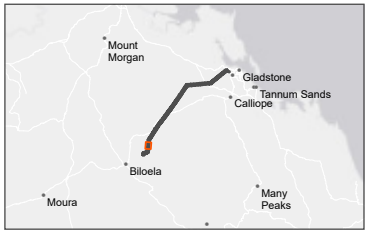
- State

Biodiversity significance

- State Habitat for EVNT taxa
- State

Protected Areas

- Timber Reserve



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Kilometres

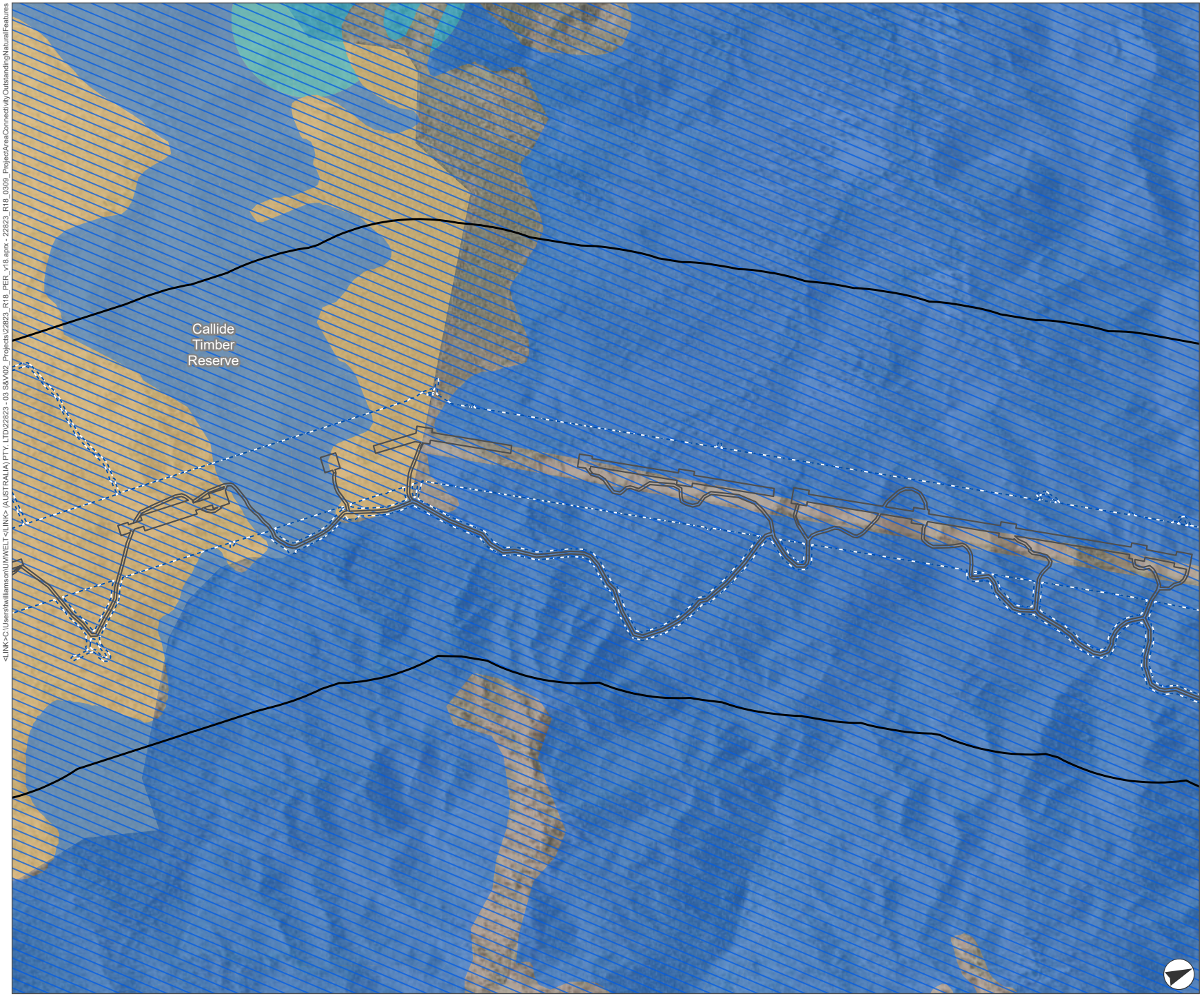
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FIGURE 3.9-4

Project Area Connectivity and Outstanding Natural Features

Legend

- Field Survey Extent
- Disturbance Footprint
- Project Area

Biodiversity Corridors

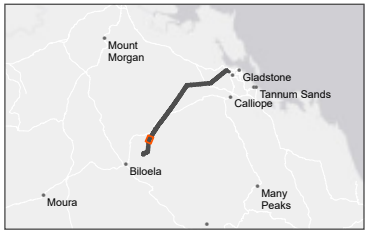
- State

Biodiversity significance

- State Habitat for EVNT taxa
- State

Protected Areas

- Timber Reserve



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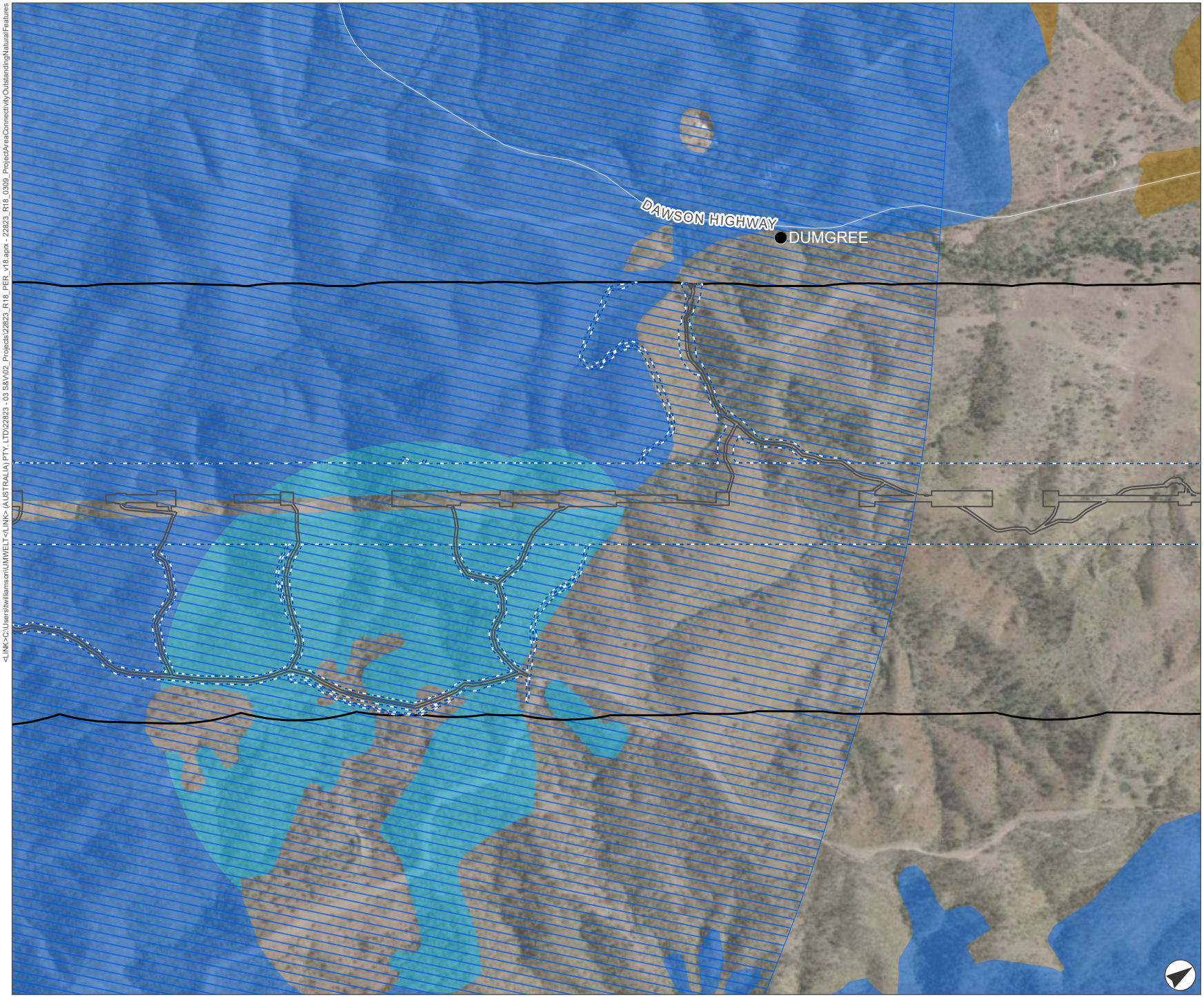


FIGURE 3.9-5

Project Area Connectivity and Outstanding Natural Features

Legend

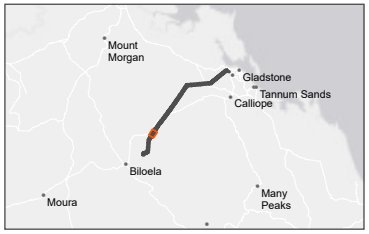
- Roads
- Field Survey Extent
- Disturbance Footprint
- Project Area

Biodiversity Corridors

- State

Biodiversity significance

- State Habitat for EVNT taxa
- State
- Local or Other Values



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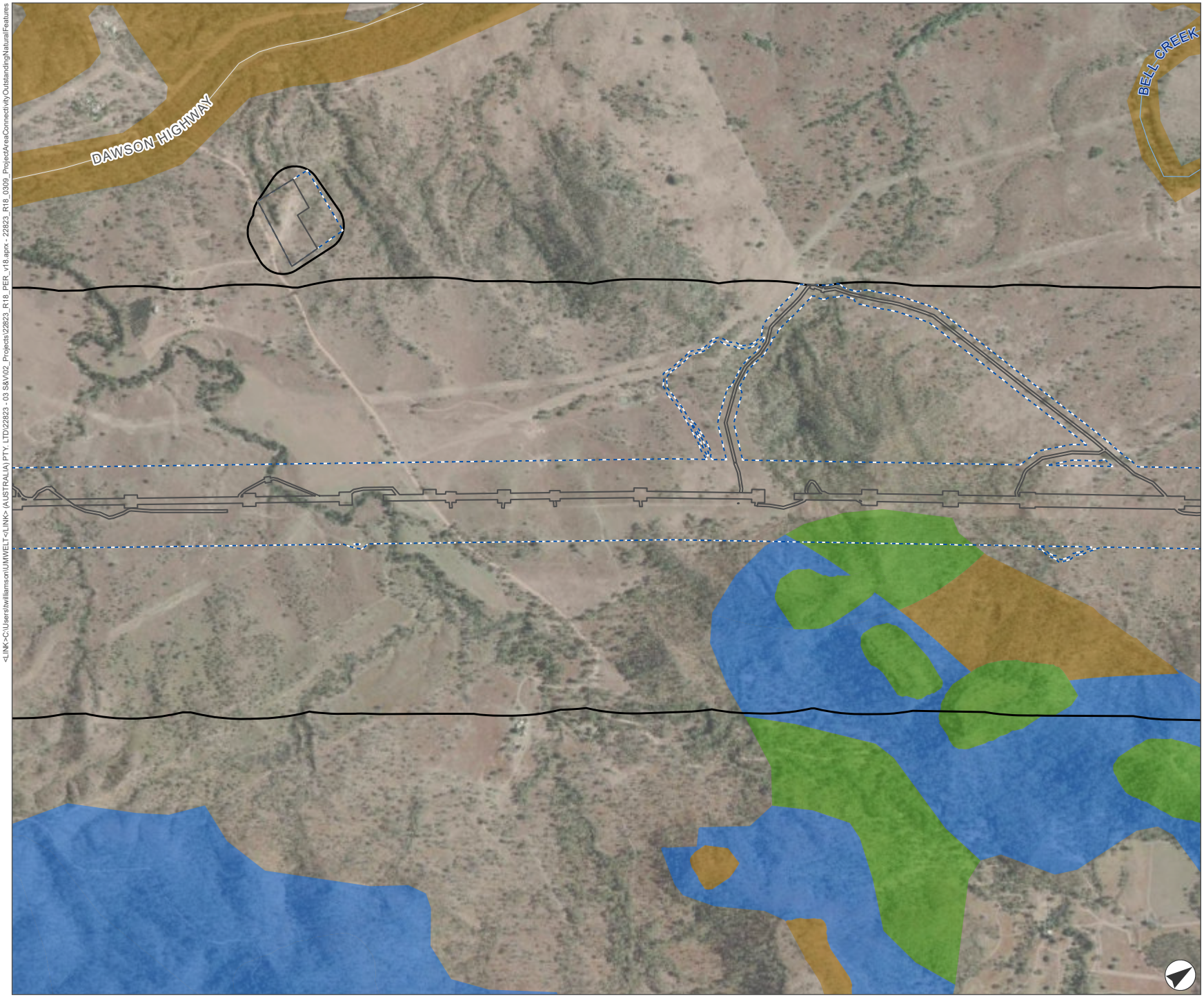


FIGURE 3.9-6

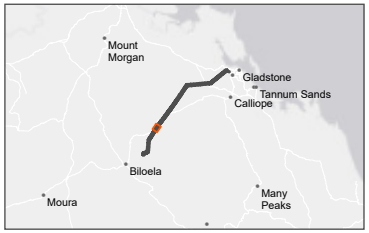
Project Area Connectivity and Outstanding Natural Features

Legend

- Roads
- Watercourse
- Field Survey Extent
- Disturbance Footprint
- Project Area

Biodiversity significance

- State
- Regional
- Local or Other Values



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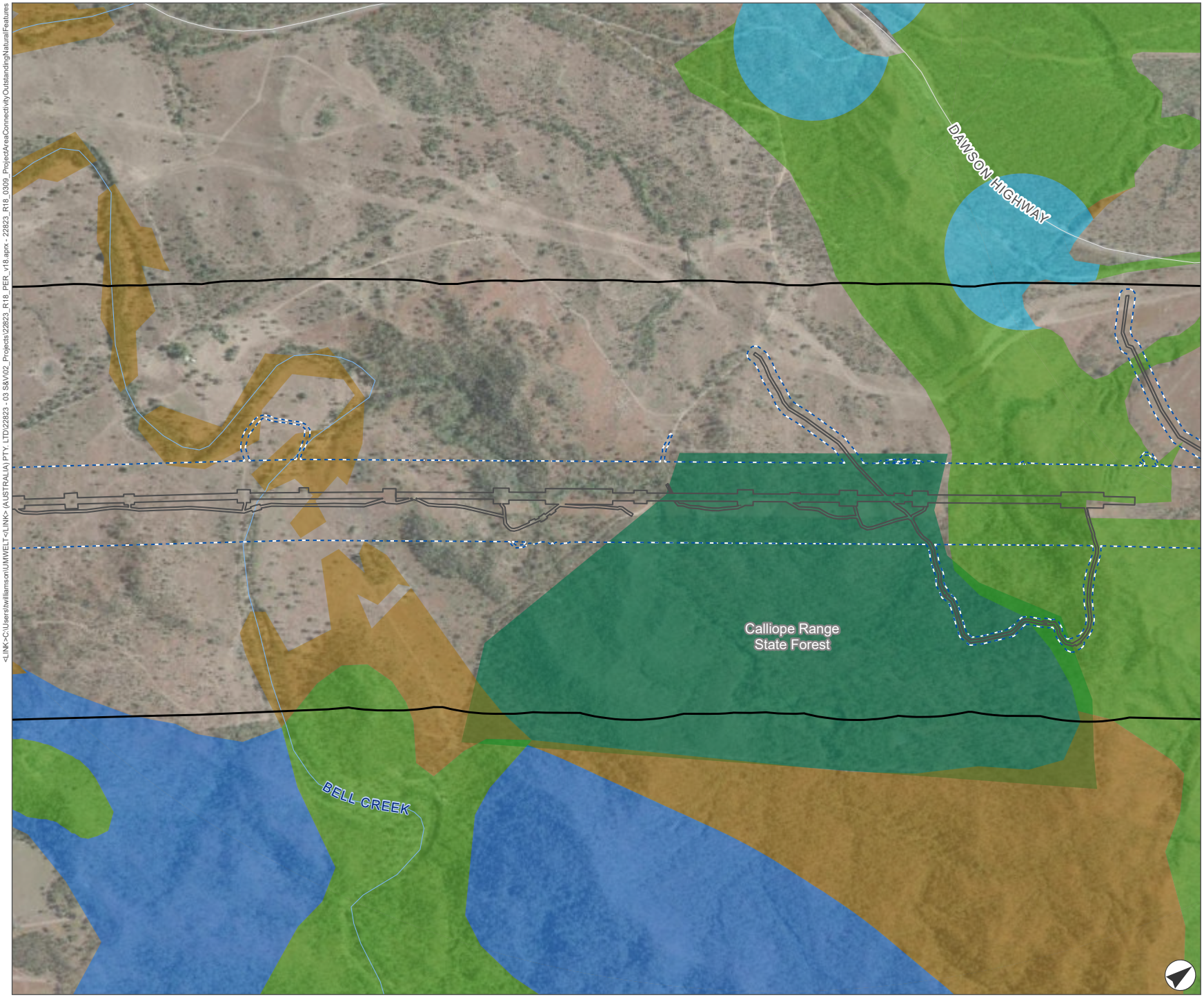


FIGURE 3.9-7

Project Area Connectivity and Outstanding Natural Features

Legend

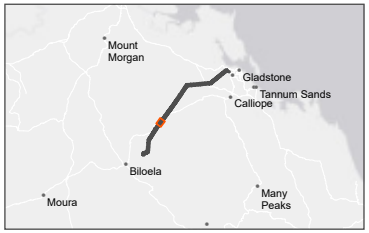
- Roads
- Watercourse
- Field Survey Extent
- Disturbance Footprint
- Project Area

Biodiversity significance

- State Habitat for EVNT taxa
- State
- Regional
- Local or Other Values

Protected Areas

- State Forest



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FIGURE 3.9-8

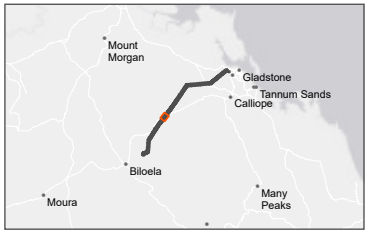
Project Area Connectivity and Outstanding Natural Features

Legend

- Roads
- Field Survey Extent
- Disturbance Footprint
- Project Area

Biodiversity significance

- Regional
- Local or Other Values



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Kilometres

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FIGURE 3.9-9

Project Area Connectivity and Outstanding Natural Features

Legend

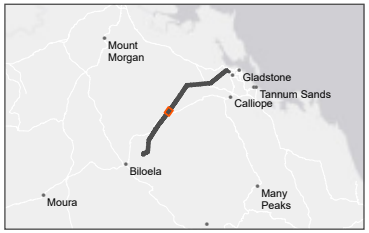
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Disturbance Footprint
- Project Area

Biodiversity Corridors

- Regional

Biodiversity significance

- State
- Regional
- Local or Other Values



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Kilometres

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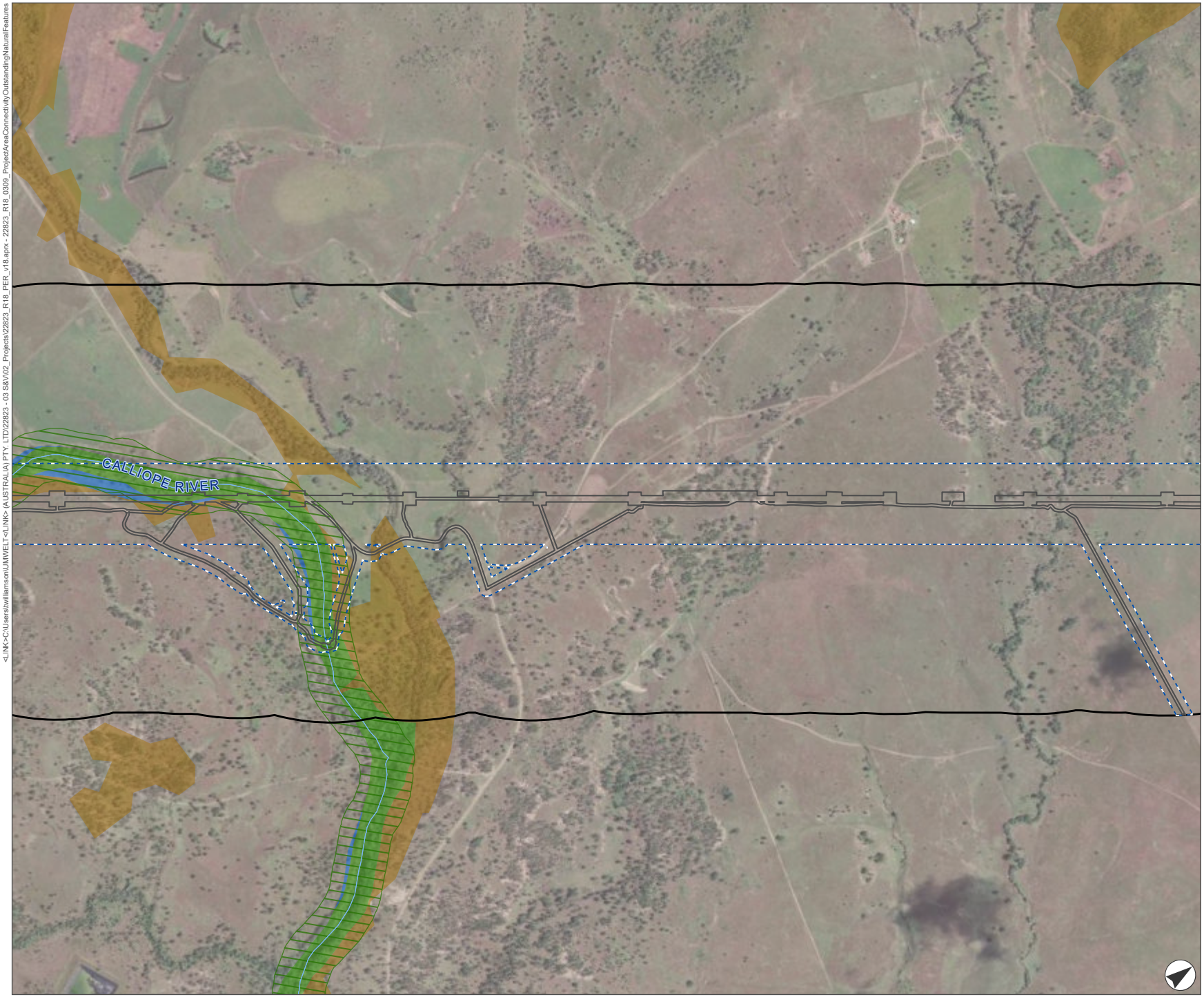


FIGURE 3.9-10

Project Area Connectivity and Outstanding Natural Features

Legend

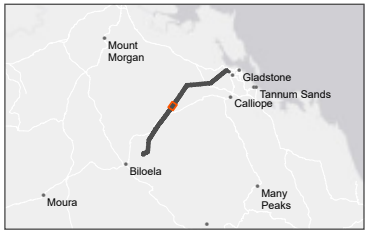
- Watercourse
- Field Survey Extent
- Disturbance Footprint
- Project Area

Biodiversity Corridors

- Regional

Biodiversity significance

- State
- Regional
- Local or Other Values



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Kilometres

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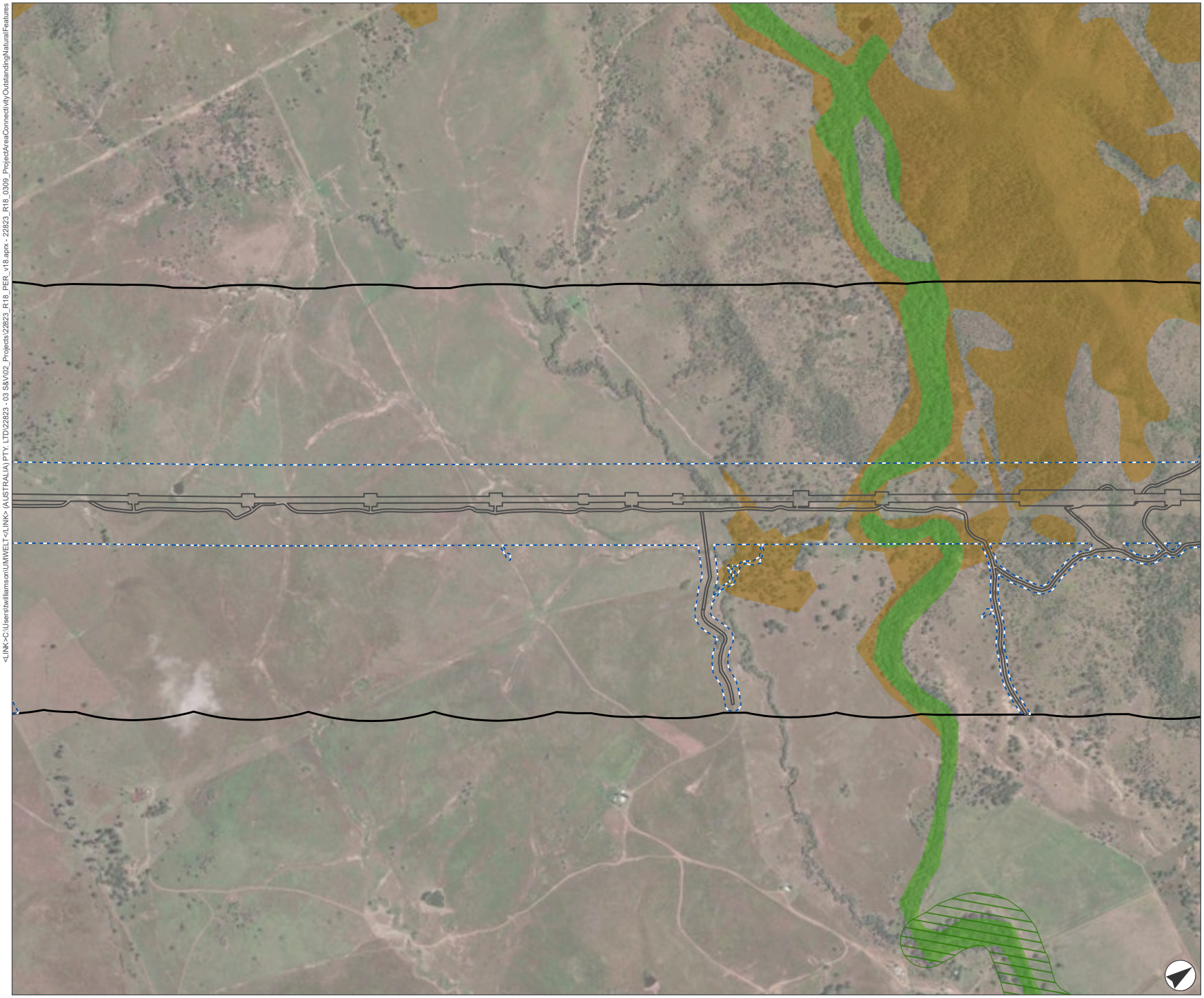


FIGURE 3.9-11

Project Area Connectivity and Outstanding Natural Features

Legend

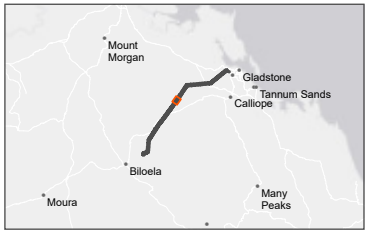
- Field Survey Extent
- Disturbance Footprint
- Project Area

Biodiversity Corridors

- Regional

Biodiversity significance

- Regional
- Local or Other Values



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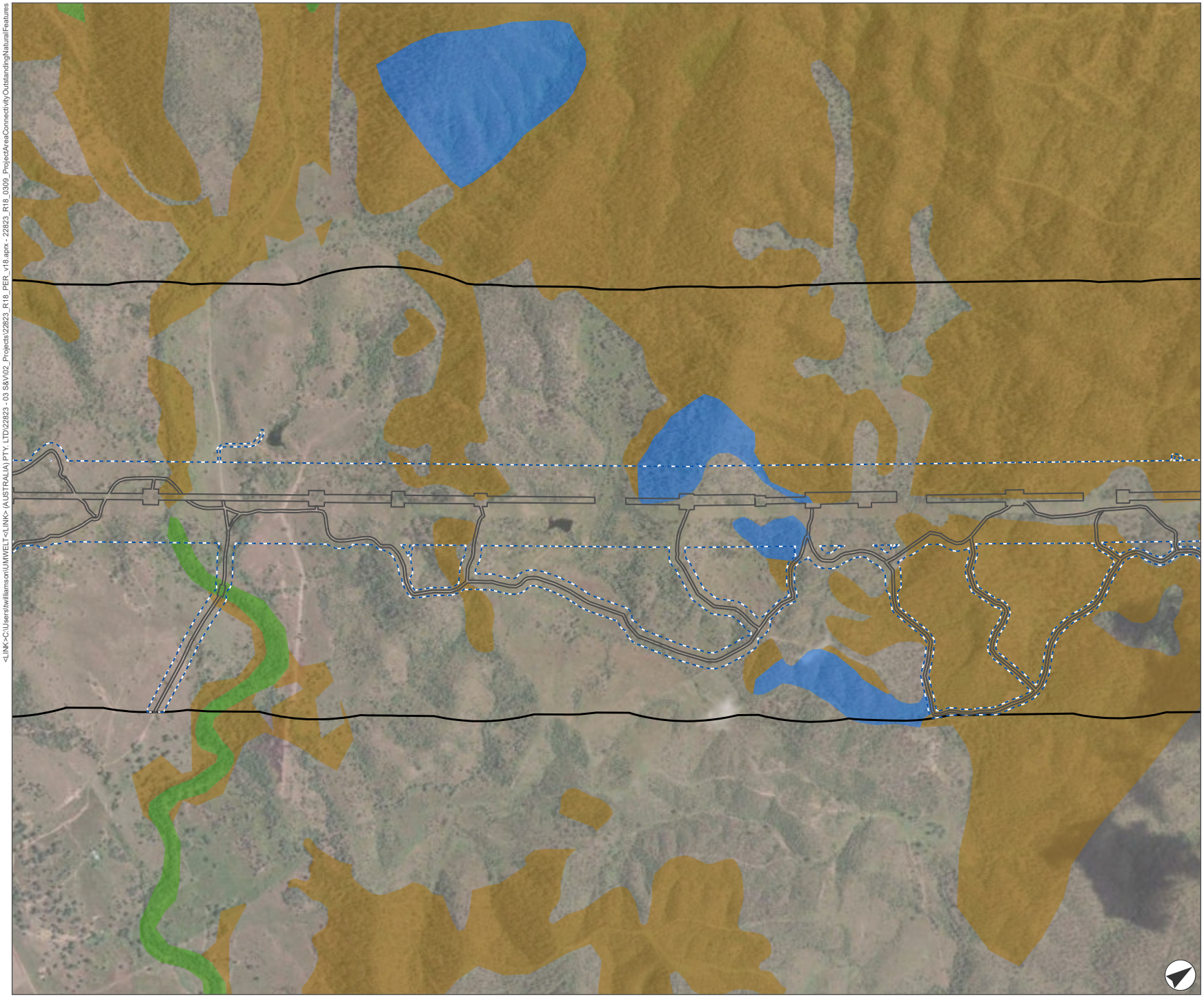


FIGURE 3.9-12

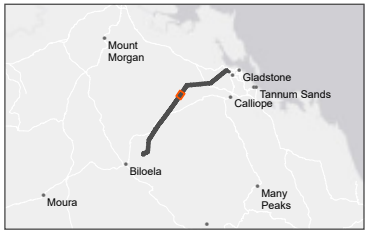
Project Area Connectivity and Outstanding Natural Features

Legend

- Field Survey Extent
- Disturbance Footprint
- Project Area

Biodiversity significance

- State
- Regional
- Local or Other Values



0 0.5 1

Kilometres

Scale 1:20,000 at A4
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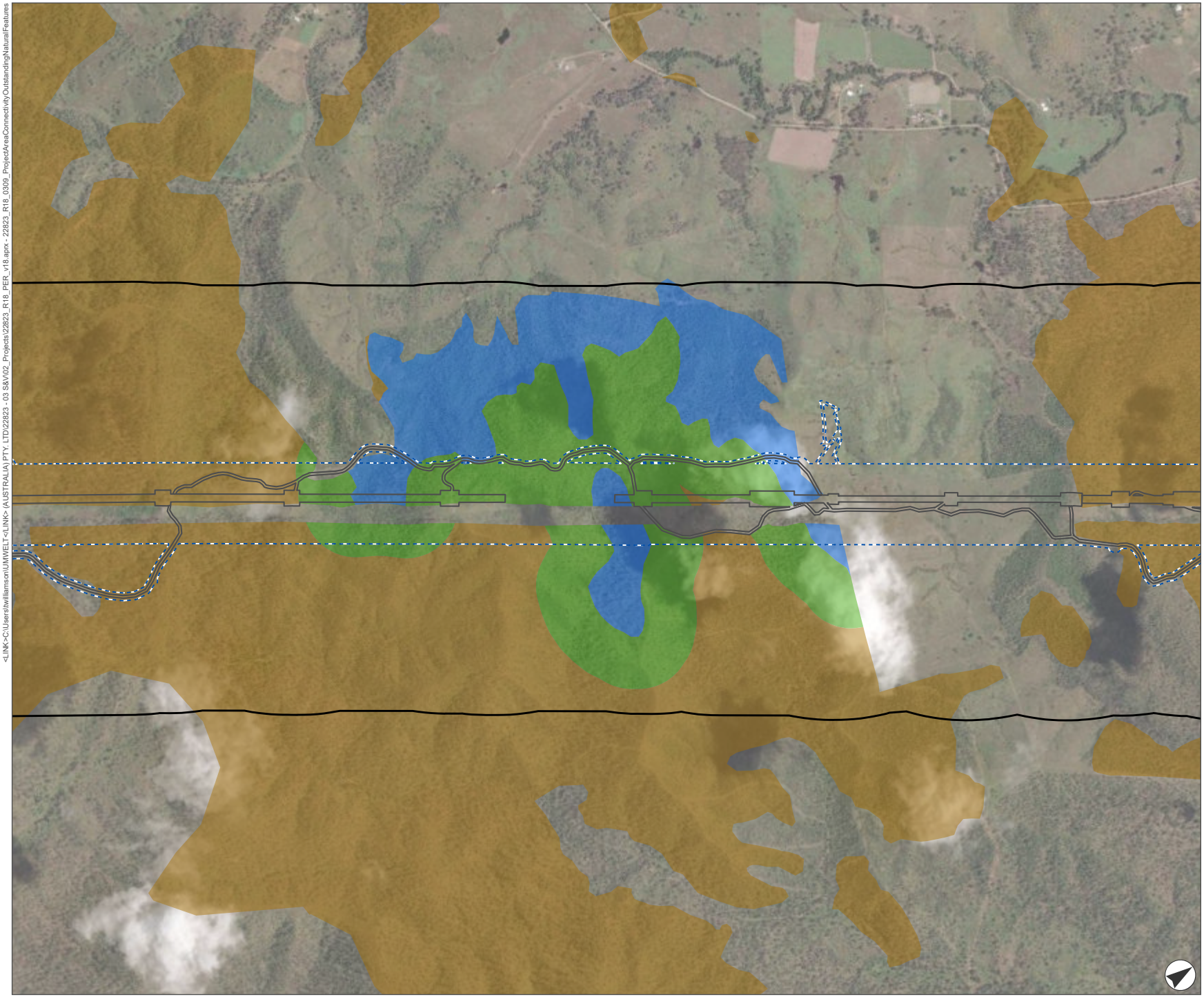


FIGURE 3.9-13

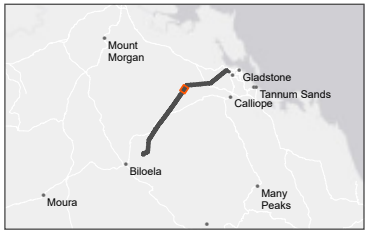
Project Area Connectivity and Outstanding Natural Features

Legend

- Field Survey Extent
- Disturbance Footprint
- Project Area

Biodiversity significance

- State
- Regional
- Local or Other Values



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Kilometres

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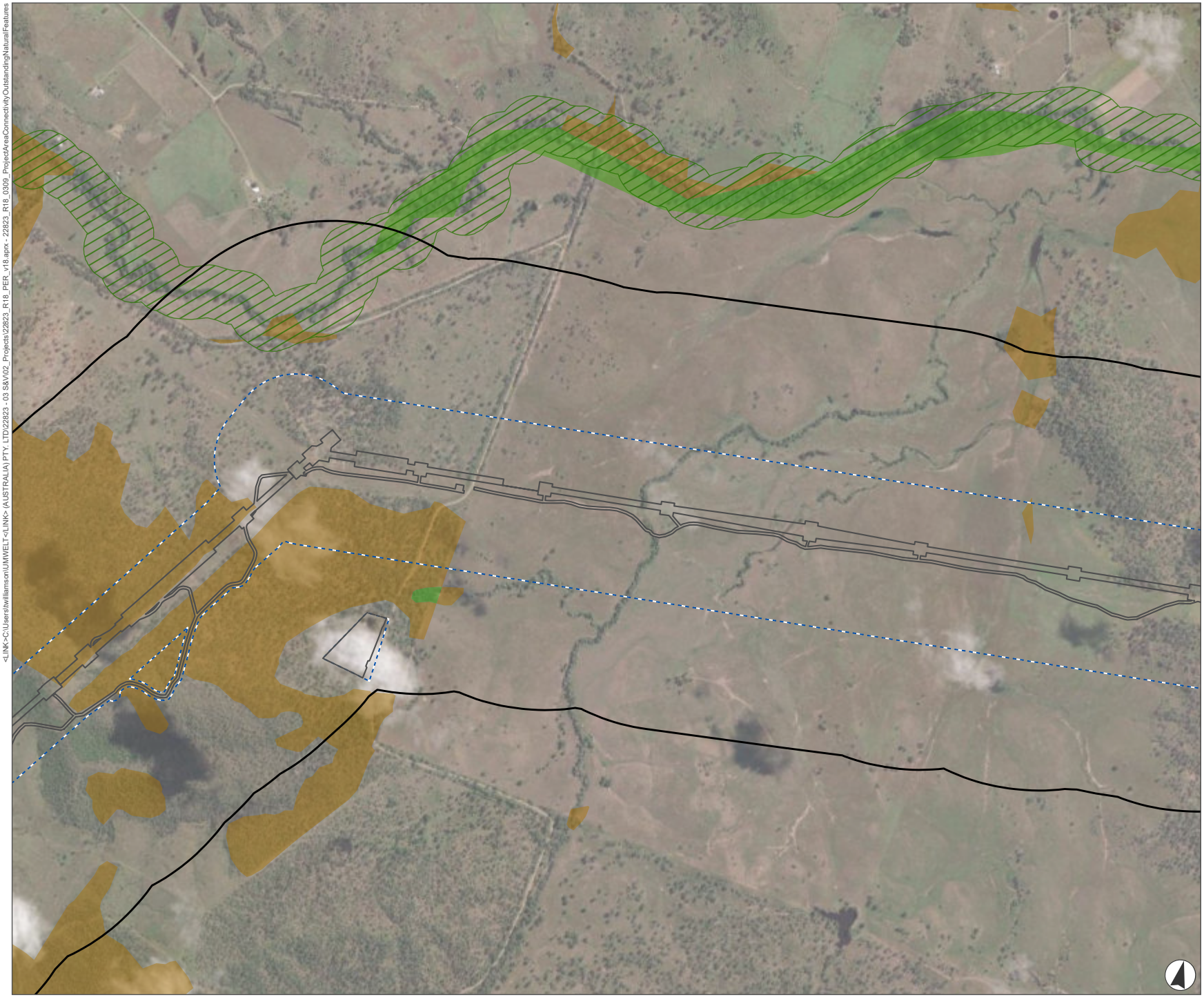


FIGURE 3.9-14

Project Area Connectivity and Outstanding Natural Features

Legend

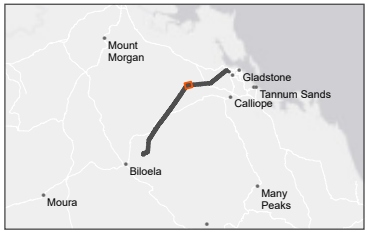
- Field Survey Extent
- Disturbance Footprint
- Project Area

Biodiversity Corridors

- Regional

Biodiversity significance

- Regional
- Local or Other Values



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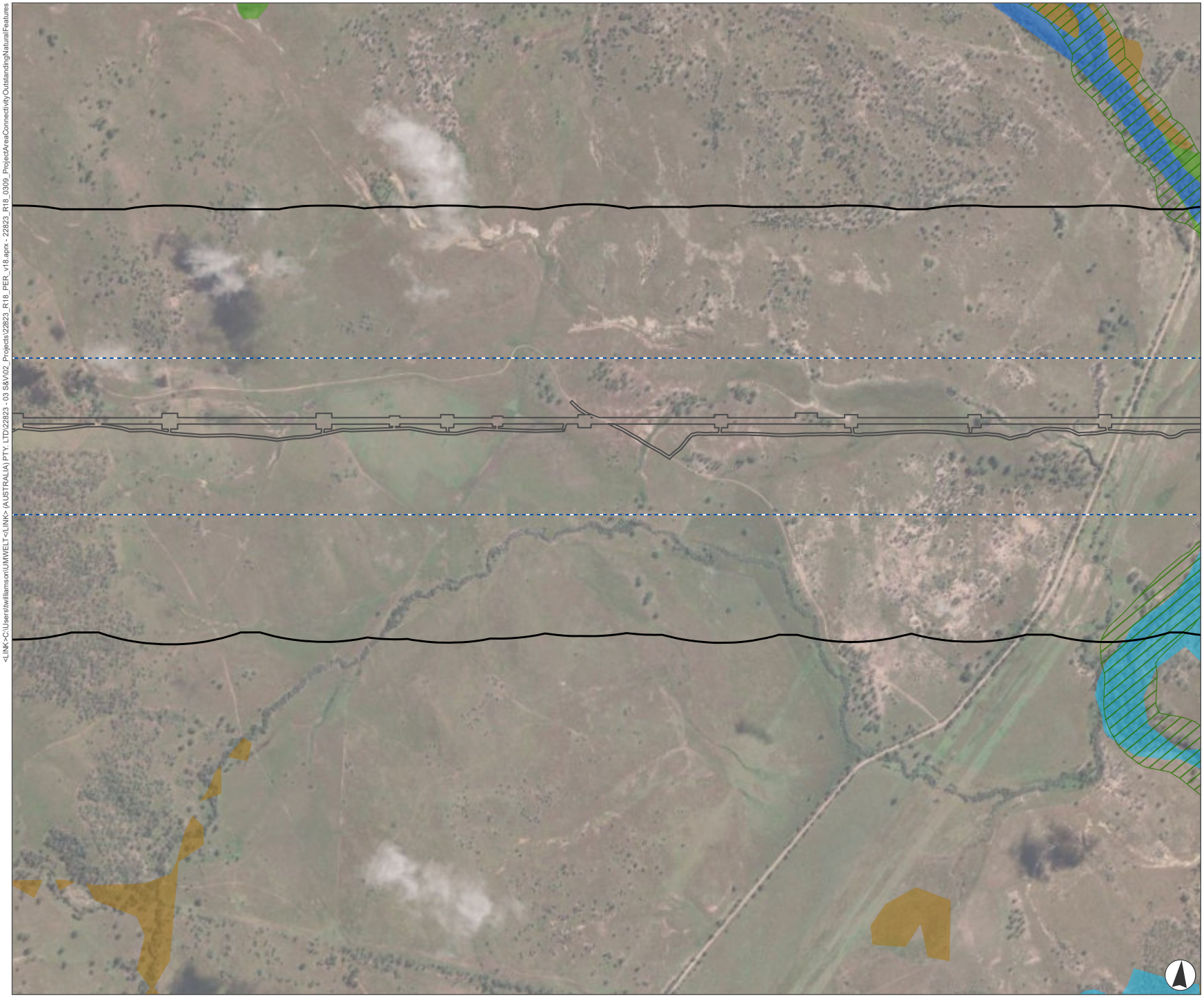


FIGURE 3.9-15

Project Area Connectivity and Outstanding Natural Features

Legend

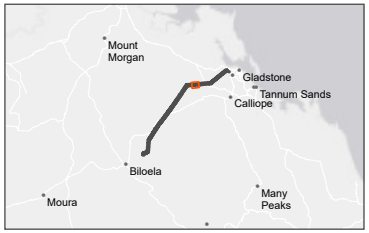
- Field Survey Extent
- Disturbance Footprint
- Project Area

Biodiversity Corridors

- Regional

Biodiversity significance

- State Habitat for EVNT taxa
- State
- Regional
- Local or Other Values



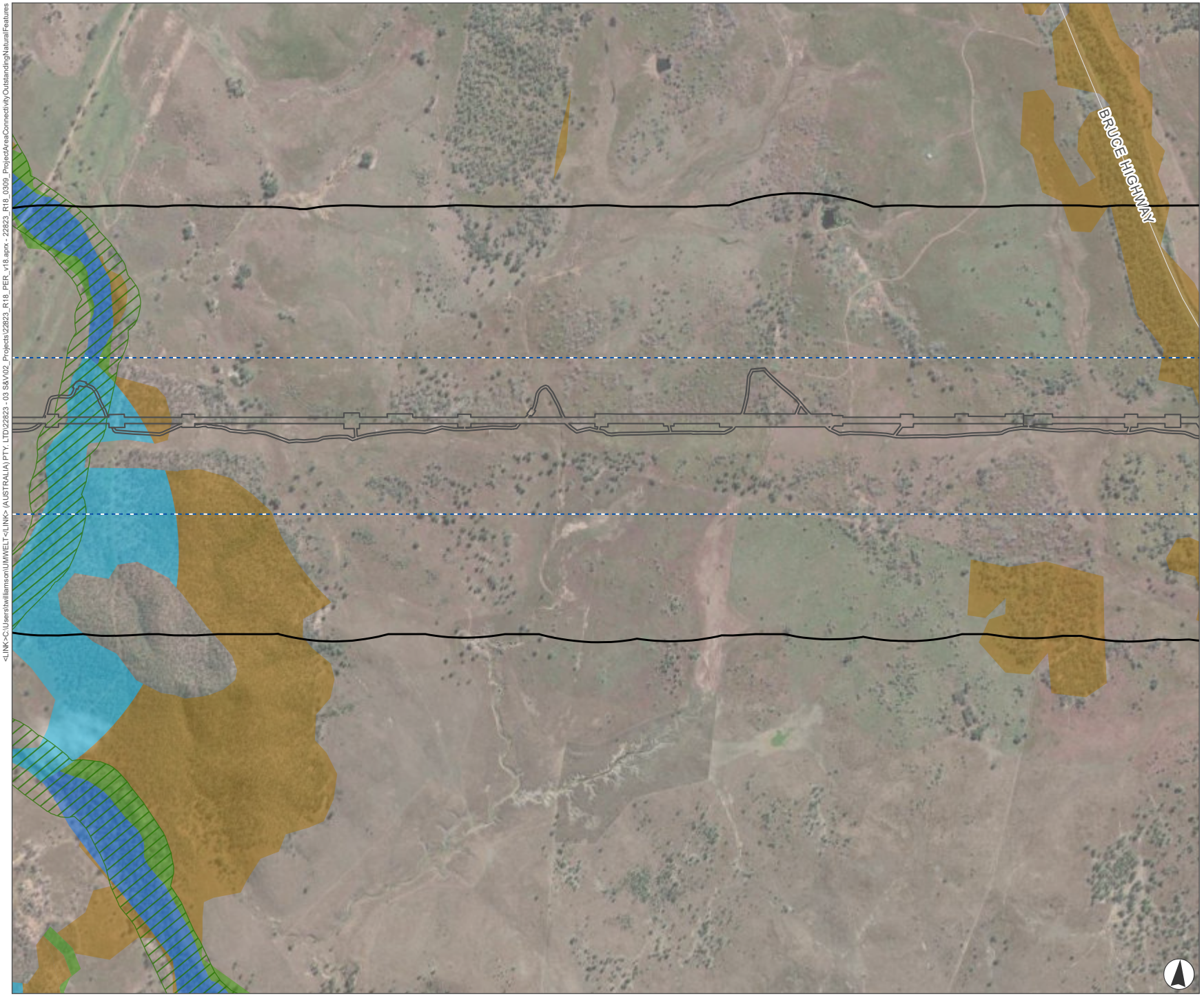
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FIGURE 3.9-16

Project Area Connectivity and Outstanding Natural Features

Legend

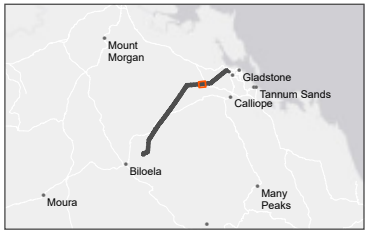
- Roads
- Field Survey Extent
- Disturbance Footprint
- Project Area

Biodiversity Corridors

- Regional

Biodiversity significance

- State Habitat for EVNT taxa
- State
- Regional
- Local or Other Values



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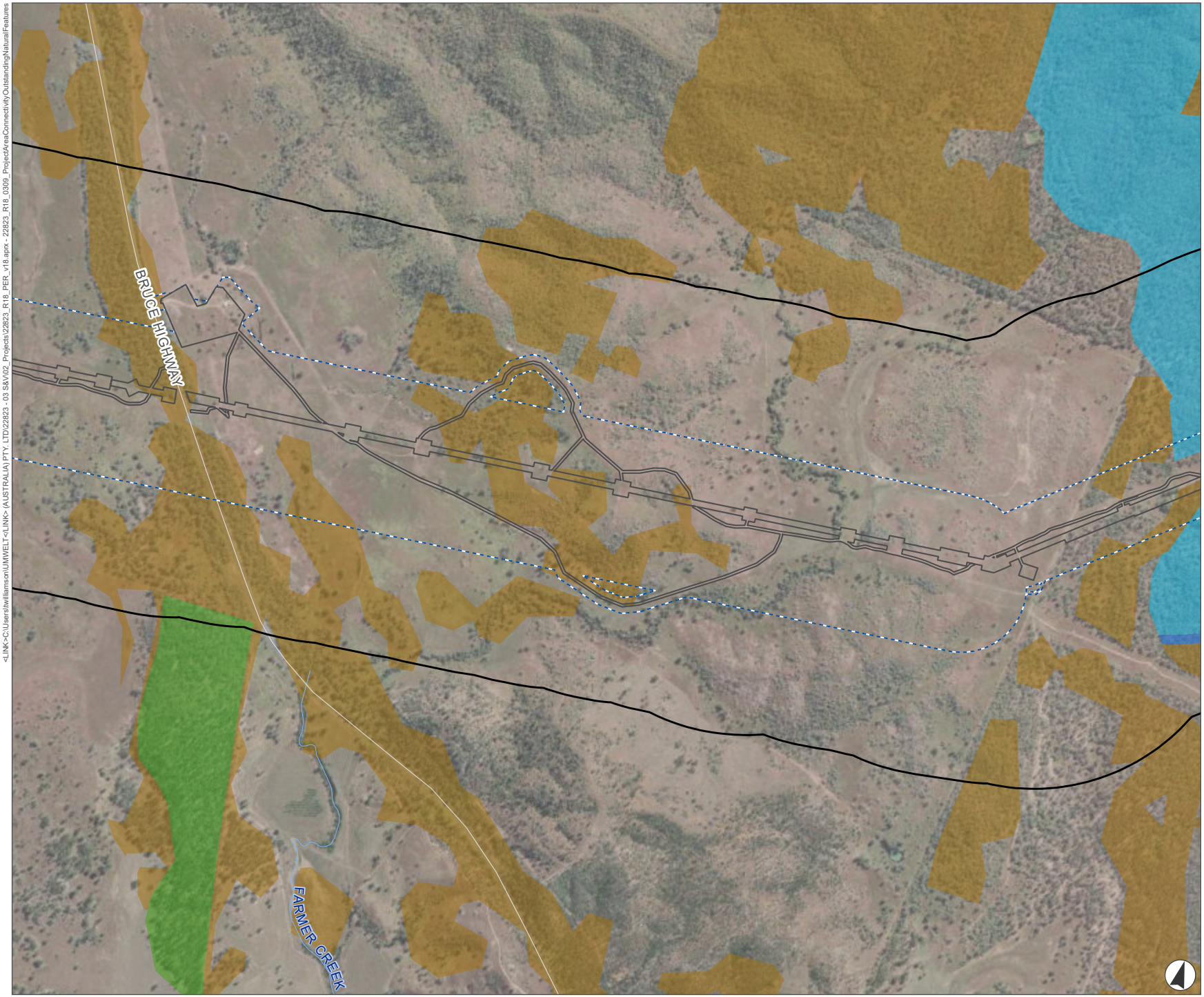


FIGURE 3.9-17

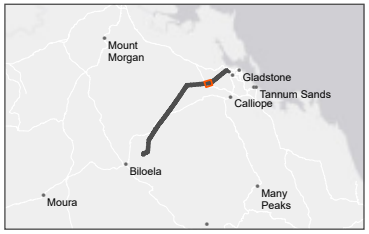
Project Area Connectivity and Outstanding Natural Features

Legend

- Roads
- Field Survey Extent
- Disturbance Footprint
- Project Area

Biodiversity significance

- State Habitat for EVNT taxa
- State
- Regional
- Local or Other Values



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Kilometres

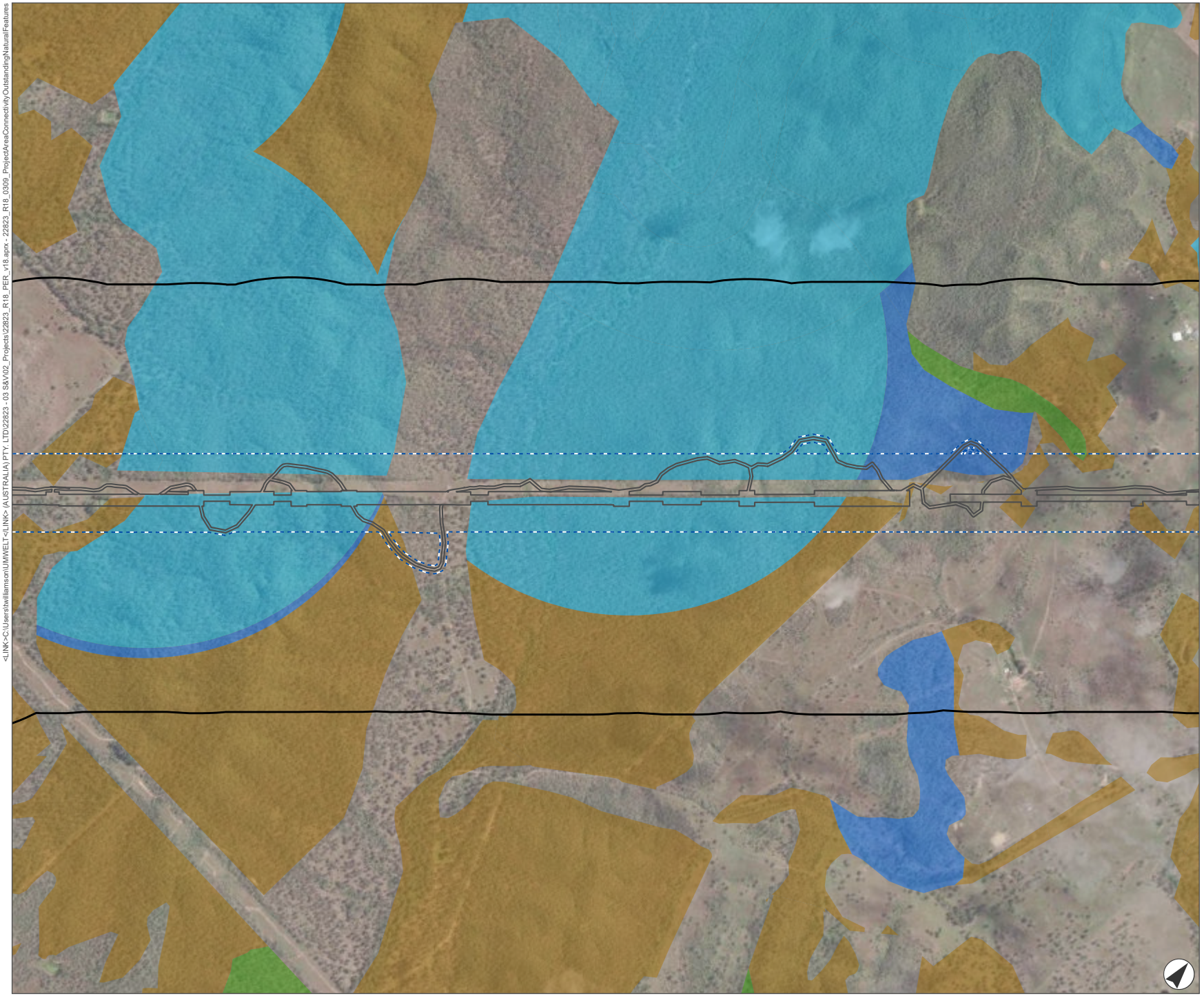
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FIGURE 3.9-18

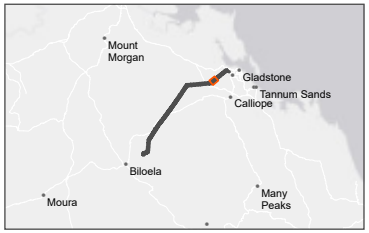
Project Area Connectivity and Outstanding Natural Features

Legend

- Field Survey Extent
- Disturbance Footprint
- Project Area

Biodiversity significance

- State Habitat for EVNT taxa
- State
- Regional
- Local or Other Values



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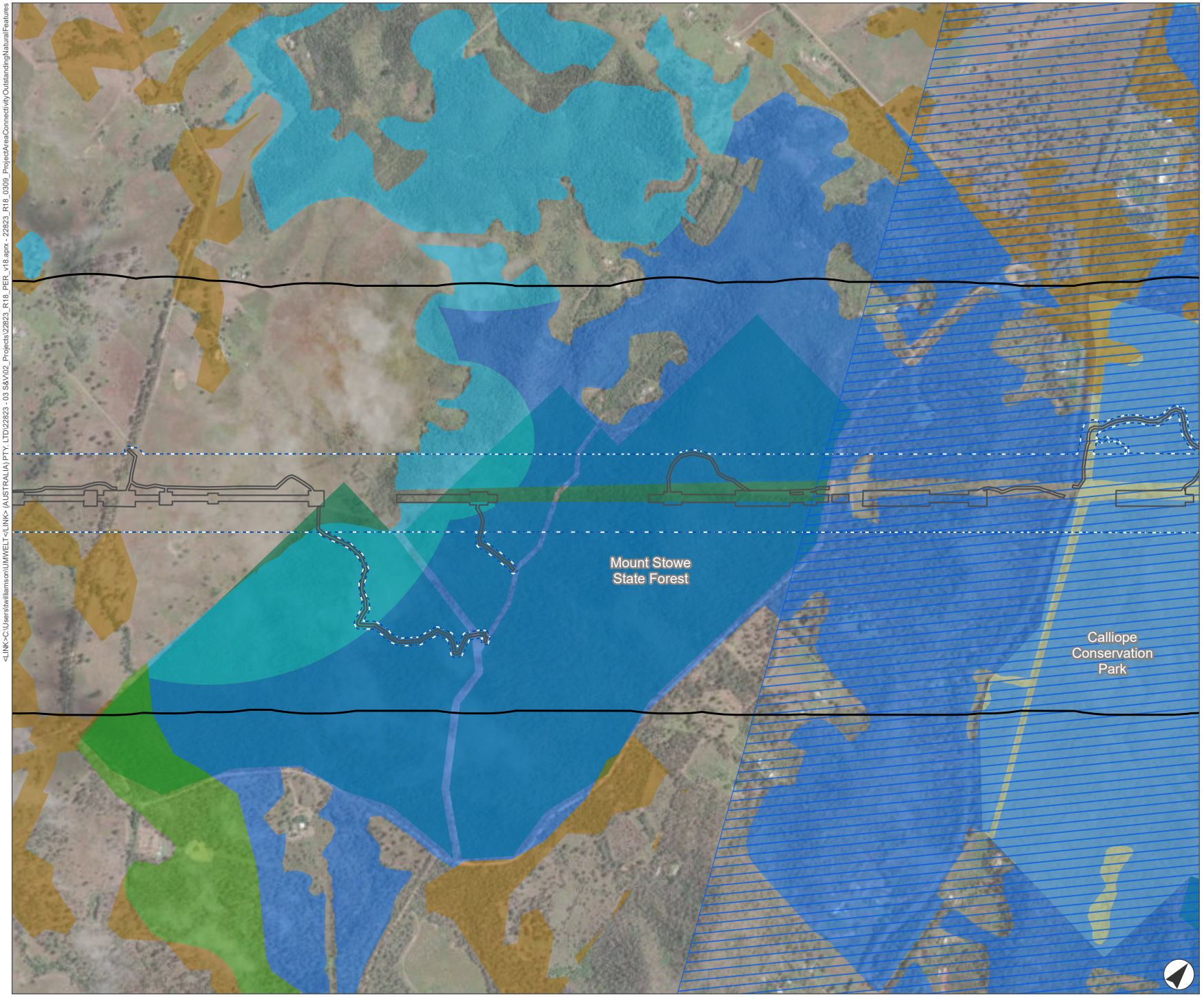


FIGURE 3.9-19

Project Area Connectivity and Outstanding Natural Features

Legend

- Field Survey Extent
- Disturbance Footprint
- Project Area

Biodiversity Corridors

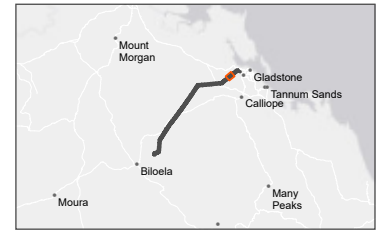
- State

Biodiversity significance

- State Habitat for EVNT taxa
- State
- Regional
- Local or Other Values

Protected Areas

- Conservation Park
- State Forest



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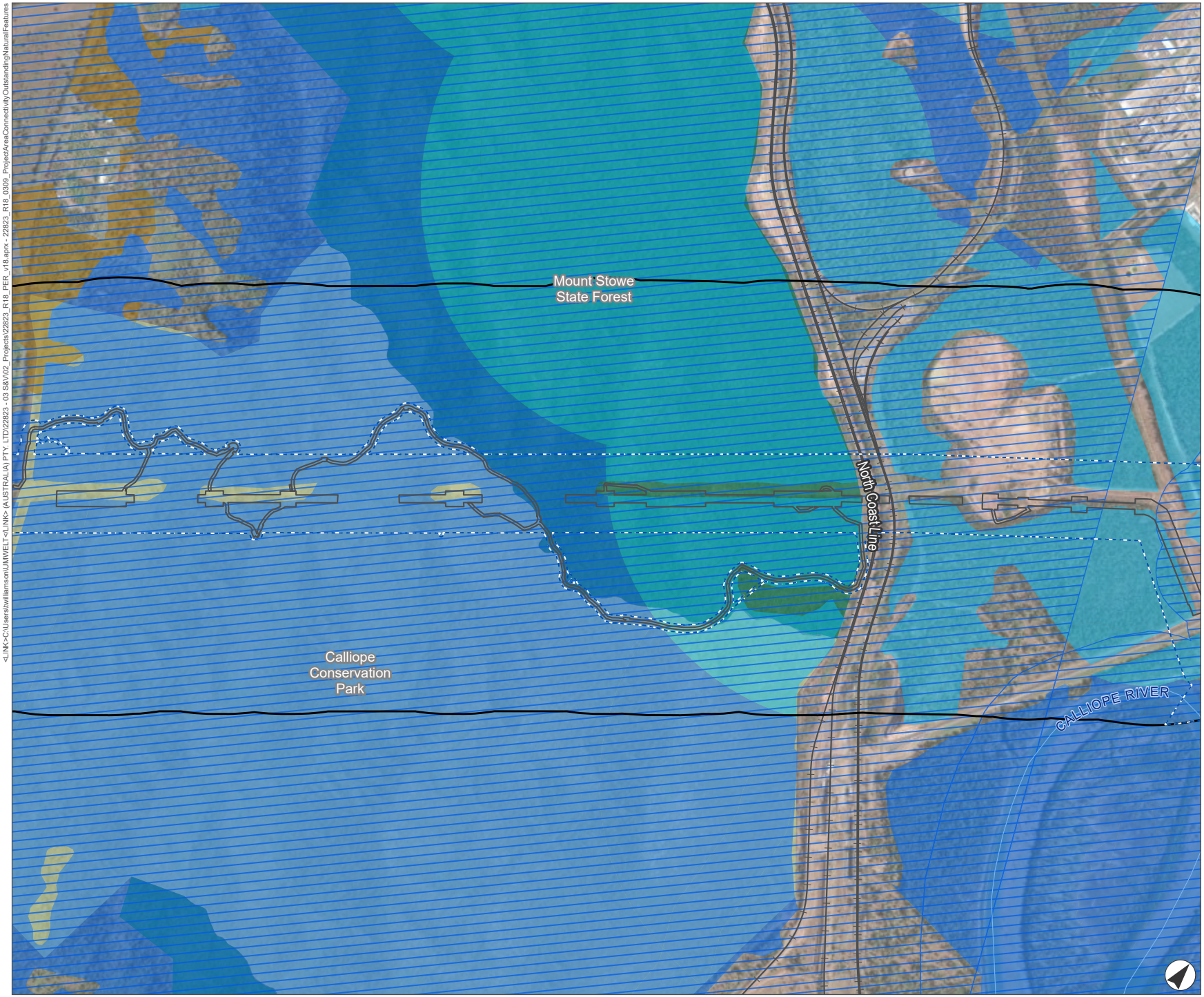


FIGURE 3.9-20

Project Area Connectivity and Outstanding Natural Features

Legend

- Railway
- Watercourse
- Field Survey Extent
- Disturbance Footprint
- Project Area

Biodiversity Corridors

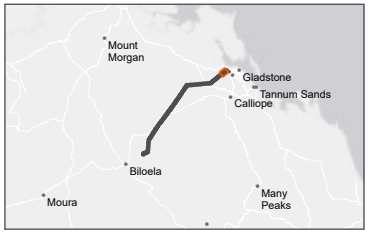
- State

Biodiversity significance

- State Habitat for EVNT taxa
- State
- Local or Other Values

Protected Areas

- Conservation Park
- State Forest



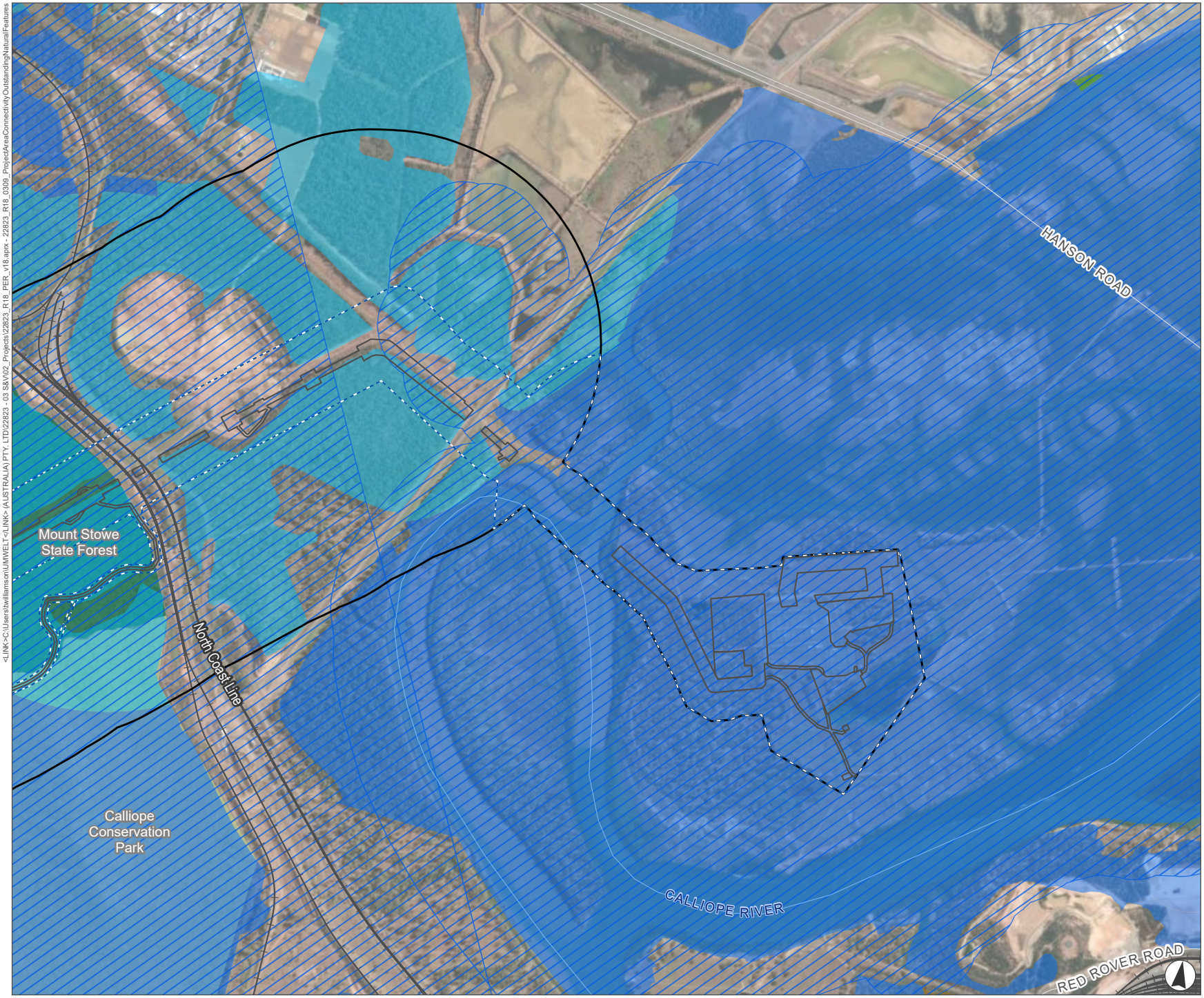
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FIGURE 3.9-21

Project Area Connectivity and Outstanding Natural Features

Legend

- Roads
- Railway
- Watercourse
- Field Survey Extent
- Disturbance Footprint
- Project Area

Biodiversity Corridors

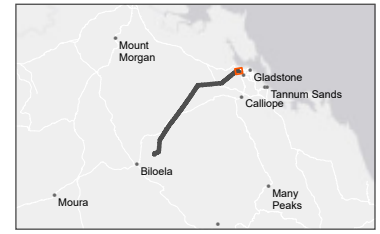
- State

Biodiversity significance

- State Habitat for EVNT taxa
- State
- Regional
- Local or Other Values

Protected Areas

- Conservation Park
- State Forest



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4.0 Assessment Methodology

This chapter addresses section 4.8 of the PER Guidelines and describes the scope, timing and methodology for studies and surveys undertaken with respect to vegetation communities and water resources including for the cumulative impact assessment. Powerlink has collaborated with DCCEEW throughout the preparation of the Draft PER to align expectations regarding the assessment methodologies.

4.1 Ecology Methodology

4.1.1 Nomenclature

Nomenclature used in this Chapter follows that of the Census of Queensland Flora and Fungi (Bean, 2024). Introduced species are denoted by an asterisk in the text (*). For consistency, this has been applied to both flora and fauna.

4.1.2 Desktop Assessment

A desktop assessment was undertaken to broadly characterise and identify the ecological values, including MNES, that may occur within the Project Area, as well as to describe the environmental context and surrounds of the Project Area (i.e. within 10 km unless otherwise stated). The desktop assessment included a review of literature, and searches of publicly available datasets and online mapping, as discussed in **Section 4.1.2.1** to **Section 4.1.2.2.**

A desktop assessment undertaken in early phases of the Project to aid in the scoping and planning of field surveys (**Section 4.1.4**). This includes the identification of species to be targeted during field surveys and for assisting in the ground-truthing of ecological values, vegetation communities and habitat for threatened species.

Subsequent desktop assessments were undertaken to capture changes in available data, as well as design changes, with an updated assessment conducted in March 2026 to ensure data utilised in this report is of high accuracy and currency. The data from the desktop assessment was used to inform the likelihood of occurrence assessment (**Section 4.1.3**), the species habitat mapping and the Significant Impact Assessments (SIA) (**Section 8.0**).

4.1.2.1 Database Searches

Interrogation of publicly available datasets and online mapping tools was undertaken to understand the ecological values that had been previously mapped or modelled to occur within the desktop search extent. The desktop search extent for this assessment was a 10 km buffer of the Project Area.

The following information sources were reviewed at Project inception, and were revised throughout the Project's development (November 2022, May 2023, October 2024,August 2025 and February 2026) to account for updates to these information sources as well as changes in design:

- EPBC Act Protected Matters Search Tool (PMST) for MNES (Department of Climate Change, Energy, the Environment and Water, 2026).

- Department of Environment, Tourism, Science and Innovation (DETSI) Wildlife Online database for species records (Department of the Environment, Tourism, Science and Innovation, 2025).
- Protected Plants Flora Survey Trigger map (Department of Environment and Science, 2025)
- Certified Biodiversity Planning Assessment (BPA) mapping for the brigalow and south east Queensland bioregions, to identify significant wildlife corridors and areas of State, regional and local biodiversity significance (Department of Environment and Science, 2020b, 2020a).
- Groundwater dependent ecosystems and potential aquifer mapping–Queensland (to identify occurrence of mapped groundwater dependent ecosystems (GDEs)) (Department of Environment, Science and Innovation, 2021).
- Detailed surface geology–Queensland (to identify the State mapped surface geology) (Department of Natural Resources and Mines, Manufacturing, and Regional and Rural Development, 2023).
- Contours–10 m interval map (for elevation mapping relevant to species habitat suitability) (Department of Natural Resources and Mines, Manufacturing, and Regional and Rural Development, 2019).
- Queensland Wetland Areas Mapping (Department of the Environment, Tourism, Science and Innovation, 2024).
- WetlandInfo Wetland Summary Information (to identify the spatial extent of mapped wetlands within the Project Area) (Department of the Environment, Tourism, Science and Innovation, 2025a).
- Reservoirs Map (provides details of known water bodies within the Project Area, i.e. farm dams) (Department of Natural Resources and Mines, Manufacturing, and Regional and Rural Development, 2024a).
- Bureau of Meteorology Online Climate Data (to determine weather conditions during field surveys and longer term weather trends for the area) (Bureau of Meteorology, 2025).
- Habitat Suitability Models Qld (Department of Environment and Science, 2023).
- Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (DNRMMRRD) online mapping layers:
    - Vegetation Management Regional Ecosystem (RE) map (Version 13) (Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development, 2024b)
    - Vegetation Management Pre-clear RE map (Version 13) (for vegetation communities mapped by the State as previously existing in the Project Area) (Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development, 2023)
    - Vegetation Management Watercourse and Drainage Feature map (Version 6.0) (Department of Natural Resources and Mines, Manufacturing, and Regional and Rural Development, 2024b)
    - Vegetation Management Supporting Map, including Essential Habitat mapping (Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development, 2024a)
    - Mineral resource sites–Queensland map, to identify abandoned mines (Department of Natural Resources and Mines, Manufacturing, and Regional and Rural Development, 2020).
- Detailed Surface Geology–Queensland map (Department of Resources, 2022).
- Regional Ecosystem Description Database (REDD) (Version 13) (Queensland Government, 2025b).

- Species Profile and Threats (SPRAT) database for detailed information on threatened flora and fauna species (Department of Climate Change, Energy, the Environment and Water, 2025k).
- Species of National Environmental Significance (SNES) dataset (for MNES species distributions) (Department of Climate Change, Energy, the Environment and Water, 2024b).
- DETSI Potential Habitat Models (to identify potential habitat for modelled species) (Department of EnvironmentScience, 2022).
- Interactive National Flying-fox monitoring viewer (identifies known flying-fox camps, including Nationally Important Camps) (Department of Climate Change, Energy, the Environment and Water, 2023f).
- The Australasian Bat Society BATMAP (to identify the national distribution of bats in Australia) (Australasian Bat Society Inc, 2025).
- eBird Australia webpage (provides spatial records and species specific information about ecological requirements) (eBird Australia, 2025).
- Birdlife International Data Zone portal (to search for International Bird Areas (IBAs)) (Birdlife International, 2024).
- Digital imagery (aerial photographs) (Google, 2025) (QImagery, Queensland Government, 2025).
- Historical aerial imagery (Q Imagery, 2025).
- Queensland Globe (Queensland Globe, 2025).
- QSpatial database (Queensland Government, 2025a).
- Powerlink LiDAR, which includes topography and canopy tree heights.
- Digital imagery (aerial photographs), including Queensland Globe, client flown high-resolution aerial imagery, ESRI aerial imagery.

4.1.2.2 Literature Review

The literature review investigated scientific literature relating to MNES (survey guidelines and species-specific habitat utilisation and requirements) and the methods and results of previous ecological studies undertaken within the wider region to broaden the understanding of potentially occurring MNES.

Scientific Literature

The following relevant scientific literature was reviewed in relation to potentially occurring MNES to increase understanding of these values and required survey methods:

- *Methodology for the Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland* (Neldner et al., 2025).
- *BioCondition, A Condition Assessment Framework for Terrestrial Biodiversity in Queensland* (Eyre et al., 2015).
- *Man*agement of Endangered Plants *for threatened flora species targeted surveys methods* (Cropper, 1993).

- *Guide to Determining Terrestrial Habitat Quality (version 1.2)* (Department of Environment and Science, 2020c).
- *Survey Guidelines for Australia's Threatened Mammals* (Department of Sustainability, Environment, Water, Population and Communities, 2011).
- *Survey Guidelines for Australia's Threatened Birds* (Department of Environment, Water, Heritage and the Arts, 2010).
- *Survey Guidelines for Australia's Threatened Bats* (Department of the Environment, Water, Heritage and the Arts, 2010).
- *Survey Guidelines for Australia's Threatened Reptiles* (Department of Sustainability, Environment, Water, 2011).
- Draft *Referral Guidelines for nationally listed Brigalow Belt reptiles* (Department of Climate Change, Energy, the Environment and Water, 2023e).
- *Referral guideline for the 14 birds listed migratory under the EPBC Act* (Department of the Environment, 2015b).
- *Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species* (Department of the Environment and Energy, 2017a).
- *Terrestrial Vertebrate Fauna Survey Guidelines for Qld* (Version 4.0) (Eyre, Ferguson, et al., 2022).
- *Forest Protection Survey Program: Survey Guideline–Spotlighting and Call Playback (V4.1)* (Jemma Cripps et al., 2018).
- *A review of koala habitat assessment criteria and methods* (K. Youngentob et al., 2021).
- *Identifying Habitat for the Endangered Koala* (Department of Climate Change, Energy, the Environment and Water, 2022d).
- *Referral guideline for the vulnerable water mouse Xeromys myoides* (Department of the Environment, 2015c).
- *National Recovery Plan for Black-breasted Button-quail (Turnix melanogaster)* (Department of Climate Change, Energy, the Environment and Water, 2022e).
- *Guide to greater glider habitat in Queensland* (Eyre, Smith, et al., 2022).
- *A review of ghost bat ecology, threats and survey requirements* (Bat Call WA Pty Ltd, 2021).
- *Targeted species survey guidelines for the ghost bat* (Hourigan, 2011).
- *Northern Territory guidelines for surveying for the ghost bat at the landscape scale* (Laura Ruykys et al., 2024).
- *EPBC Act referral guidelines for the endangered northern quoll* (Department of the Environment, 2016).
- *Monitoring Priority Threatened Species: Overview of monitoring methods for the Collared Delma (Delma torquata)* (Ecological Monitoring System Australia, 2024).
- EPBC Act Policy Statement 3.21 Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species (Department of the Environment and Energy, 2017a).
- *Targeted species survey guidelines for the painted honeyeater* (Rowland, 2012).

- Threatened flora observations, Batchfire Callide Mine (Batchfire Callide, 2025).
- Available conservation advice, Commonwealth listing advice and recovery plans for all species identified during the desktop assessment.

4.1.3 Likelihood of Occurrence

Section 5.1 of the PER guidelines describes the requirement to complete a detailed assessment of presence, or likelihood of presence of MNES within the Project Area and its vicinity. A likelihood of occurrence assessment was completed for EPBC Act listed threatened ecological communities (TECs) and flora and fauna species (including migratory fauna) identified in the desktop assessment (**Appendix E**).

The desktop search parameters included the Project Area and a 10 km buffer around the Project Area. Each community and species were assessed against the categories outlined in **Table 4.1** with consideration of known records, mapped distribution, preferred habitat and ecological requirements. This likelihood of occurrence assessment was used to inform the field surveys. Following the completion of the field survey program, the methodology was applied again to reassess the likelihood of occurrence outcomes in the context of the ground-truthed vegetation, habitat mapping and species records.

Changes associated with the re-assessment of the likelihood following the field surveys included:

- Changing the assessment of likelihood to 'known' if a species or ecological community was found to be present during the field surveys.
- Adjusting the likelihood of occurrence, based on a presence or absence of habitat within the Project Area.

The likelihood result was not downgraded in response to a failure to detect a species during field surveys when habitat suitable for the species was identified within the Project Area. This approach accommodates natural changes in the distribution and abundance of species over time and was applied in acknowledgement of the limitations of field sampling methods and survey conditions, which may not capture all target species present at the time of sampling.

This approach is an application of the precautionary principle that underpins ecological assessment, which errs on the side of conservative assumptions regarding species range and habitat. Whilst the field survey effort has been comprehensive, it is possible that as the Project progresses and pre-clearance surveys are conducted, this data will be used to refine the assessments and may lead to less conservative conclusions.

The likelihood of occurrence assessment was finalised in August 2025 and reviewed in February2026, following the completion of the last field survey and considers updates to species distributions and publicly available records up until this point. The likelihood of occurrence assessment is provided in **Appendix E**. Species assessed as 'high' or 'moderate' are collectively referred to as 'potentially occurring' herein.

Table 4.1 Likelihood of Occurrence Definitions

Category	Definition
Known	The species or community was confirmed in the Project Area during field surveys completed as part of the field survey program or database records from the past decade occur within the Project Area. Records are considered valid and associated with a high spatial confidence.
High	With consideration of the extent, quality and suitability of habitat within the Project Area, the location of the Project Area relative to existing contemporary records (past 20 years) of the MNES (with consideration of sampling effort in the region and the species' detectability) it is highly likely that the MNES occurs in the Project Area. Also includes species likely to occur in the Project Area during migratory, short-distance seasonal or nomadic movements (including cases for which likelihood of occurrence is high regardless of the nature of habitat present in the Project Area). For TECs, the TEC has one or more corresponding regional ecosystem (RE) modelled within the Project Area, and key species have been recorded from the broader area (20 km from the Project Area). This excludes areas that have been ground-truthed to exclude the TEC.
Moderate	Potential or suitable habitat in limited extent is present in the Project Area but database records within the desktop search extent are dated (>20 years old) or have low accuracy or validity. Therefore, 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 Project 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 Project Area during migratory, short-distance seasonal or nomadic movements. For TECs, the TEC has one or more corresponding REs mapped within the Project Area; however, key species have not been recorded from the broader area (20 km from the Project Area). This excludes areas that have been ground-truthed to exclude the TEC.
Low	The Project Area either contains limited suitable habitat or only marginal habitat. The species records are either very scarce or absent in the desktop search extent. The species is deemed unlikely to occur in the Project Area based on the aforementioned factors. The species may disperse through or near the Project Area infrequently. For TECs, the TEC has no corresponding REs mapped within the Project Area.
Unlikely	The Project Area offers limited to no potential habitat for a TEC or species, is outside the known range and/or is lacking broader habitat requirements.

4.1.4 Field Survey

A total of 19 field surveys were completed for the Project between 2023 and 2026 (**Table 4.2**). Each field survey had a defined purpose and utilised different survey techniques, which are discussed in **Section 4.1.5**, **Section 4.1.6** and **Section 4.1.7.** The main survey types included baseline vegetation and habitat surveys, targeted threatened flora and fauna surveys and habitat condition surveys. Baseline and targeted flora surveys were purposefully timed to align with the flowering periods of target species (if necessary for identification) and threatened fauna with the seasonal occurrence and peak activity period of target species.

Weather data for the field surveys has been extracted from the nearest weather station (Gladstone Airport (039326) (Bureau of Meteorology, 2026) and is included in **Table 4.2**, along with the survey type and associated survey duration. Targeted flora surveys undertaken by Ecologica in 2025/2026 have used the following weather stations; Biloela (039290) for rainfall totals and Thangool (039089) for the temperature range (Bureau of Meteorology, 2026)

Table 4.2 Field Surveys Undertaken for the Project

Field Survey	Section Surveyed	Survey Dates	Survey Length (days)	Rainfall (mm)	Temperature (°C)	
					Min.	Max.
Baseline flora and vegetation survey and fauna habitat assessment	Section D	9–14 March 2023	6	21.2	24.0	32.2
Baseline fauna survey	Eastern Sections C, D and E	25–30 March 2023	6	0	21.5	31.0
Baseline flora and vegetation survey and habitat assessment	Northern Sections C, D and E	30 March–3 April 2023	5	7.2	20.4	28.7
Baseline fauna survey	Northern and Western Section C	12–17 April 2023	6	0	17.4	30.5
Baseline flora and vegetation survey and habitat assessment	Southern Section B and Section A	18–23 April 2023	6	0	19.5	28.6
Baseline fauna survey including camera deployment	Southern Section B and Section A	26 April–1 May 2023	6	0.6	17.8	27.8
Baseline flora and vegetation survey (with targeted *Cycas megacarpa* surveys) and camera collection	Sections A, B, C, D and E	15–20 May 2023	6	2.3	13.9	24.8
BioCondition surveys	Sections A, B, C, D and E	9–14 October 2023	5	10.0	14.6	29.4
BioCondition surveys	Sections A, B, C, D and E	23–28 October 2023	6	0	18.1	31.1
Targeted northern quoll survey	Sections A, B, C, D and E	31 July–5 August 2024	6	0	7.6	25.1
Marine plants survey	Sections E	5 December 2024	1	1.2	24.7	30.6

Field Survey	Section Surveyed	Survey Dates	Survey Length (days)	Rainfall (mm)	Temperature (°C)	
					Min.	Max.
Weed survey	Sections A, B, C, D and E	17–21 March 2025	5	1.4	21.7	30.8
Targeted collared delma and ghost bat survey	Sections A and B	28 May–1 June 2025	5	25.6	12.4	27.7
Targeted collared delma and water mouse survey	Sections D and E	16–21 June 2025	6	1.6	9.9	28.7
Targeted collared delma habitat, ghost bat and *Cycas megacarpa* survey	Sections A and B	14–20 July 2025	7	0.6	1.7	26.5
Targeted collared delma Habitat, ghost bat and *Cycas megacarpa* survey	Sections B and D	27–31 July 2025	5	0.4	11.4	23.7
***Cycas megacarpa* translocation surveys**	Section B	19-22 October 2025	4	0.0	13.3	36.3
Threatened plants surveys	Sections A-D	18-22 January 2026	5	5.4	17.2	35.7
Targeted flora and Fauna surveys of laydown areas	Sections B, C and E	01 February 2026	1	0.0	21.9	25.4

4.1.4.1 Survey Timing and Site Selection

Surveys were deliberatively scheduled to maximise the detectability of species and were undertaken across multiple years (2023 to 2026). As the Project Area is situated in the Brigalow Belt Bioregion, surveys were conducted in optimal seasons, as recommended by the *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland* (Eyre, Ferguson, et al., 2022) with the majority of surveys occurring within autumn to account for improved conditions post summer rains. This timing also co-insides with an active period including dispersal and local migration of many species that occurs prior to the onset of winter.

In addition, several targeted surveys were timed to adhere to relevant species-specific survey guidelines (where available) including breeding season (northern quoll) and temperature specific timing (collared delma).

Site selection was based on early iterations of RE mapping (**Section 4.1.10.1**) and State mapped regional ecosystems (Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development, 2024b).

4.1.5 Vegetation Communities

4.1.5.1 Regional Ecosystems and Condition

The flora and vegetation surveys across the Project Area from 2023-2026 were undertaken to identify and record vascular flora species as well as classify and map vegetation communities. Due to the size of the Project Area, mapping the vegetation within its entirety was not practical, therefore only the Disturbance Footprint plus a 150 m buffer was mapped including access tracks, herein referred to as the **Field Survey Extent**.

The sampling of flora and classification and mapping vegetation communities into REs was undertaken using the *Methodology for the Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland* (Neldner et al., 2025).

REs are vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil (Sattler & Williams, 1999) and is typically identified by the dominant canopy species.

As well as classification of REs, the baseline flora and vegetation surveys collected data to classify patches based on their condition. Vegetation within the Project Area was classified as 'remnant', 'regrowth' and 'non-remnant' condition according to the following criteria:

- **Remnant**–vegetation communities as described under the *Vegetation Management Act 1999* (VM Act) and referenced by Neldner et. al., (2025). 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**–non-remnant vegetation that has a significant woody component but fails to meet the structural/ floristic characteristics of remnant vegetation.
- **Non-remnant**–all vegetation that is not mapped as remnant or regrowth vegetation. This 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 roads and cropping land.

Using this definition, land zone information, dominant species data and structural formation classes (**Table 4.3**) each vegetation patch was assigned a specific RE in accordance with the REDD (Queensland Herbarium, 2024) and condition. The spatial extent of vegetation was identified in the field and via satellite imagery to confirm vegetation boundaries for larger polygons.

Table 4.3 Structural Formation Classes[1]

Projected Foliage Cover	>70%	>30-70%	10-30%	<10%
Crown class	Dense/closed	Mid-dense	Sparse	Very sparse
Crown cover %	>80%	>50–80%	20–50%	<20%
VMA structure category	Dense	Mid-dense	Sparse	Very Sparse

Projected Foliage Cover	>70%	>30-70%	10-30%	<10%
Growth form	**Structural Formation Classes (qualified by height)**			
Tree >30 m	Tall closed forest	Tall open forest	Tall woodland	Tall open woodland
Tree 10–30 m	Closed forest	Open forest	Woodland	Open woodland
Trees 2–10 m	Low closed forest	Low open forest	Low woodland	Low open woodland
Shrubs 2–8 m	Closed scrub	Open scrub	Tall shrubland	Tall open shrubland

[1] as per. Nelder et al., 2025

In line with this method, several sampling methods were utilised in the field to classify and map REs, including Quaternary, Tertiary and Secondary sites, as described in Neldner (2025), which are further described in **Table 4.4**. Survey effort associated with these methods, as well as BioCondition and TEC assessments, are summarised in **Table 4.2** with the location of each illustrated on **Figure 4.1**. BioCondition methods, in the context of habitat quality assessments are discussed in **Section 4.1.7.2**.

Table 4.4 Flora Survey Techniques and Effort

Survey Technique	Survey Effort within the Project Area
Secondary Site	11
Tertiary Site	42
Quaternary Site	394
BioCondition Site	55*
TEC assessment site	11

*Includes two BioCondition sites used as vegetation reference condition for mangrove vegetation (RE 12.1.3).

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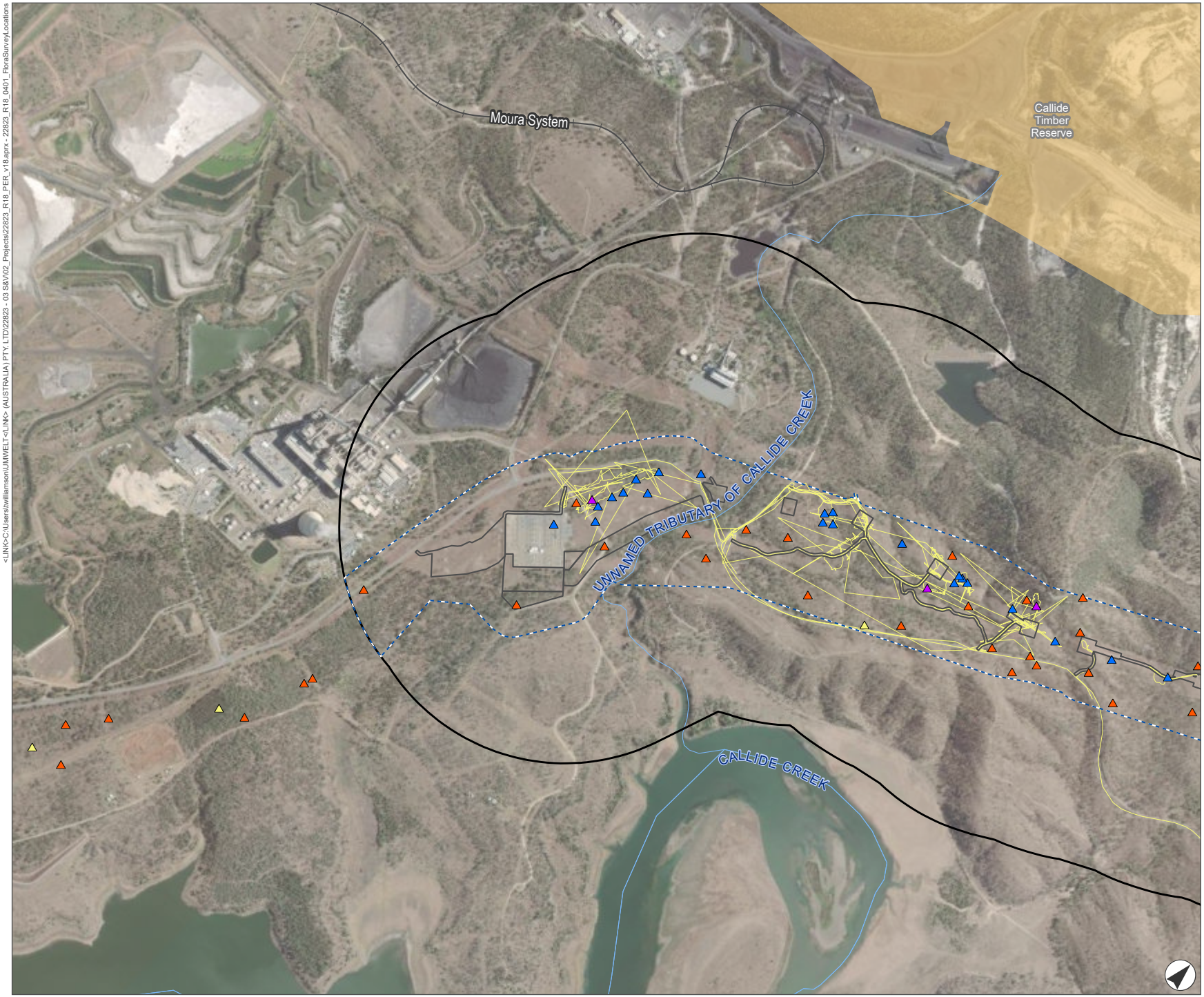


FIGURE 4.1-1

Flora Survey Locations

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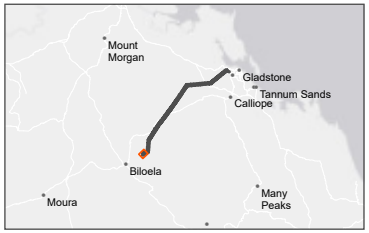
- Watercourse
- Survey Tracks
- Railway
- Field Survey Extent
- Disturbance Footprint
- Project Area

Protected Areas

- Timber Reserve

Flora Survey Locations

- Quaternary Sites
- Tertiary Sites
- Biocondition Sites
- Weed Survey Site



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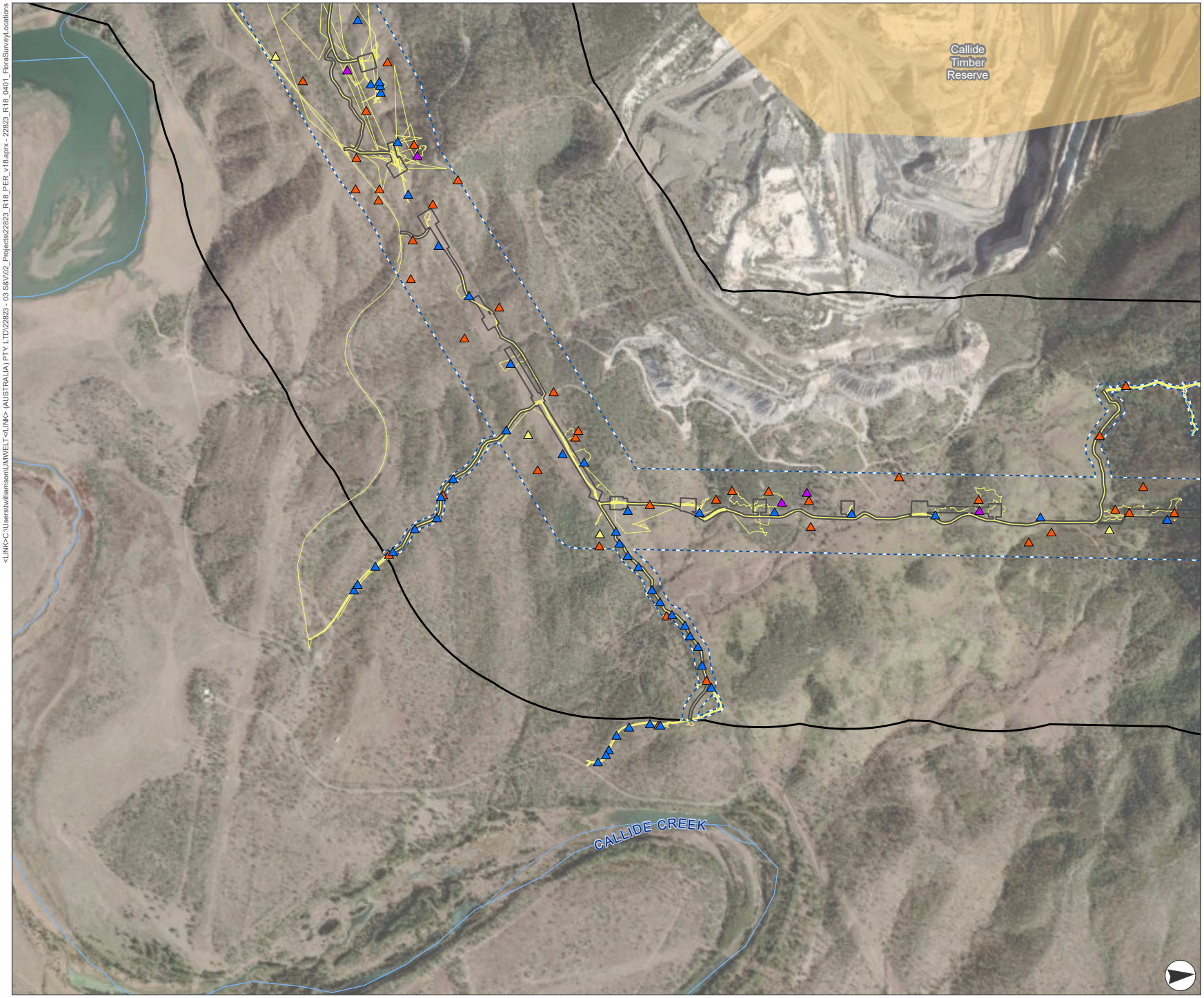
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FIGURE 4.1-2

Flora Survey Locations



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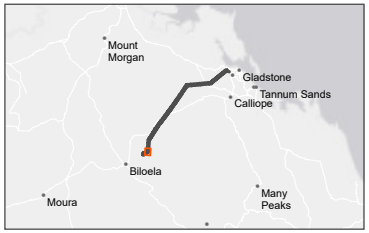
- Watercourse
- Survey Tracks
- Field Survey Extent
- Disturbance Footprint
- Project Area

Protected Areas

- Timber Reserve

Flora Survey Locations

- Quaternary Sites
- Tertiary Sites
- Biocondition Sites
- Weed Survey Site



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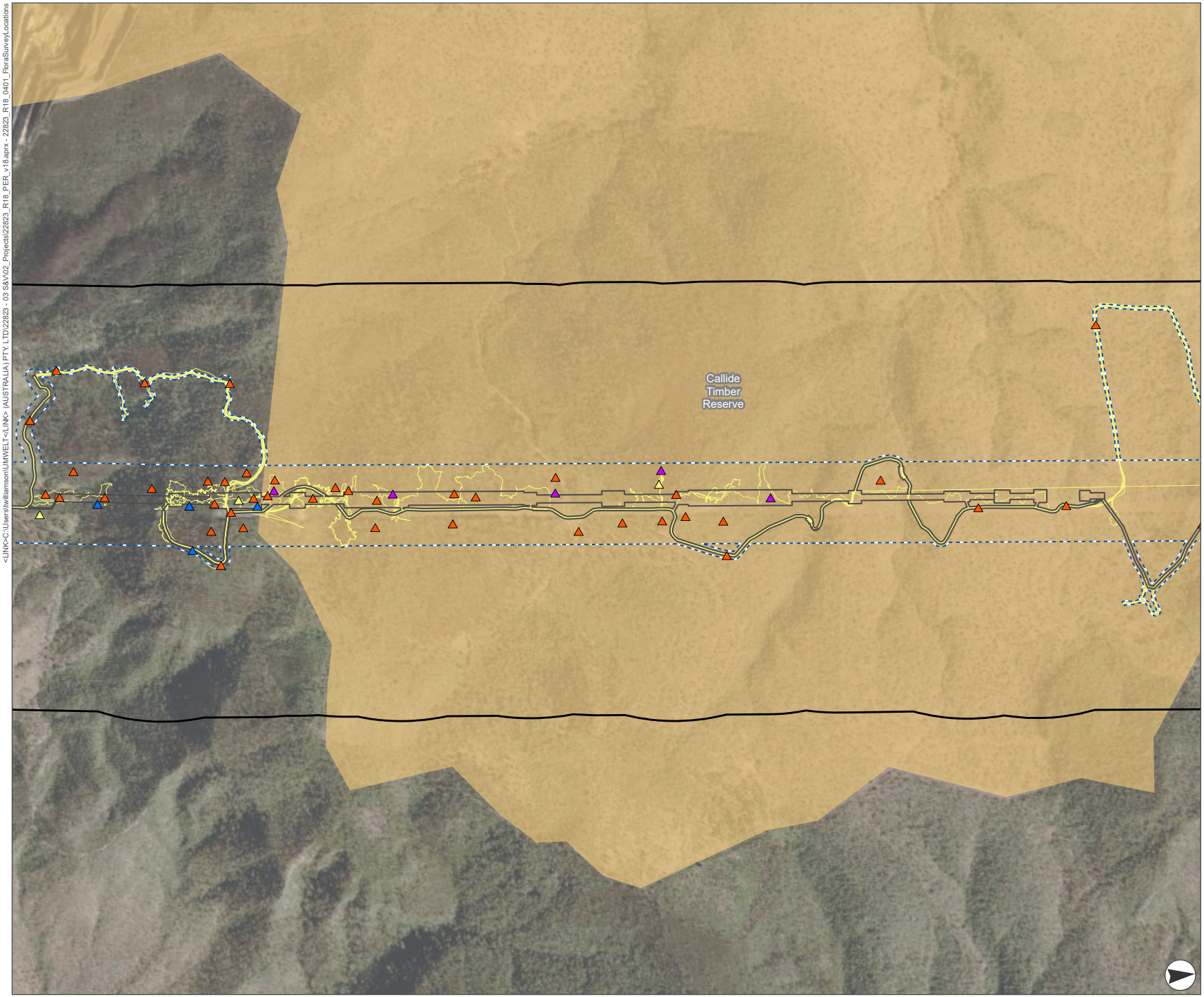


FIGURE 4.1-3

Flora Survey Locations

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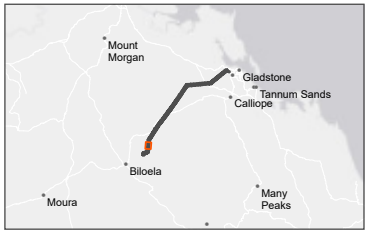
- Survey Tracks
- Field Survey Extent
- Disturbance Footprint
- Project Area

Protected Areas

- Timber Reserve

Flora Survey Locations

- Quaternary Sites
- Tertiary Sites
- Biocondition Sites
- Weed Survey Site



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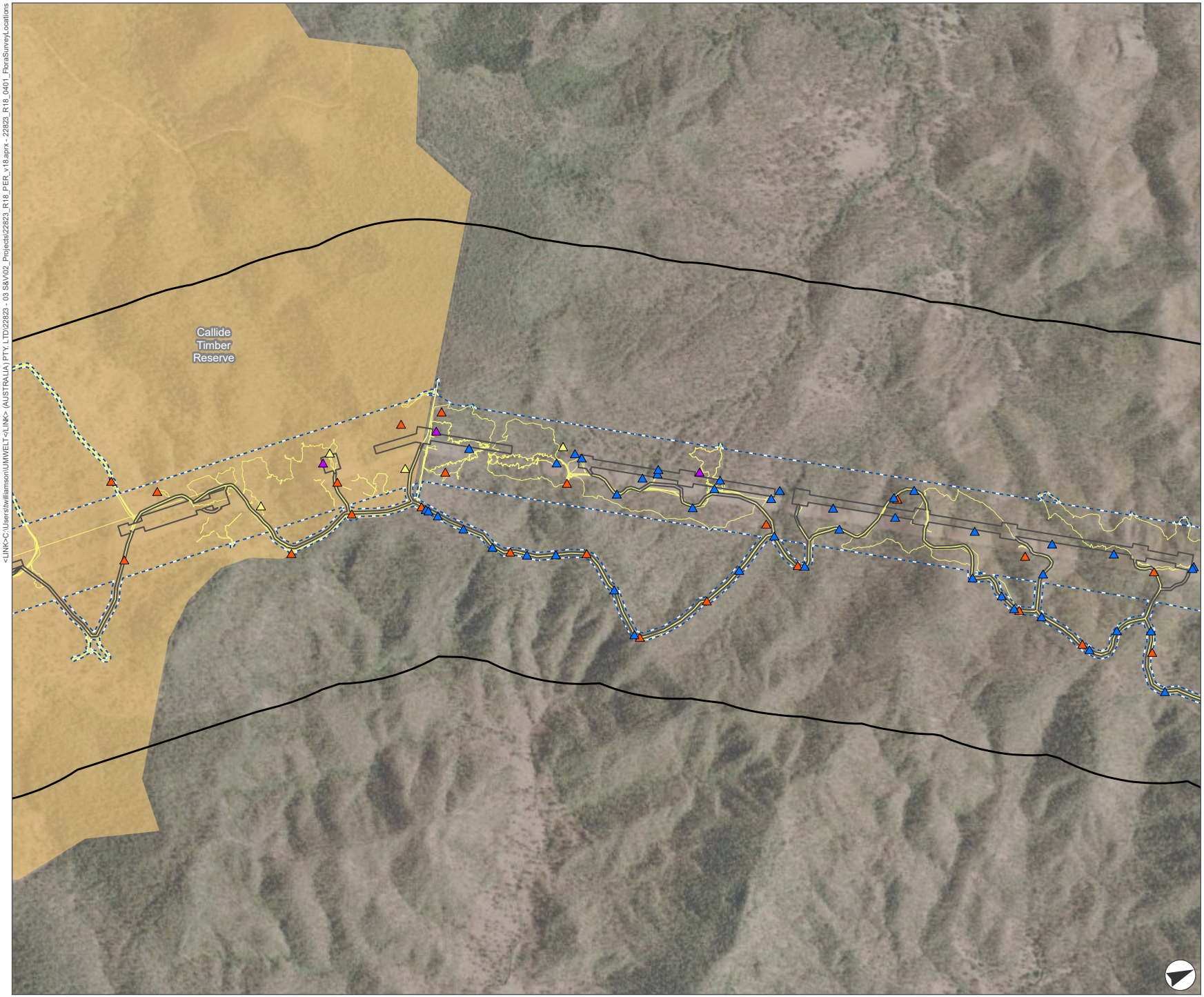


FIGURE 4.1-4

Flora Survey Locations

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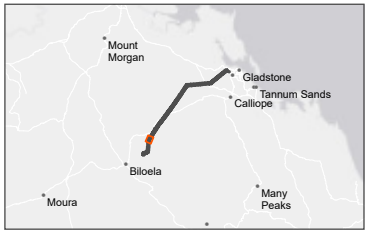
- Survey Tracks
- Field Survey Extent
- Disturbance Footprint
- Project Area

Protected Areas

- Timber Reserve

Flora Survey Locations

- Quaternary Sites
- Tertiary Sites
- Biocondition Sites
- Weed Survey Site



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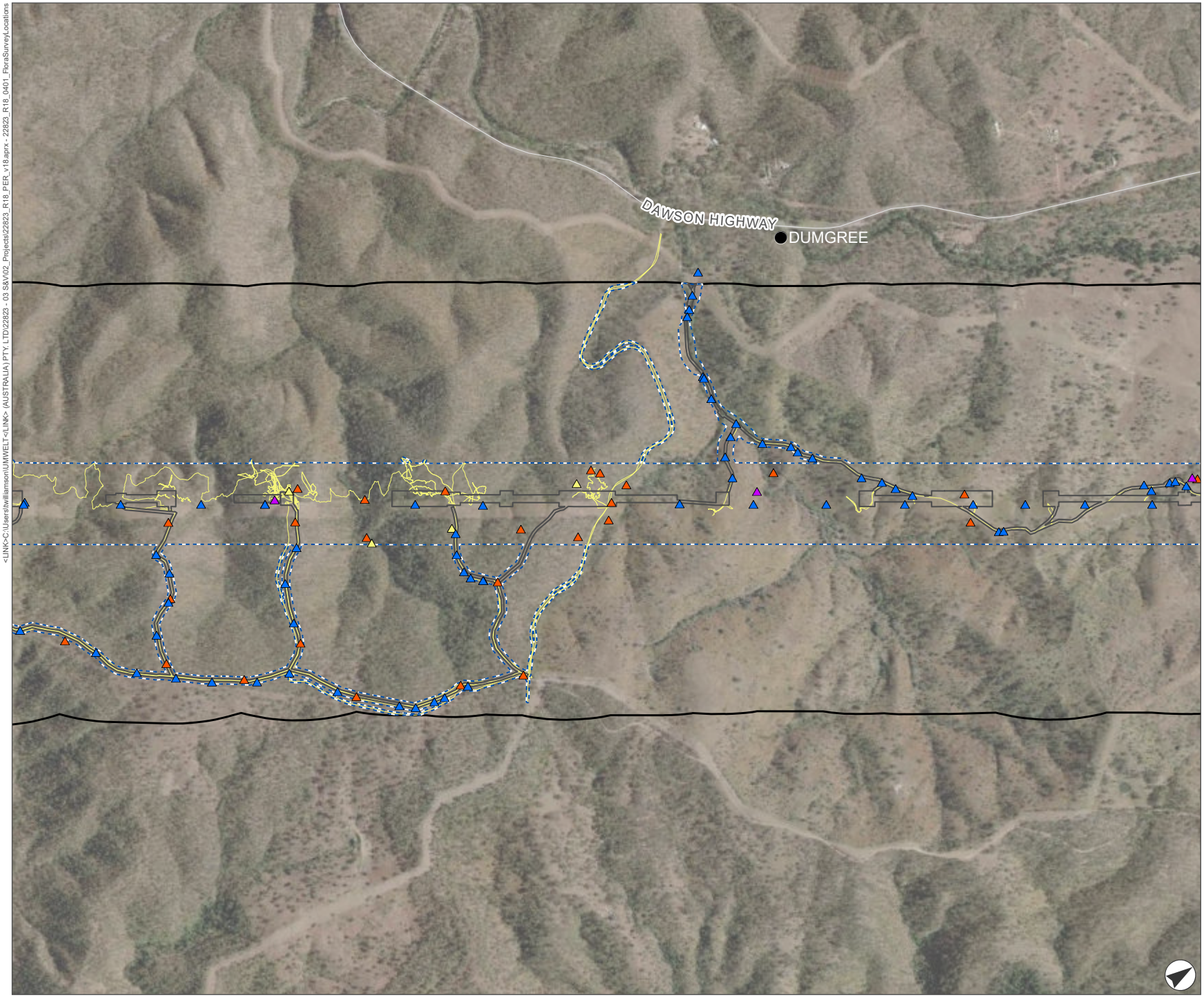


FIGURE 4.1-5

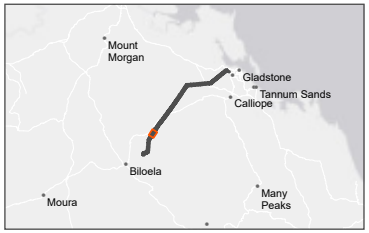
Flora Survey Locations

Legend

- Roads
- Survey Tracks
- Field Survey Extent
- Disturbance Footprint
- Project Area

Flora Survey Locations

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- Tertiary Sites
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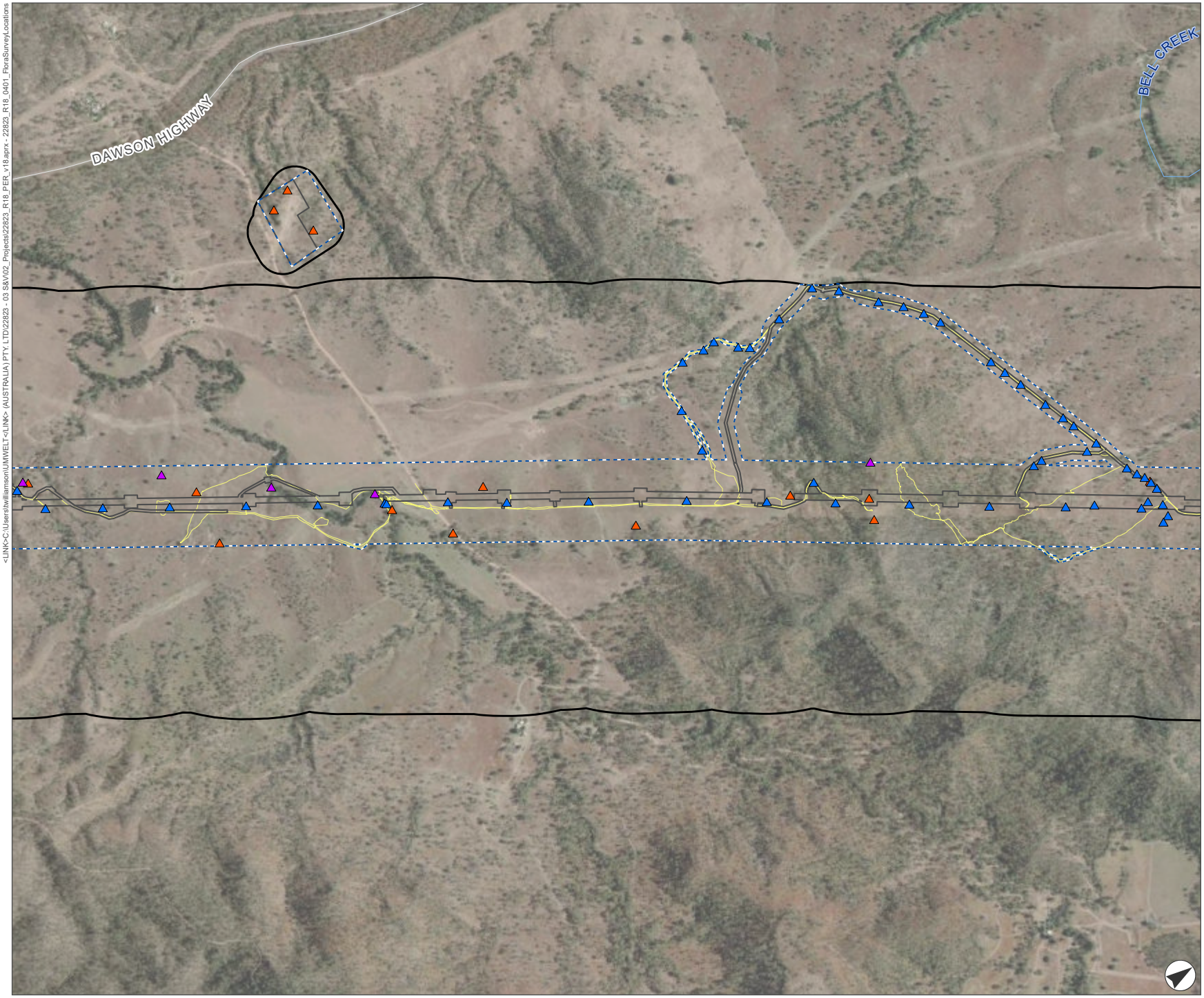


FIGURE 4.1-6

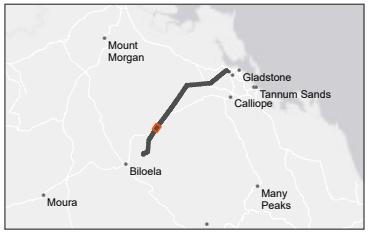
Flora Survey Locations

Legend

- Roads
- Watercourse
- Survey Tracks
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- Project Area

Flora Survey Locations

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- Biocondition Sites
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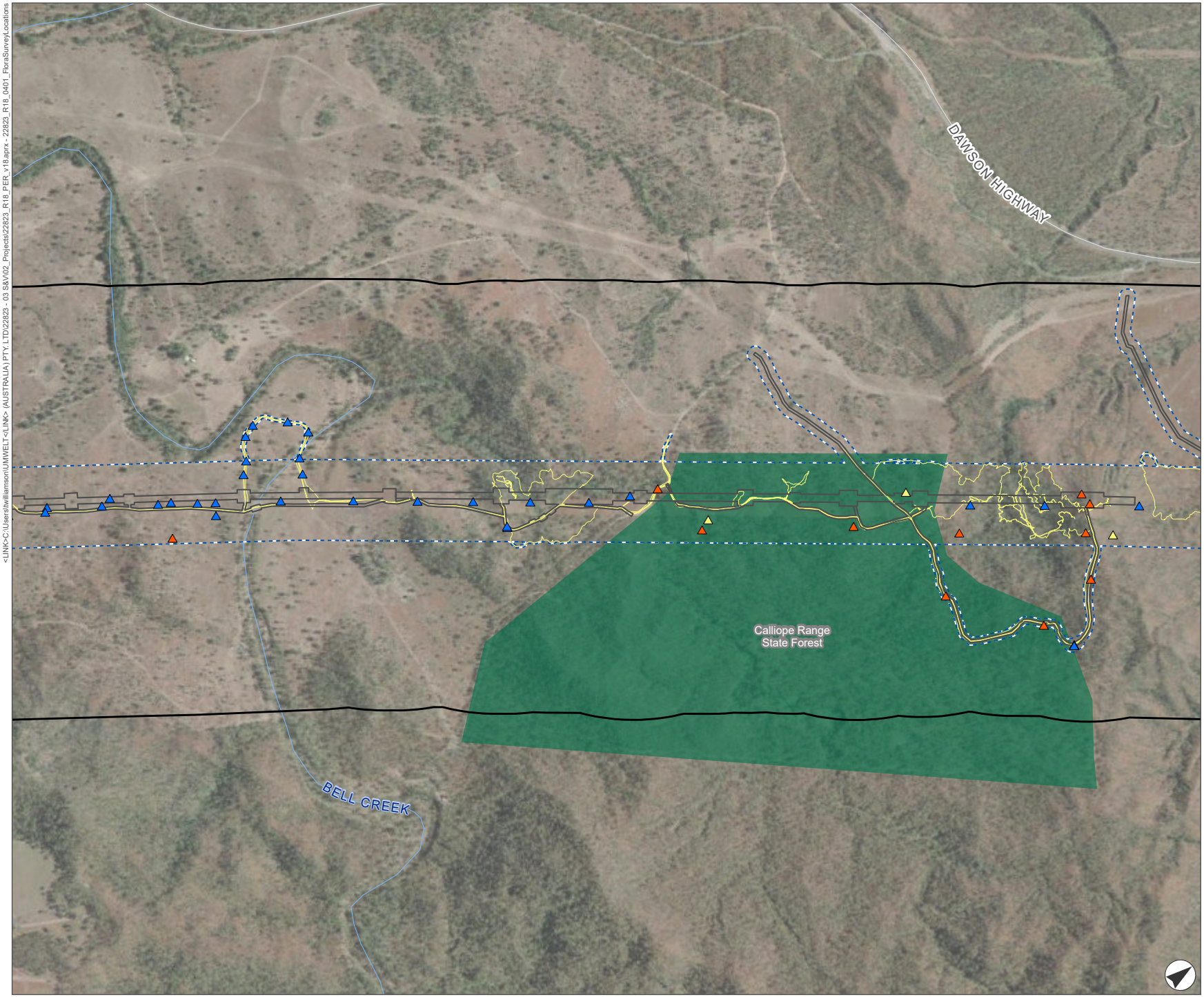
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FIGURE 4.1-7

Flora Survey Locations

Legend

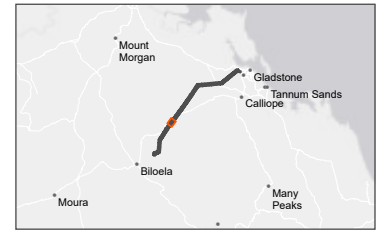
- Roads
- Watercourse
- Survey Tracks
- Field Survey Extent
- Disturbance Footprint
- Project Area

Protected Areas

- State Forest

Flora Survey Locations

- Quaternary Sites
- Tertiary Sites
- Weed Survey Site



0 0.5 1

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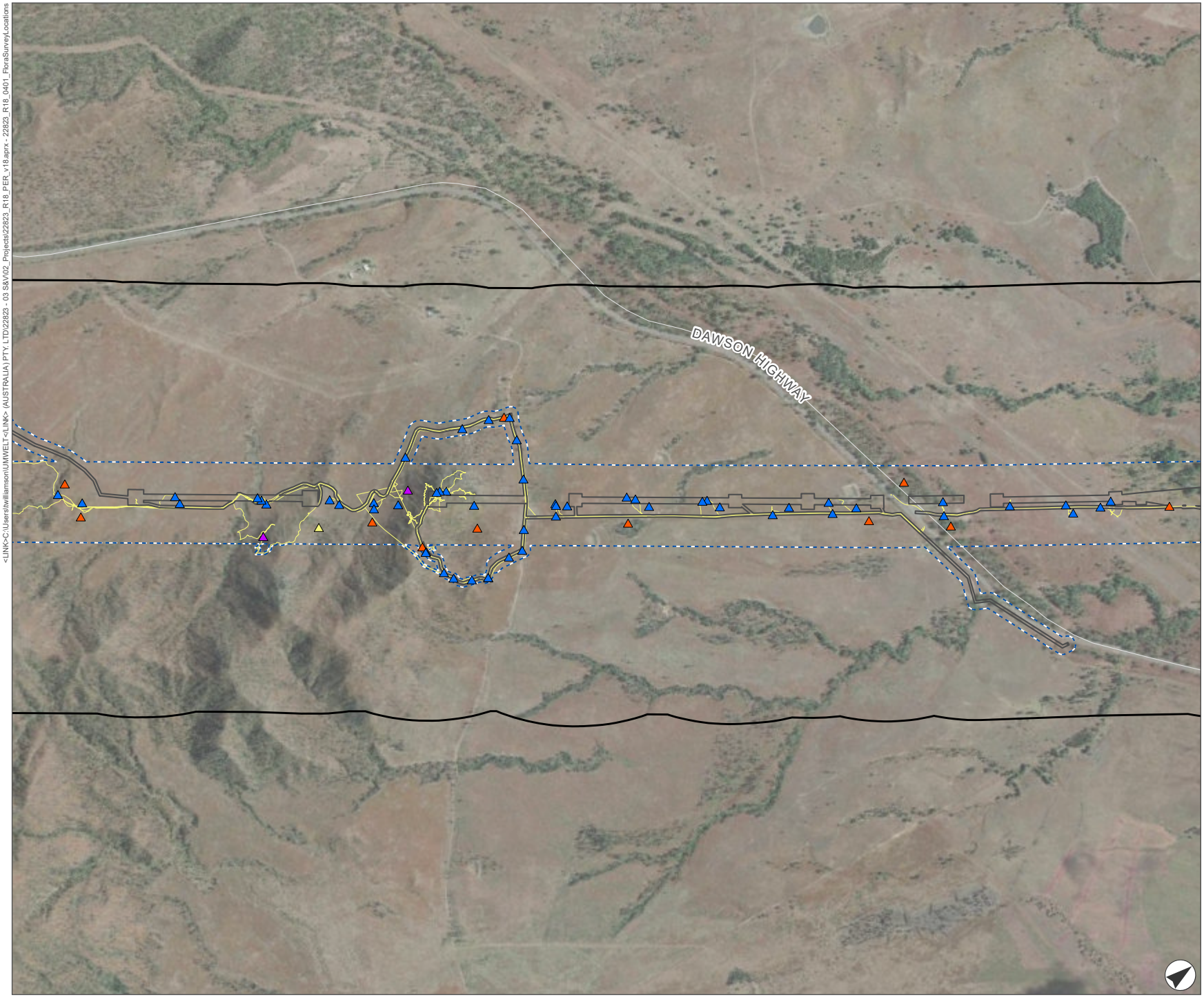


FIGURE 4.1-8

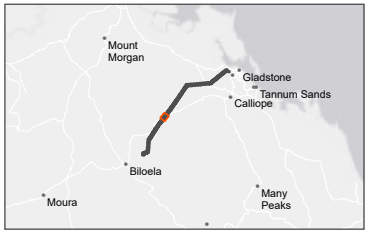
Flora Survey Locations

Legend

- Roads
- Survey Tracks
- Field Survey Extent
- Disturbance Footprint
- Project Area

Flora Survey Locations

- Quaternary Sites
- Tertiary Sites
- Biocondition Sites
- Weed Survey Site



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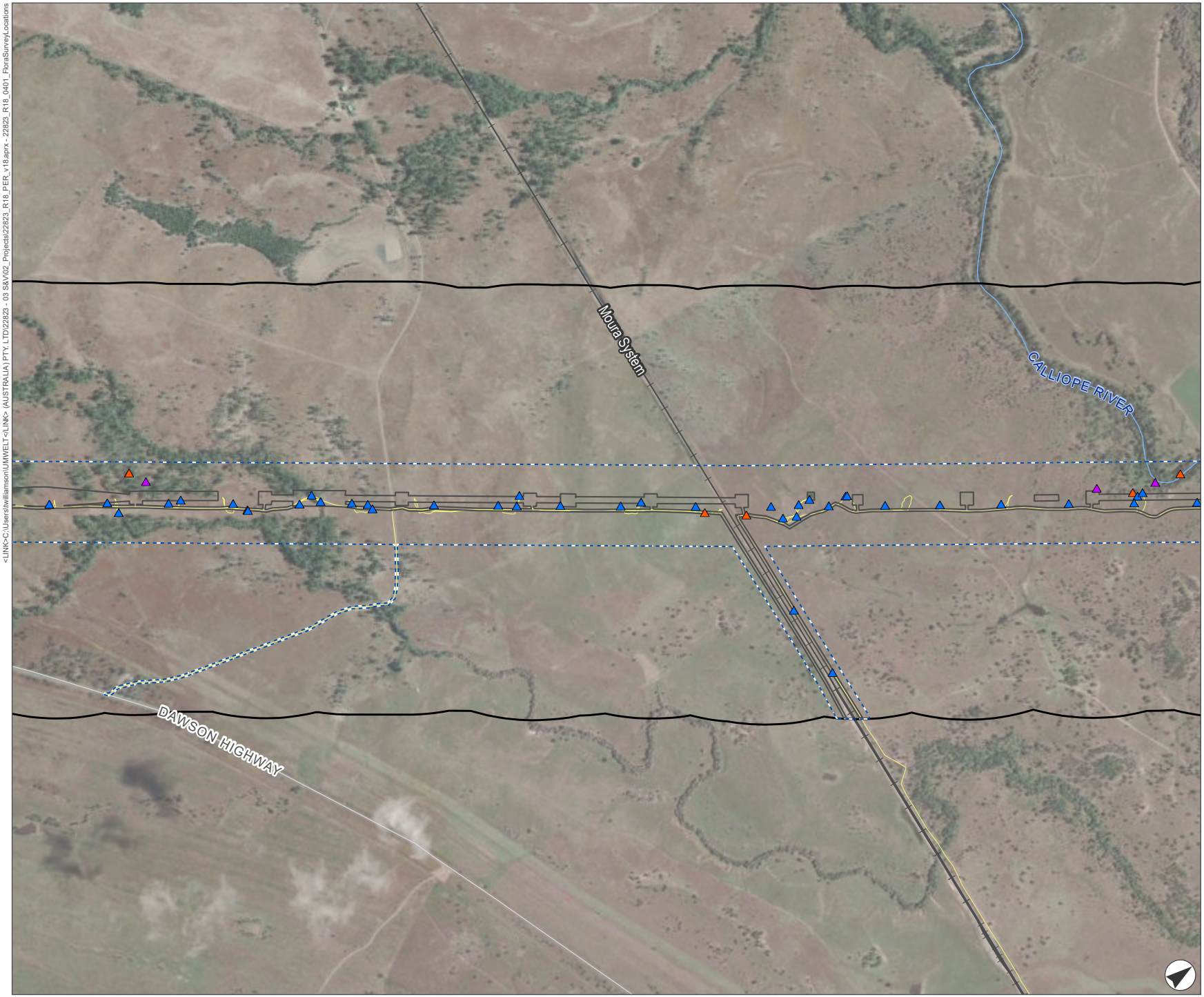


FIGURE 4.1-9

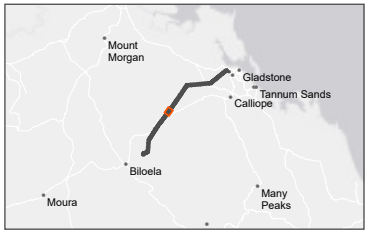
Flora Survey Locations

Legend

- Roads
- Watercourse
- Survey Tracks
- Railway
- Field Survey Extent
- Disturbance Footprint
- Project Area

Flora Survey Locations

- Quaternary Sites
- Biocondition Sites
- Weed Survey Site



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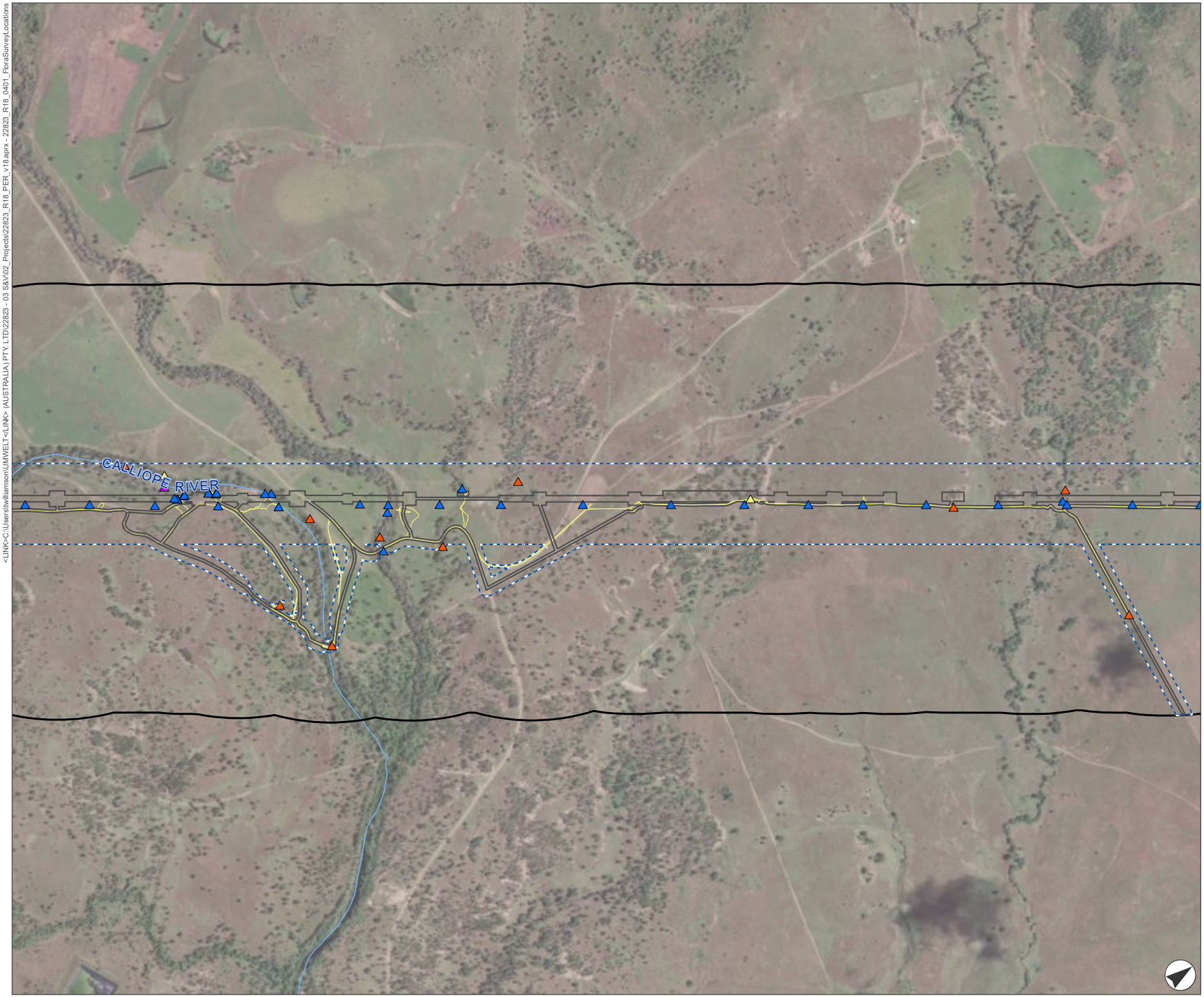


FIGURE 4.1-10

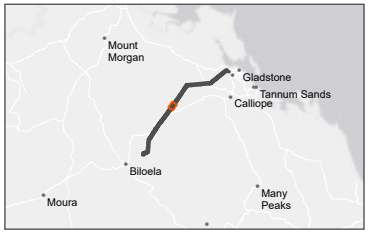
Flora Survey Locations

Legend

- Watercourse
- Survey Tracks
- Field Survey Extent
- Disturbance Footprint
- Project Area

Flora Survey Locations

- Quaternary Sites
- Tertiary Sites
- Biocondition Sites
- Weed Survey Site



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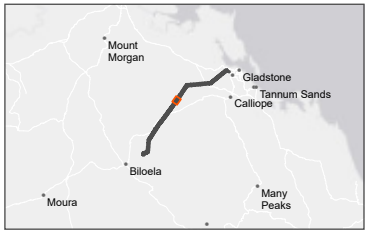
FIGURE 4.1-11
Flora Survey Locations

Legend

- Survey Tracks
- Field Survey Extent
- Disturbance Footprint
- Project Area

Flora Survey Locations

- Quaternary Sites
- Tertiary Sites
- Weed Survey Site



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FIGURE 4.1-12

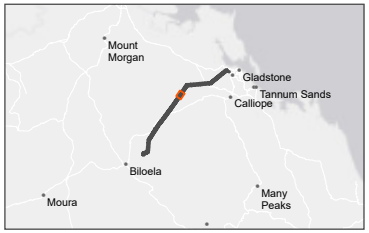
Flora Survey Locations

Legend

- Survey Tracks
- Field Survey Extent
- Disturbance Footprint
- Project Area

Flora Survey Locations

- Quaternary Sites
- Tertiary Sites
- Biocondition Sites
- Weed Survey Site



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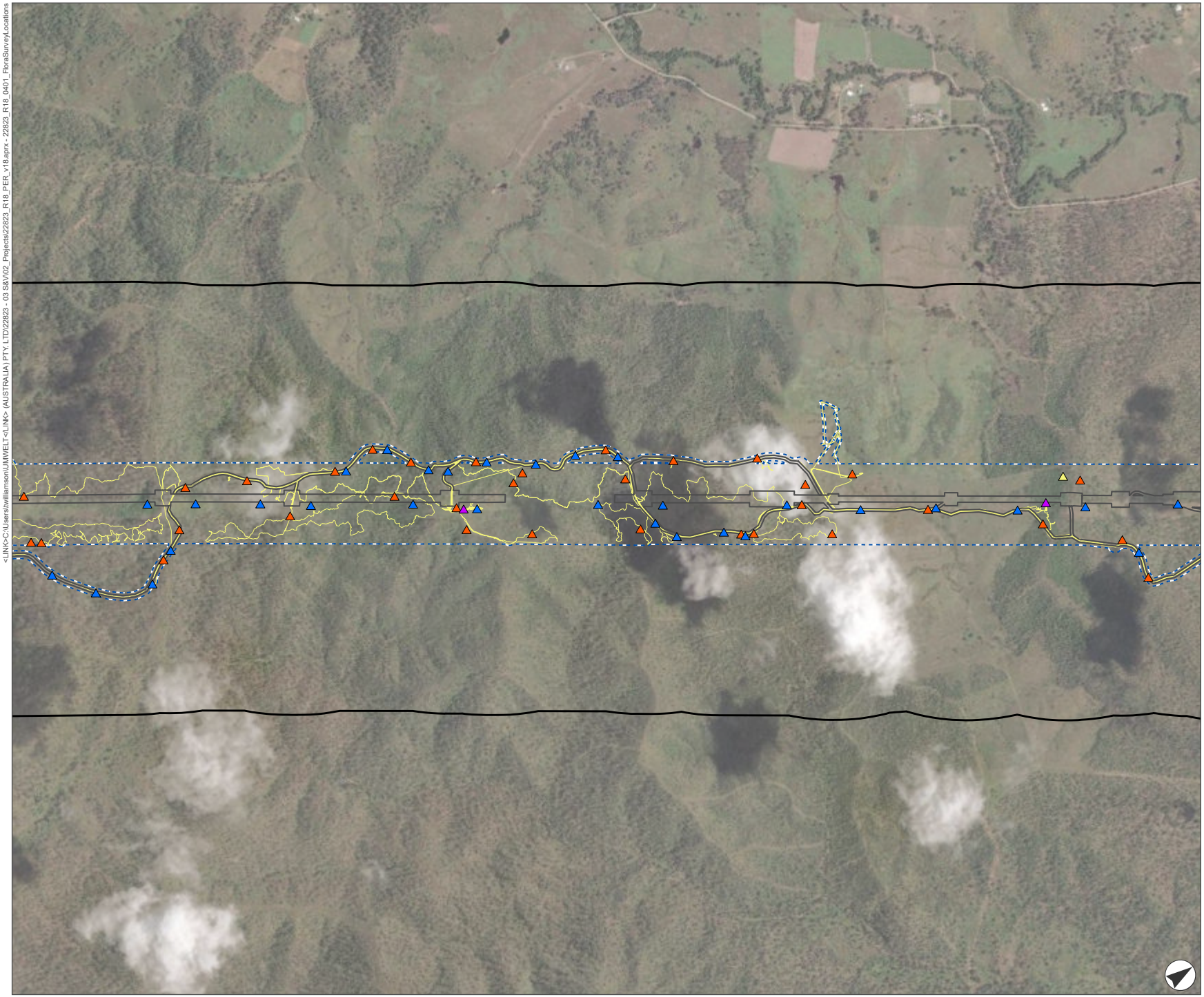


FIGURE 4.1-13

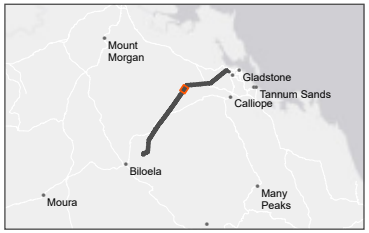
Flora Survey Locations

Legend

- Survey Tracks
- Field Survey Extent
- Disturbance Footprint
- Project Area

Flora Survey Locations

- Quaternary Sites
- Tertiary Sites
- Biocondition Sites
- Weed Survey Site



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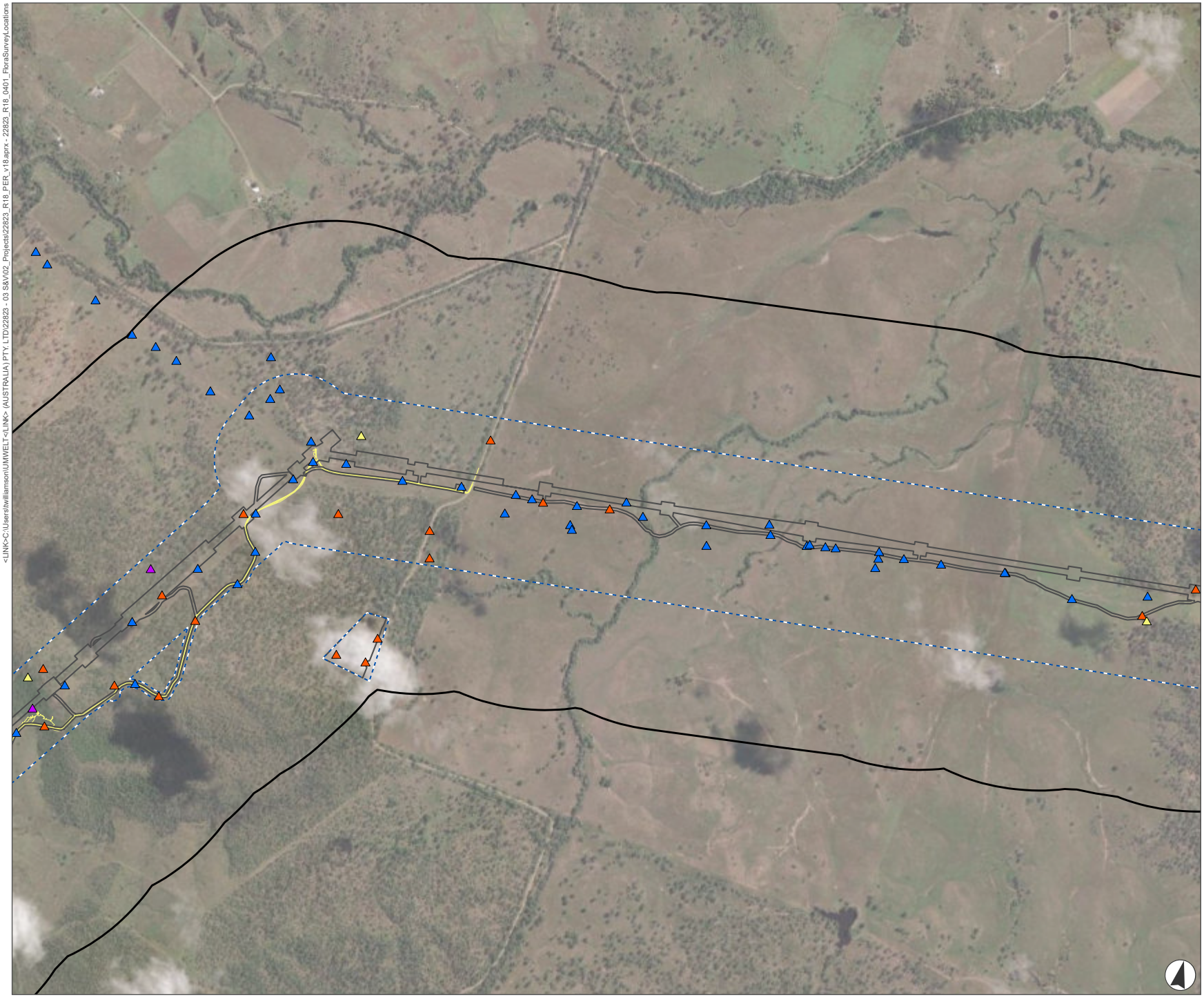


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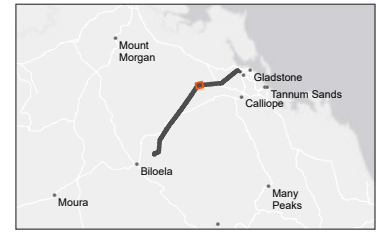
Flora Survey Locations

Legend

- Survey Tracks
- Field Survey Extent
- Disturbance Footprint
- Project Area

Flora Survey Locations

- Quaternary Sites
- Tertiary Sites
- Biocondition Sites
- Weed Survey Site



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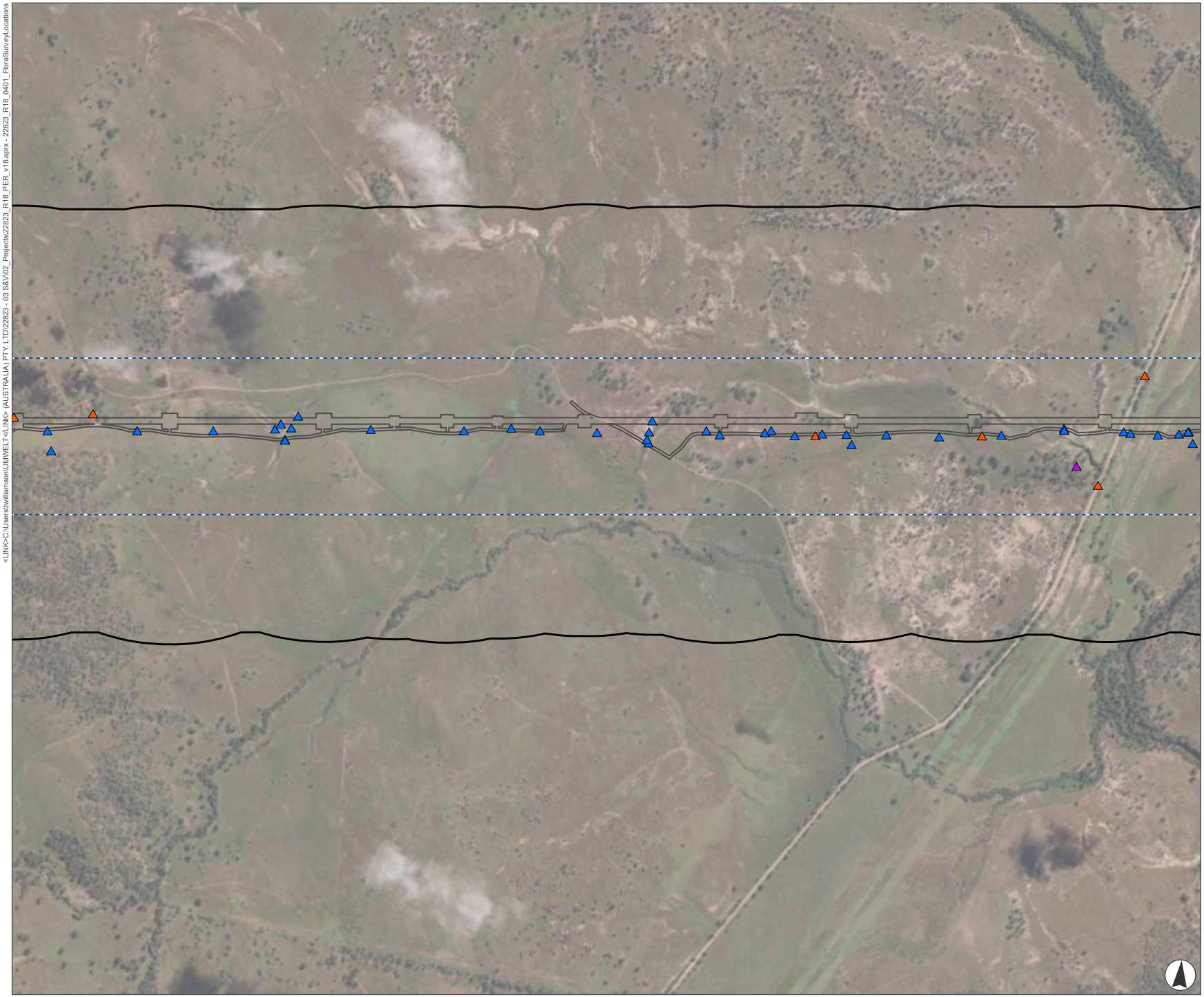


FIGURE 4.1-15

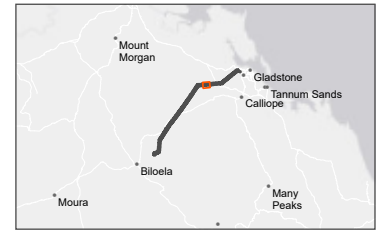
Flora Survey Locations

Legend

- Field Survey Extent
- Disturbance Footprint
- Project Area

Flora Survey Locations

- Quaternary Sites
- Biocondition Sites
- Weed Survey Site



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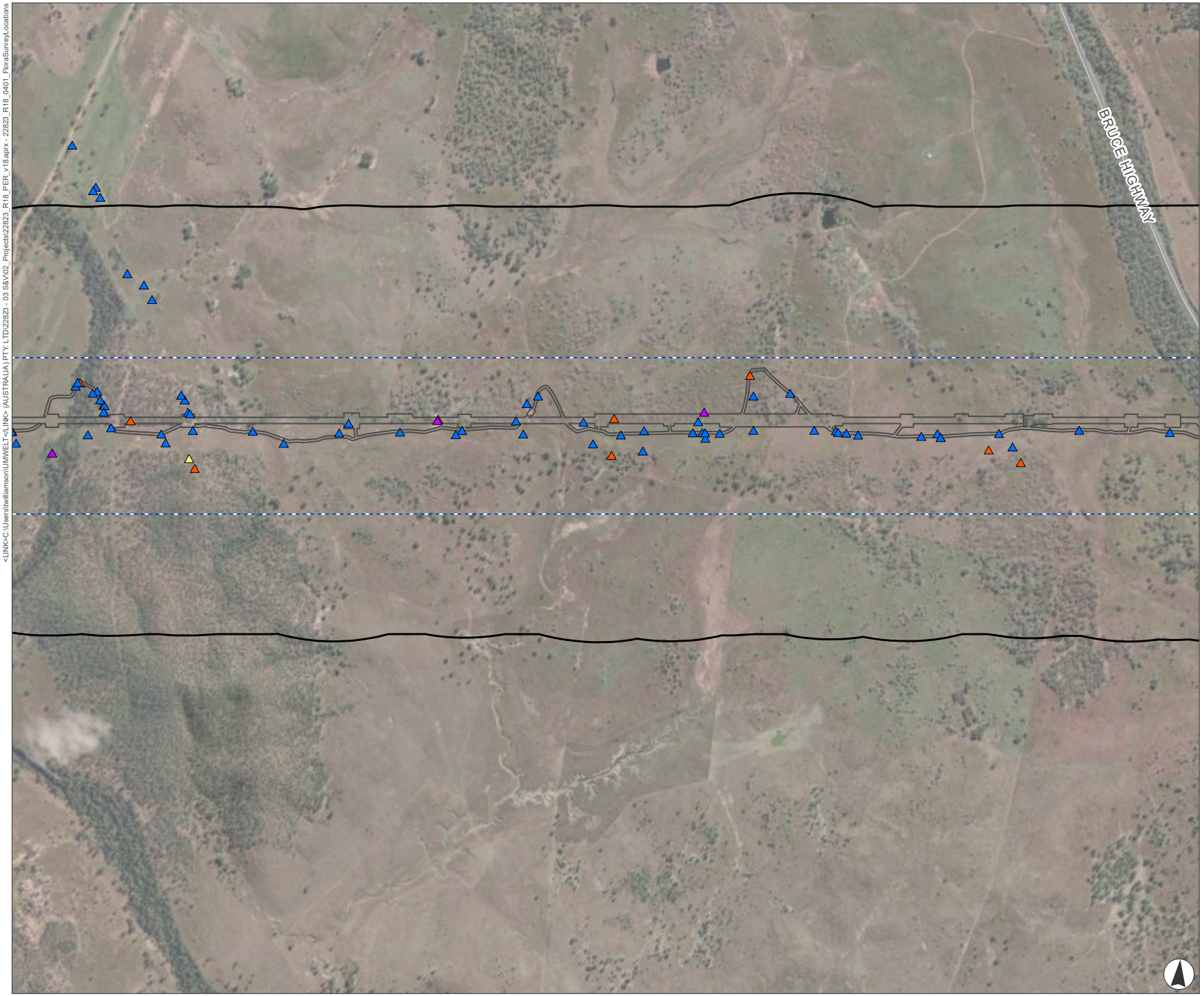
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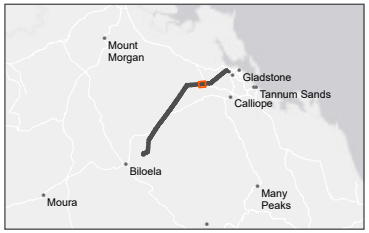
FIGURE 4.1-16
Flora Survey Locations

Legend

- Roads
- Field Survey Extent
- Disturbance Footprint
- Project Area

Flora Survey Locations

- Quaternary Sites
- Tertiary Sites
- Biocondition Sites
- Weed Survey Site



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FIGURE 4.1-17

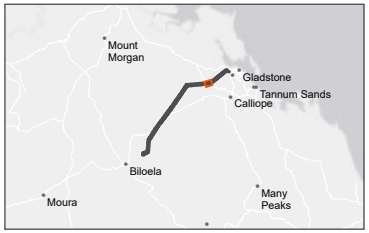
Flora Survey Locations

Legend

- Roads
- Survey Tracks
- Field Survey Extent
- Disturbance Footprint
- Project Area

Flora Survey Locations

- Quaternary Sites
- Tertiary Sites
- Biocondition Sites
- Weed Survey Site



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FIGURE 4.1-18

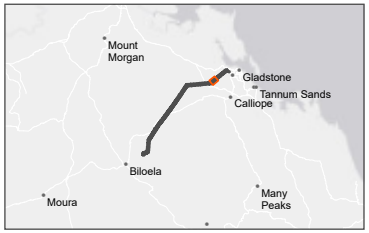
Flora Survey Locations

Legend

- Survey Tracks
- Field Survey Extent
- Disturbance Footprint
- Project Area

Flora Survey Locations

- Quaternary Sites
- Tertiary Sites
- Biocondition Sites
- Weed Survey Site



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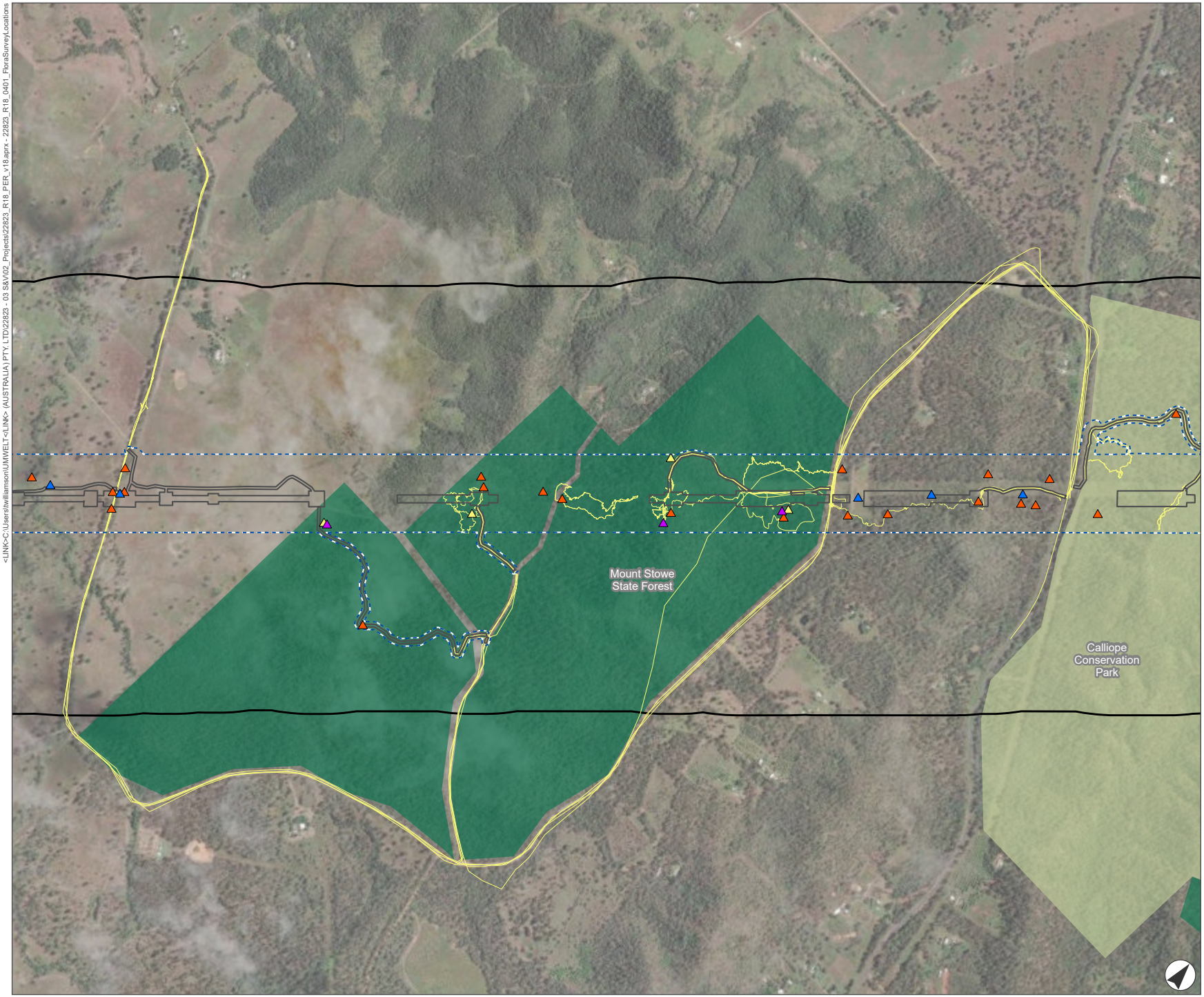
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FIGURE 4.1-19

Flora Survey Locations



Legend

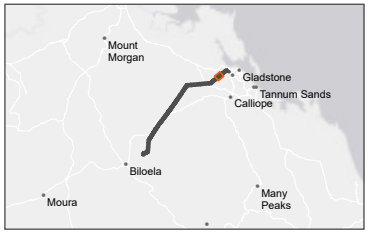
- Survey Tracks
- Field Survey Extent
- Disturbance Footprint
- Project Area

Protected Areas

- Conservation Park
- State Forest

Flora Survey Locations

- Quaternary Sites
- Tertiary Sites
- Biocondition Sites
- Weed Survey Site



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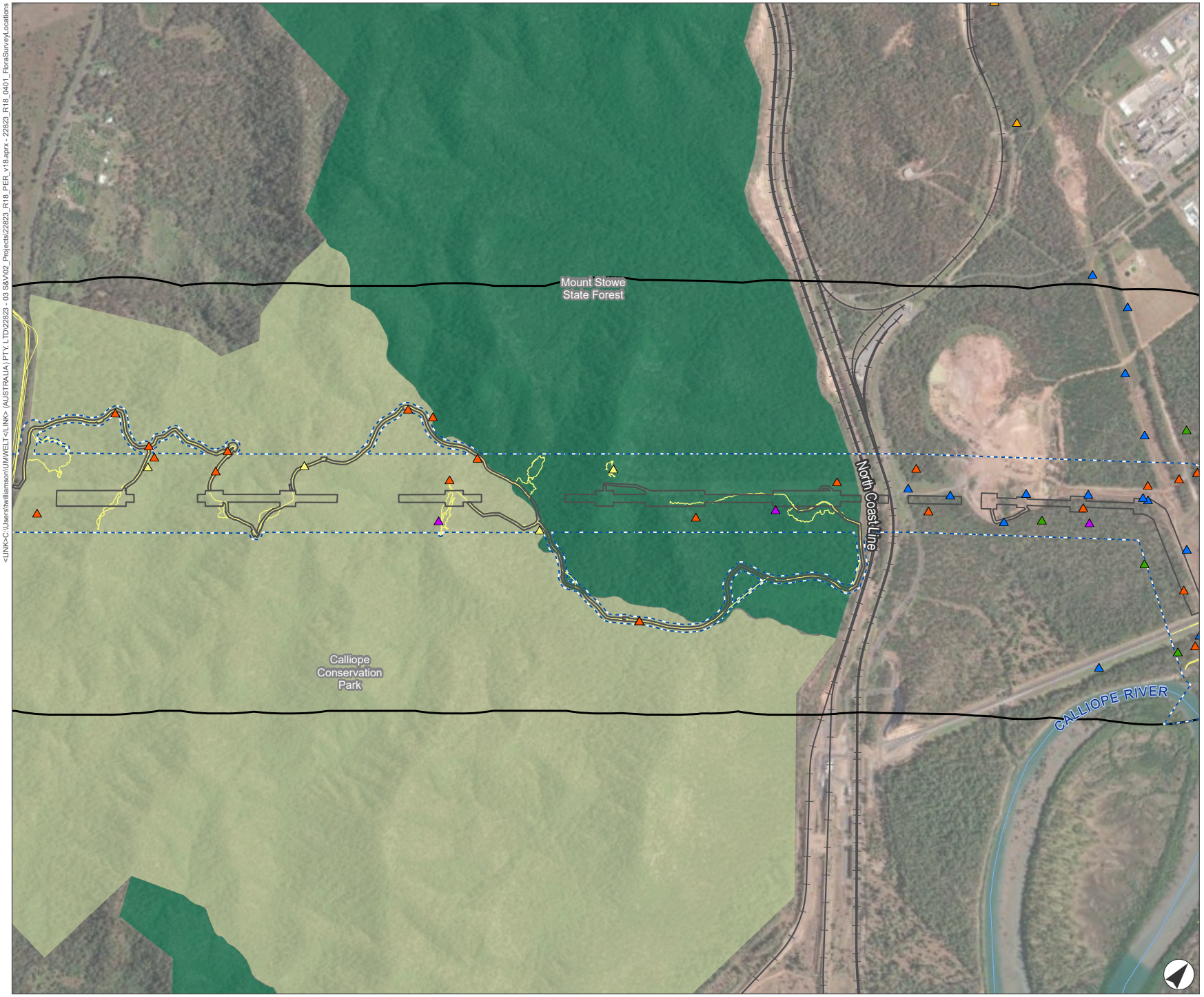


FIGURE 4.1-20

Flora Survey Locations

Legend

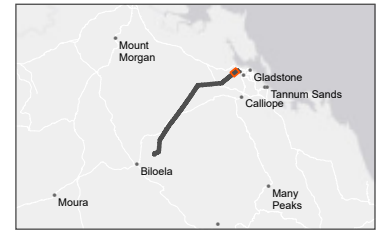
- Watercourse
- Survey Tracks
- Railway
- Field Survey Extent
- Disturbance Footprint
- Project Area

Protected Areas

- Conservation Park
- State Forest

Flora Survey Locations

- Quaternary Sites
- Secondary Sites
- Tertiary Sites
- Biocondition Sites
- TEC Assessment
- Weed Survey Site



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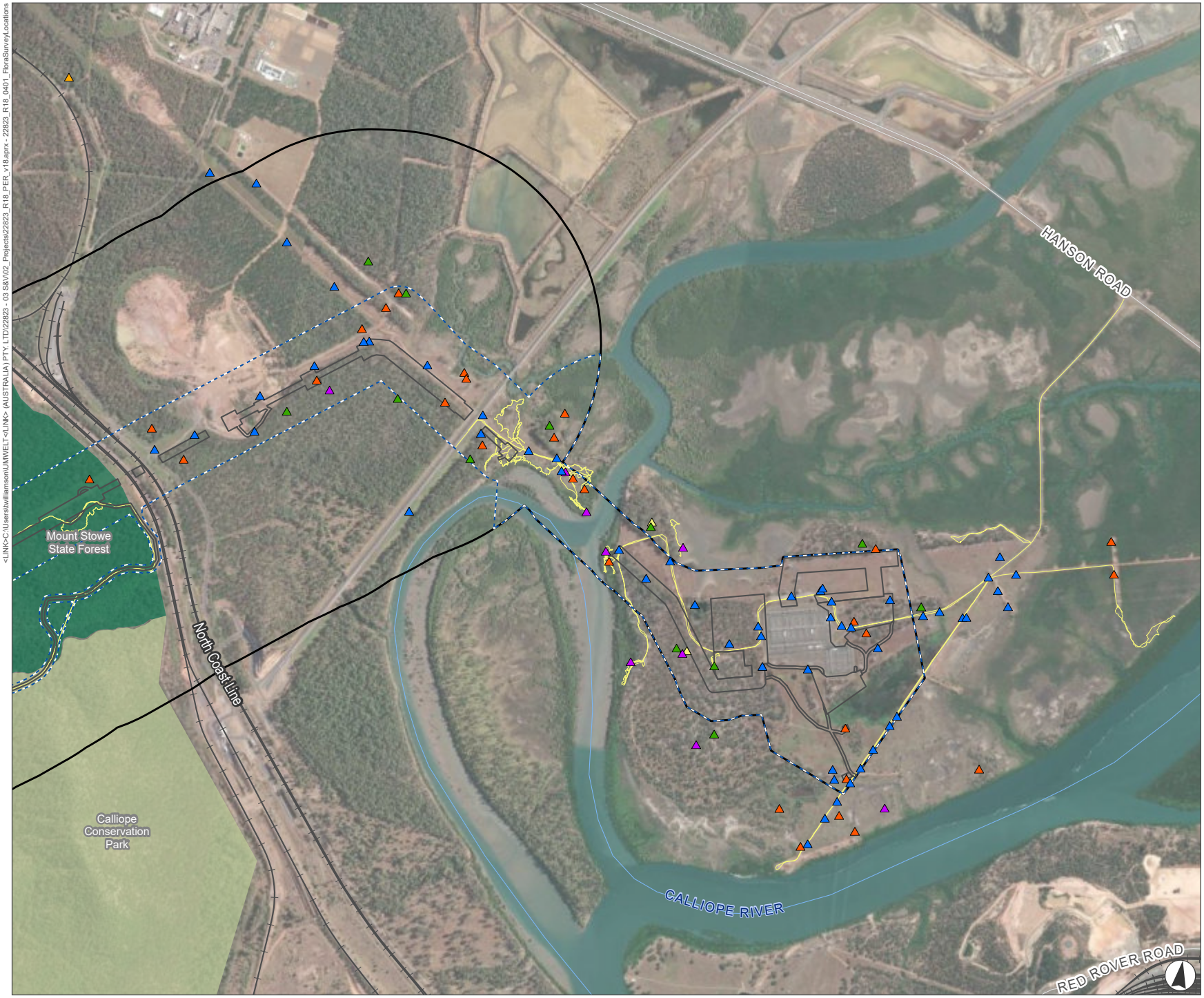
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FIGURE 4.1-21

Flora Survey Locations



Legend

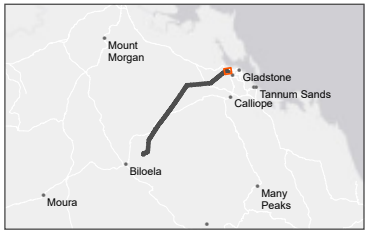
- Roads
- Watercourse
- Survey Tracks
- Railway
- Field Survey Extent
- Disturbance Footprint
- Project Area

Protected Areas

- Conservation Park
- State Forest

Flora Survey Locations

- Quaternary Sites
- Secondary Sites
- Tertiary Sites
- Biocondition Sites
- TEC Assessment
- Weed Survey Site



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Kilometres

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Secondary and Tertiary

Secondary sites are used for classification and detailed descriptions of REs and vegetation communities (Neldner et al., 2025). Using this method, vegetation data is collected along a 10 m x 50 m plot, however modified plots may be used where narrow fringing-communities exist i.e. 5 m x 100 m plot. Data collected during a secondary flora site includes:

- all location, environmental and overall structural information (heights and cover of each layer)
- a list of all species present, including the ground layer
- basal area of woody stems (using the Bitterlich stick method (Neldner et al., 2025))
- percentage cover and stem density measures of abundance
- presence of disturbances (erosion, weeds etc).

Tertiary sites are less detailed than secondary sites but can still be used to classify and produce detailed vegetation community descriptions. Tertiary sites are often collected instead of secondary sites where seasonal conditions such as drought make a full assessment of species impractical. Data collected during a tertiary site is the same as a secondary, with the exception of the species recorded in the ground layer (in this instance only the dominant or conspicuous) and basal area.

Quaternary

Quaternary site data are used primarily as a record of field traverses and to verify vegetation mapping. Quaternary sites were collected at regular intervals along a traverse, and/or made where vegetation communities were observed to have changed. The minimum data captured at each quaternary location included:

- date, collector and location
- unique site identifier
- dominant flora species present
- additional data such as vegetation cover, RE and structural heights.

4.1.5.2 Threatened Ecological Communities

A total of four TECs were confirmed present within or adjacent to the Project Area during field surveys. Each TEC has their own key diagnostic characteristics and condition thresholds – see **Section 5.0** for specific criteria as it applies to individual TEC. Field surveys were conducted in patches of potential TEC (synonymous REs or vegetation assemblages), where data was collected to determine if it met the key diagnostic characteristics and condition thresholds of the respective TEC, typically using a modified Secondary site and collecting additional data where necessary.

In the absence of site data (often due to access issues), conservative assumptions have been made as to whether patches are considered a TEC or not.

4.1.6 Terrestrial Flora

During field surveys, incidental flora species observed during the survey were recorded including exotic species. Specimens of any plant taxa that could not be identified in the field were collected, pressed and dried in accordance with the requirements of the Queensland Herbarium (Queensland Herbarium & Bean, 2016). Dried specimens were then identified through reference books and keys and through comparison with named species.

4.1.6.1 Threatened Flora

Opportunistic searches for threatened flora species listed under the EPBC Act were completed throughout all field surveys in areas of suitable habitat. Survey techniques employed to target threatened flora species reflect those endorsed by the Queensland Government detailed in the *Flora Survey Guidelines–Protected Plants* (Department of Environment, Tourism, Science and Innovation, 2025) including opportunistic searches in suitable habitat. The random meander method (Cropper, 1993) was implemented, where the ecologist walks through the vegetation, recording key species and looking for threatened species. The targets of these opportunistic searches were species as known to occur or potentially occurring following the likelihood of occurrence assessment and occurred within areas of suitable habitat for respective species. Where possible, surveys were also conducted in peak flowering time for respective species.

If threatened flora species were found during these searches, their location and spatial extent was recorded, as well as notes regarding population size and health. Photographs were taken and if considered necessary, voucher samples were collected for post-field survey identification or submission to the Queensland Herbarium.

BioCondition methods, in the context of habitat quality assessments are discussed in **Section 4.1.7.2**.

Cycas megacarpa Survey

A targeted survey approach for *Cycas megacarpa* was developed through consultation of available scientific literature including the SPRAT profile and the *National Multi-species Recovery Plan for the cycads, Cycas megacarpa, Cycas ophiolitica, Macrozamia cranei, Macrozamia lomandroides, Macrozamia pauli-guilielmi and Macrozamia platyrhachis* (Queensland Herbarium, 2007a). During early field surveys, records of *C. megacarpa* within the Disturbance Footprint were opportunistically recorded, and then targeted assessments were conducted during the 15–20 May 2023 field surveys. All surveys employed at least one of the following methods to record the presence of *C. megacarpa*:

- Individual point counts (single individuals were recorded with a GPS unit).
- Visual point counts within a 25 m radius (a centre point was marked with a GPS and all individuals within a 25 m radius from that point were recorded).
- The development class for each individual was also recorded using the following classification:
    - Juvenile (<50 cm)
    - Sub-adult (0.5–1 m)
    - Adult (>1–5 m)
    - Large adult (>5 m).

Additional field surveys following the same methodology as described for 2023 surveys were completed in July 2025 targeting areas where *C. megacarpa* were suspected of being present within the Disturbance Footprint and wider Field Survey Extent. A final survey targeting *C. megacarpa* was undertaken within laydown areas 1 February 2026. These surveys enabled specific mapping of presence and absence of this species and allowed the refinement and targeting of known habitat.

4.1.6.2 Marine Plants Survey

As part of Project requirements for Queensland Government assessments, a marine plant survey was conducted on 5 December 2024 to examine the occurrences of marine plants within the Disturbance Footprint. These surveys assess the impact on these crucial habitats which are a key component of the fish habitat mosaic supporting fisheries species during their lifecycles as well as contributing to overall health and water quality. Survey methods were developed following review of *State Development Assessment Provisions guideline State code 11: Removal, destruction or damage of marine plants* (Department of Agriculture and Fisheries, 2022). Information gathered from these surveys were useful in describing relevant MNES species habitat have been incorporated into developing suitable mitigation and management measures. The location of survey sites is provided in **Figure 4.1**.

The marine plant area was traversed on foot and the vegetation on northern and southern bank of the Calliope River below the highest astronomical tide (HAT) was assessed. The HAT used in the assessment was obtained from Qspatial.

At each site the following information was recorded:

- site number
- location
- photographs
- structural description of vegetation
- marine plant types
- height and cover values of:
    - marine plant types
    - woody debris.
- bare ground.

Areas below the HAT within the Disturbance Footprint were divided into 20 m grid sections which allowed a cover percentage to be attributed to all marine plant types within a defined section. Vegetation not included as a marine plant (weed species considered a restricted matter under the *Biosecurity Act 2014* (Biosecurity Act) were not included as part of percentage cover. In this instance, bare ground, wood debris or other flora species percentage cover were scaled in the space the weed species occupied.

4.1.6.3 Weed Survey

A weed survey targeting restricted matter flora species listed under the Biosecurity Act and Weeds of National Significance (WoNS) was undertaken between 17–21 March 2025. Data was collected between existing and future infrastructure towers as well as along and adjacent to existing access tracks. Data was collected within freehold or lands lease allotments and did not include conservation parks, State forests or timber reserves – see **Figure 4.1** for weed survey locations.

Inside the transmission easement, two survey points were established within each span, unless spans were under 350 m in which case a single point was used. Data collected included weed species, estimated cover (as per Powerlink guidance), and additional notes on density and maturity. Specific individual plants or patches were recorded outside designated survey points if deemed significant.

Along and adjacent to access tracks, weed species, approximate central position and patch size classification (ranging from very small to very large, based on standard methodologies) were recorded. In addition, a buffer was used to highlight the extent of a patch along the access tracks, with the location being in the centre point of a patch. Estimated cover or density for each species was documented following Powerlink provided guidelines.

The breakdown of weed species density is detailed in **Table 4.5**.

Table 4.5 Weed Species Density Categories

Weed Density	Cover (%)	Shrubs and Woody Species Stem (per 100 m^2)
High	>30	>6
Moderate	10–<30	3–5
Sparse	1–10	1–2
Individuals	<1	<1

4.1.7 Terrestrial Fauna

The baseline sampling of terrestrial fauna species was undertaken in accordance with the *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (Version 4.0)* (Eyre, Ferguson, et al., 2022). Targeted searches for terrestrial fauna listed under the EPBC Act and NC Act were undertaken in consideration of the following Commonwealth and industry guidelines:

- *Survey Guidelines for Australia's Threatened Mammals* (Department of Sustainability, Environment, Water, Population and Communities, 2011).
- *Survey Guidelines for Australia's Threatened Birds* (Department of Environment, Water, Heritage and the Arts, 2010).
- *Survey Guidelines for Australia's Threatened Reptiles* (Department of Sustainability, Environment, Water, 2011).
- *Survey Guidelines for Australia's Threatened Bats* (Department of the Environment, Water, Heritage and the Arts, 2010).

Fauna survey methods employed during the fauna surveys are detailed in **Table 4.8**. The fauna survey site locations are shown on **Figure 4.2**. The survey was designed to target EPBC Act listed fauna species, as well as commonly occurring fauna across various taxa.

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FIGURE 4.2-1
Fauna Survey Locations

Legend

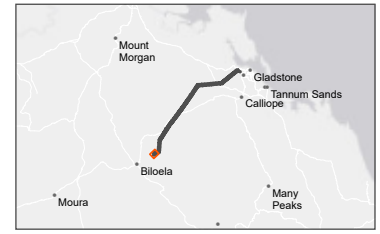
- Watercourse
- Existing Access Tracks
- Railway
- Field Survey Extent
- Disturbance Footprint
- Project Area

Protected Areas

- Timber Reserve

Fauna Survey Locations

- Habitat Assessment
- Active Search
- Bird Survey
- Call Playback
- Spotlight
- Anabat Swift
- Camera
- Water Mouse Habitat Assessment



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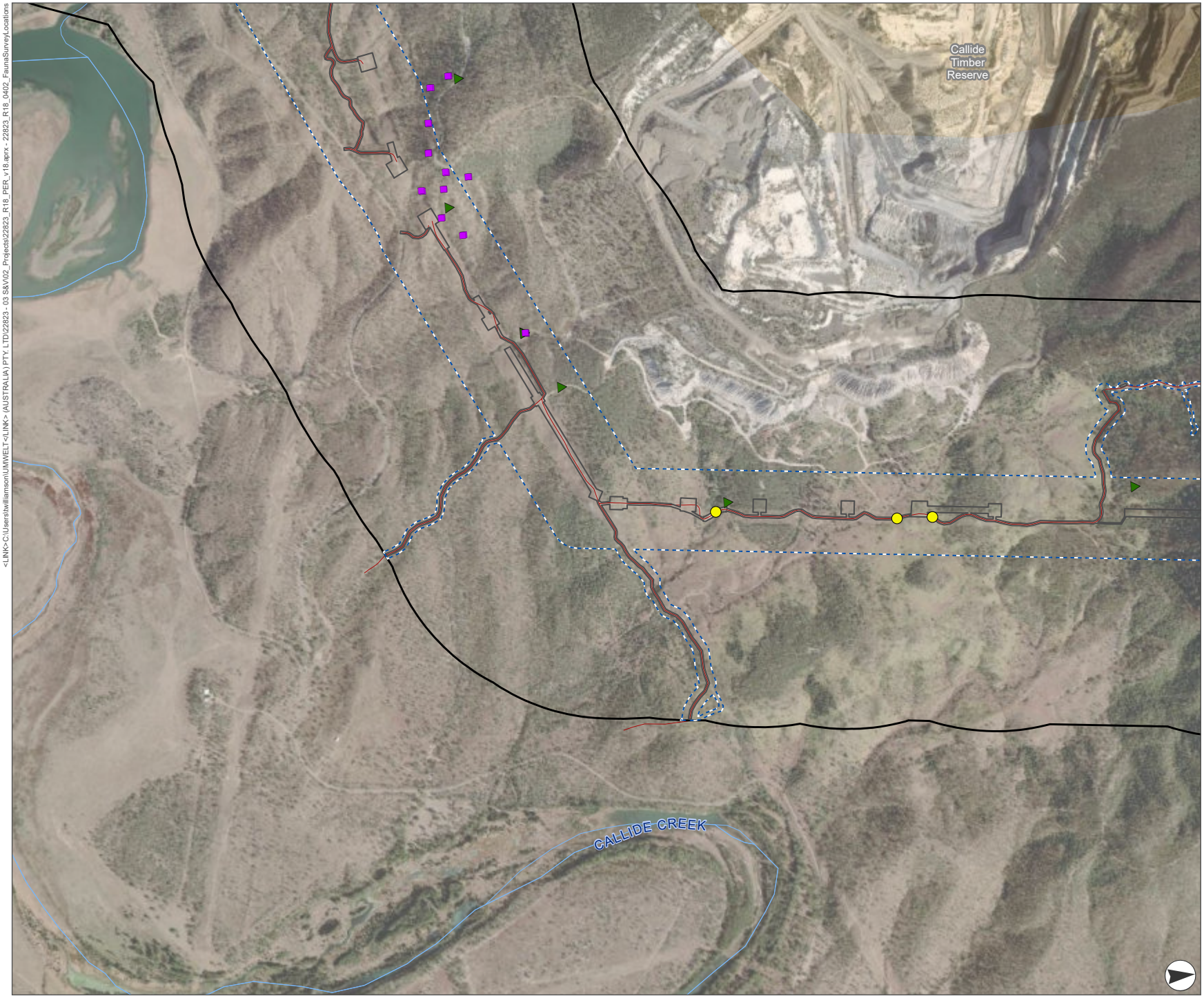


FIGURE 4.2-2

Fauna Survey Locations

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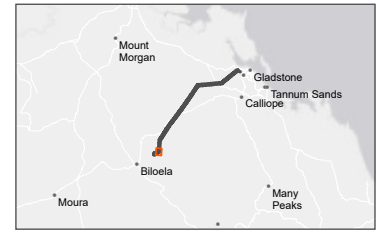
- Watercourse
- Existing Access Tracks
- Field Survey Extent
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- Project Area

Protected Areas

- Timber Reserve

Fauna Survey Locations

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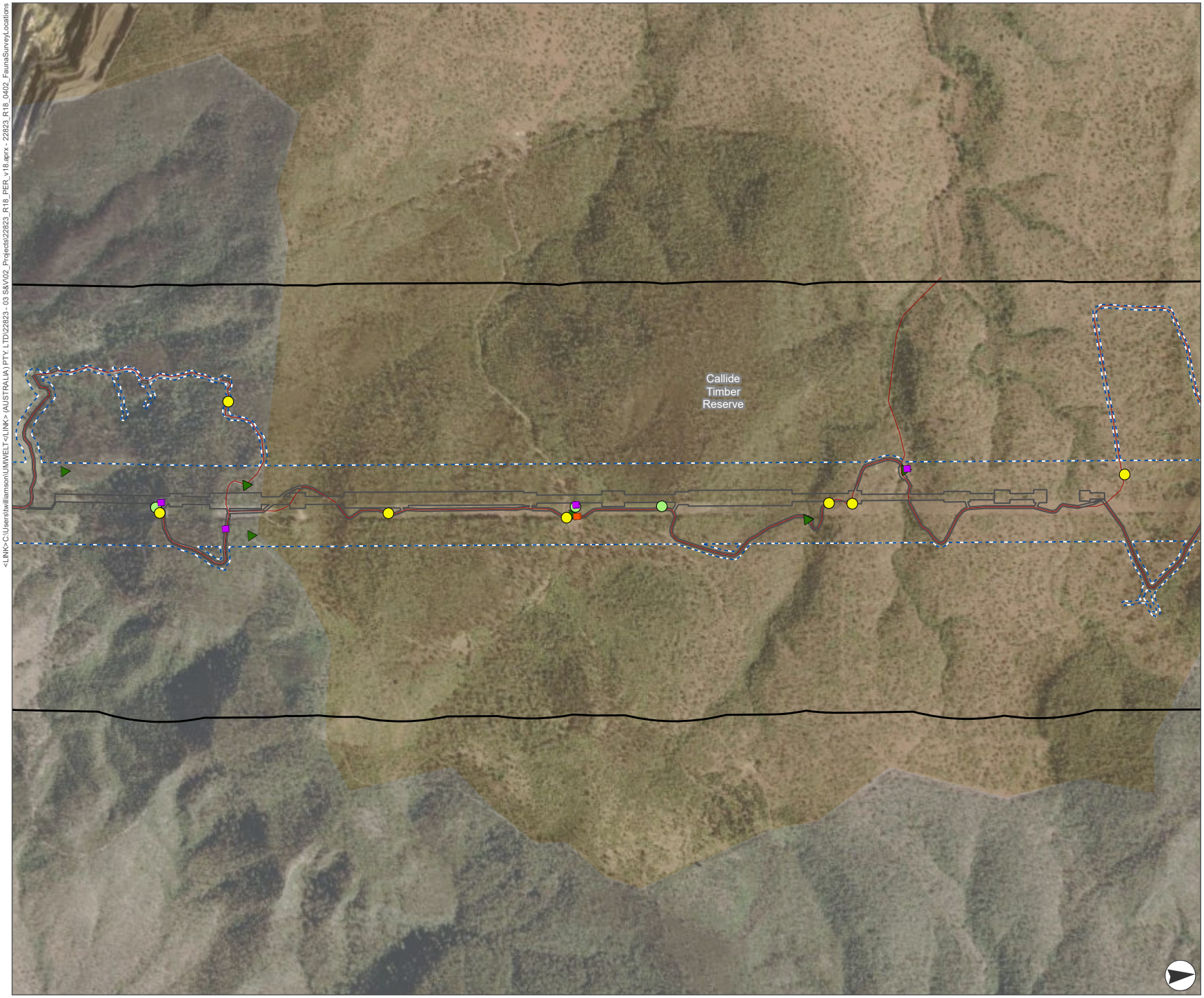


FIGURE 4.2-3

Fauna Survey Locations

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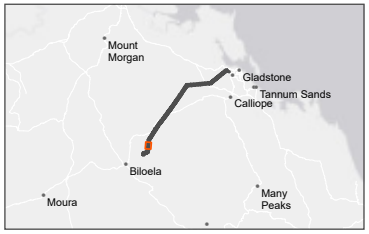
- Existing Access Tracks
- Field Survey Extent
- Disturbance Footprint
- Project Area

Protected Areas

- Timber Reserve

Fauna Survey Locations

- Habitat Assessment
- Active Search
- Bird Survey
- Call Playback
- Spotlight
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- Water Mouse Habitat Assessment



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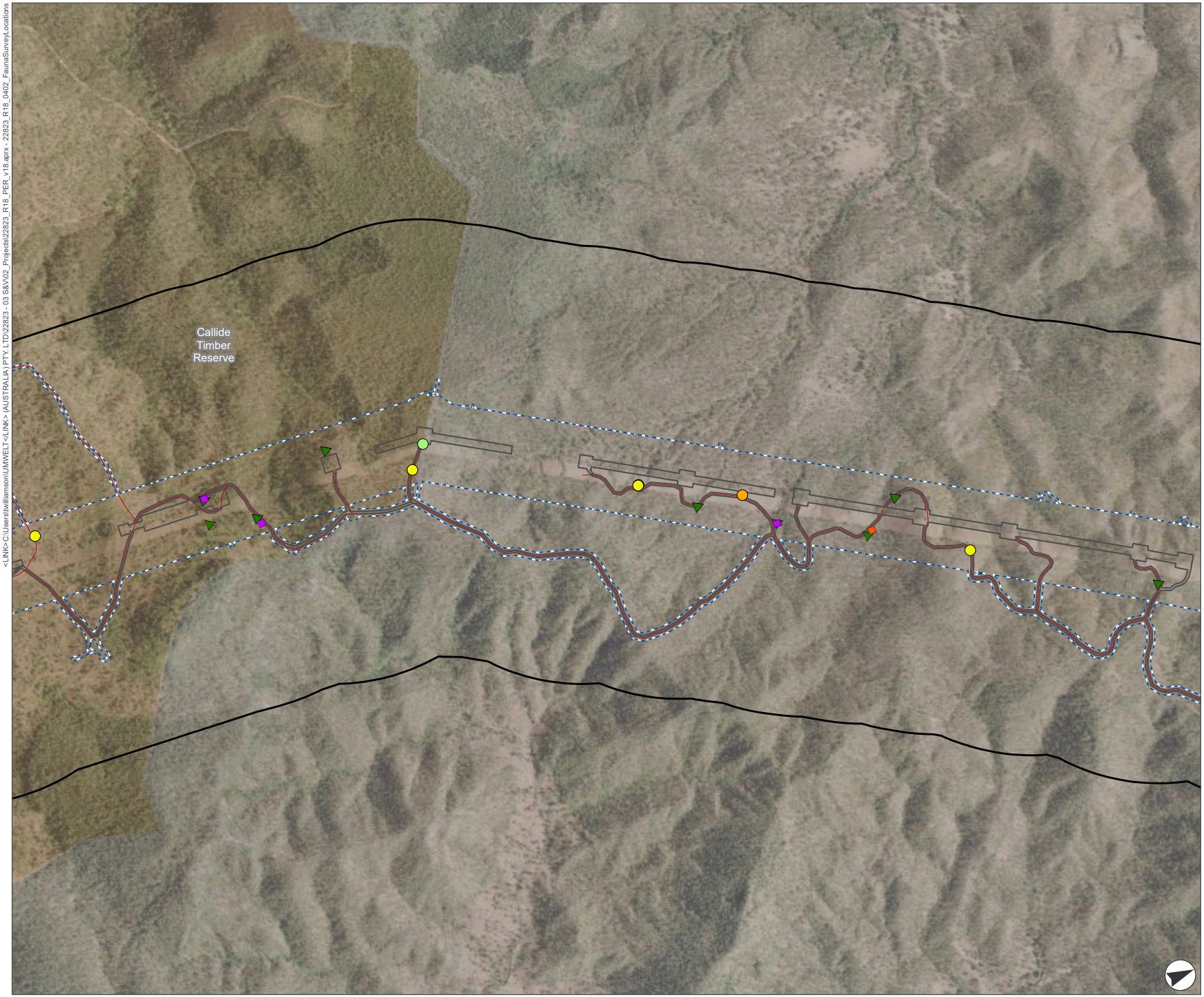
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FIGURE 4.2-4

Fauna Survey Locations

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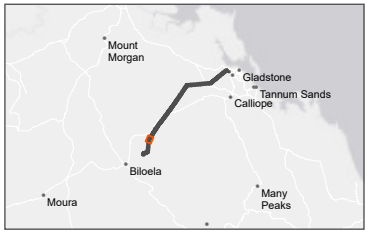
- Existing Access Tracks
- Field Survey Extent
- Disturbance Footprint
- Project Area

Protected Areas

- Timber Reserve

Fauna Survey Locations

- Habitat Assessment
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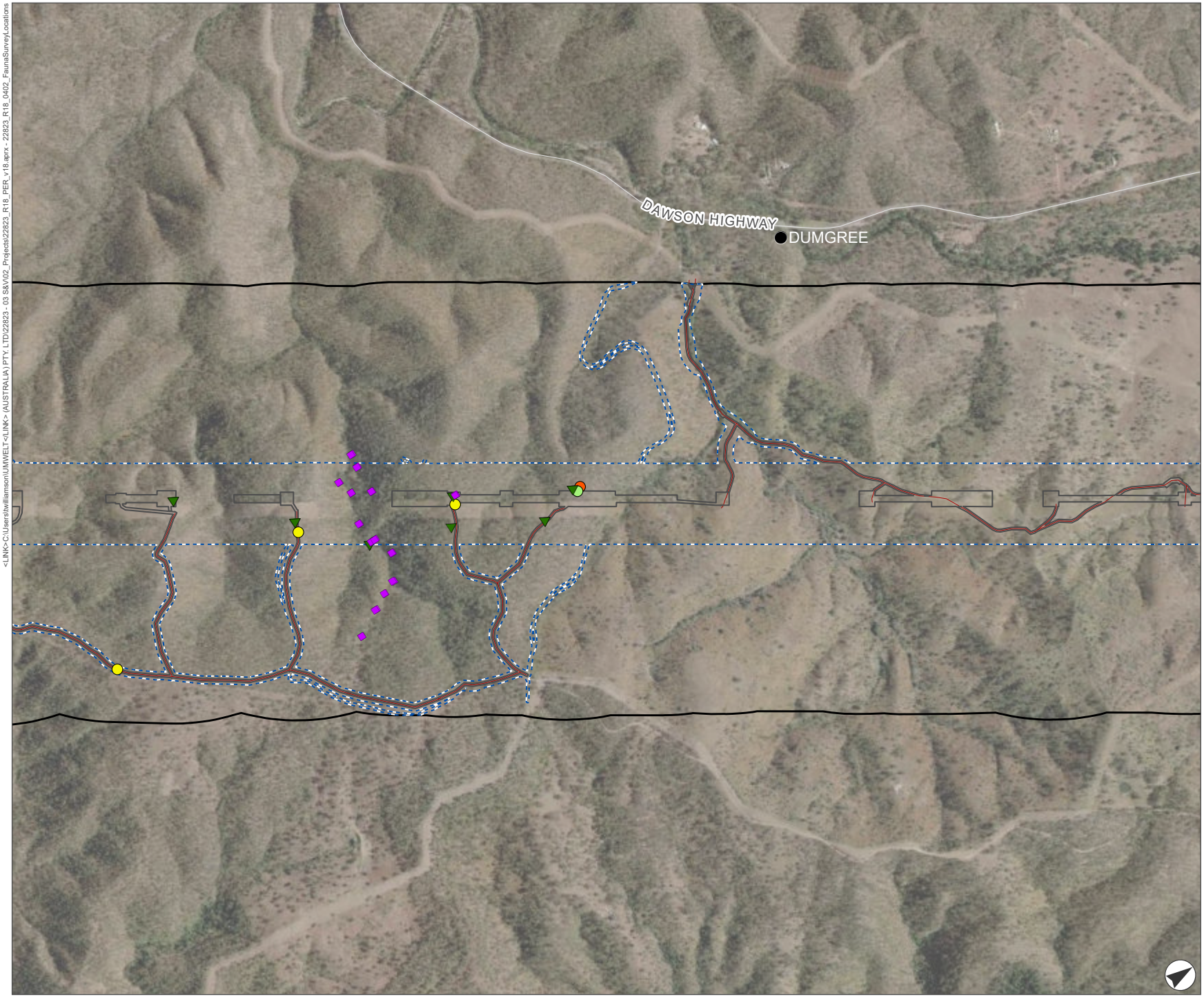


FIGURE 4.2-5

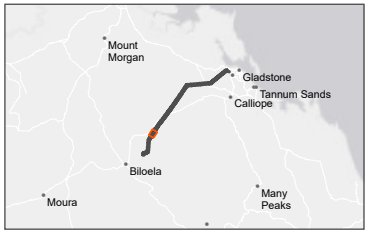
Fauna Survey Locations

Legend

- Roads
- Existing Access Tracks
- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Survey Locations

- Habitat Assessment
- Active Search
- Bird Survey
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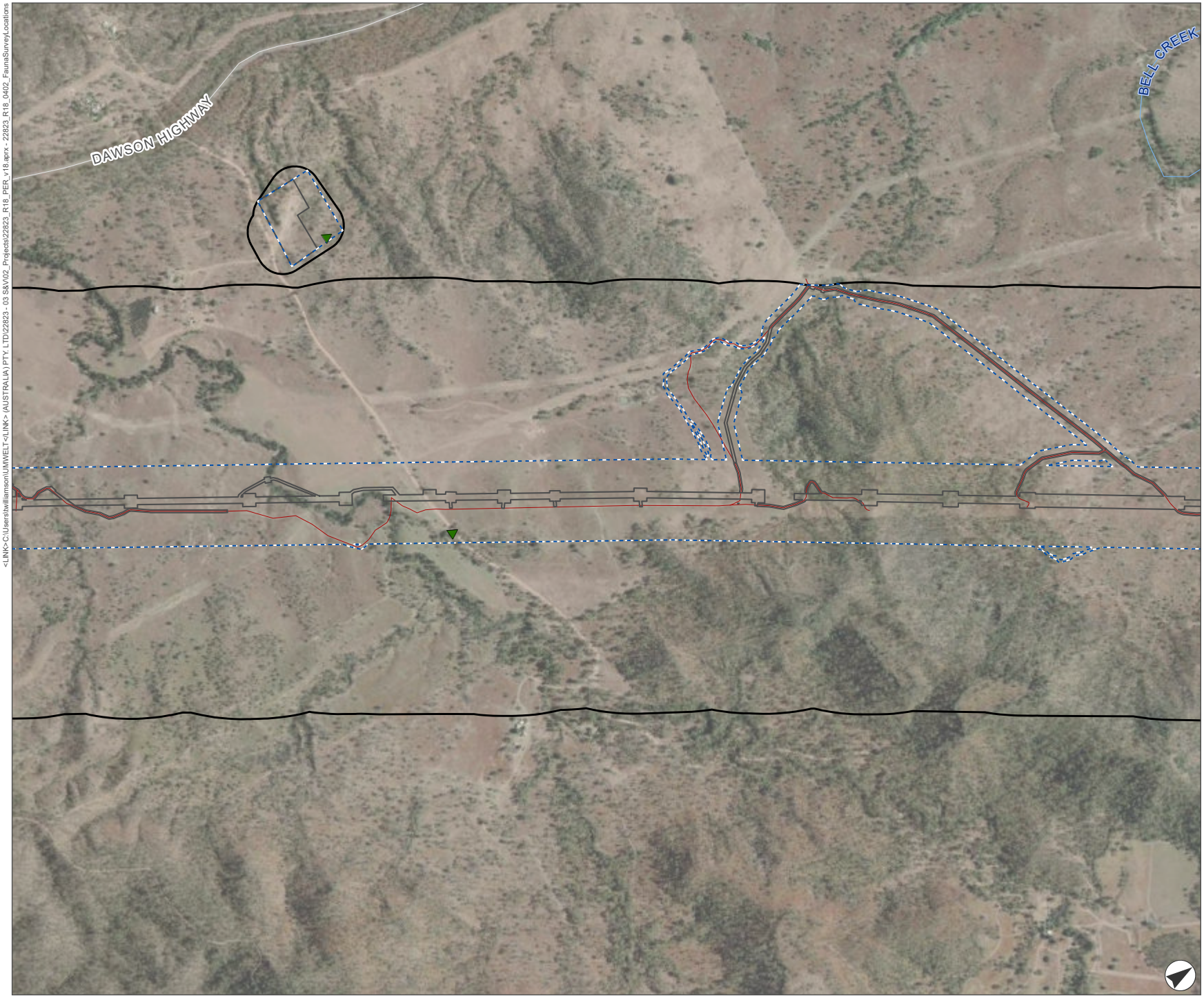


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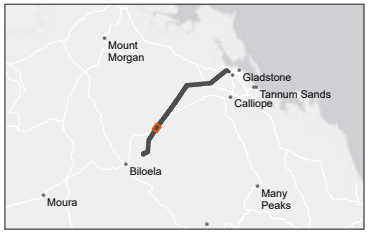
Fauna Survey Locations

Legend

- Roads
- Watercourse
- Existing Access Tracks
- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Survey Locations

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- Active Search
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Kilometres

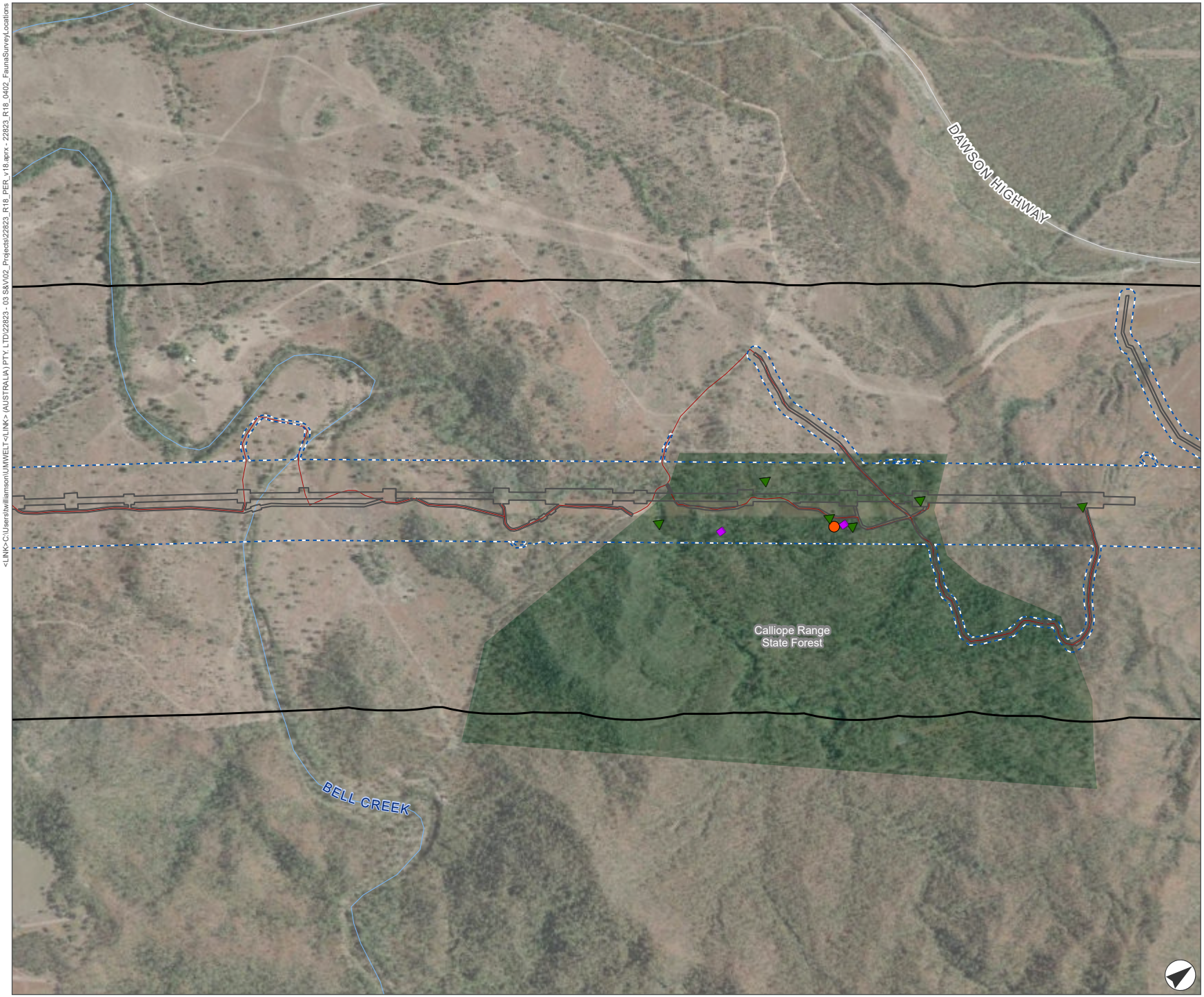
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FIGURE 4.2-7

Fauna Survey Locations

Legend

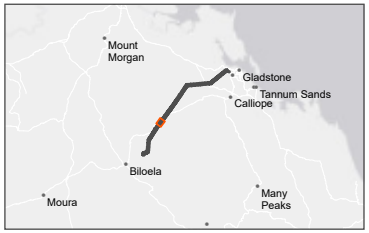
- Roads
- Watercourse
- Existing Access Tracks
- Field Survey Extent
- Disturbance Footprint
- Project Area

Protected Areas

- State Forest

Fauna Survey Locations

- Habitat Assessment
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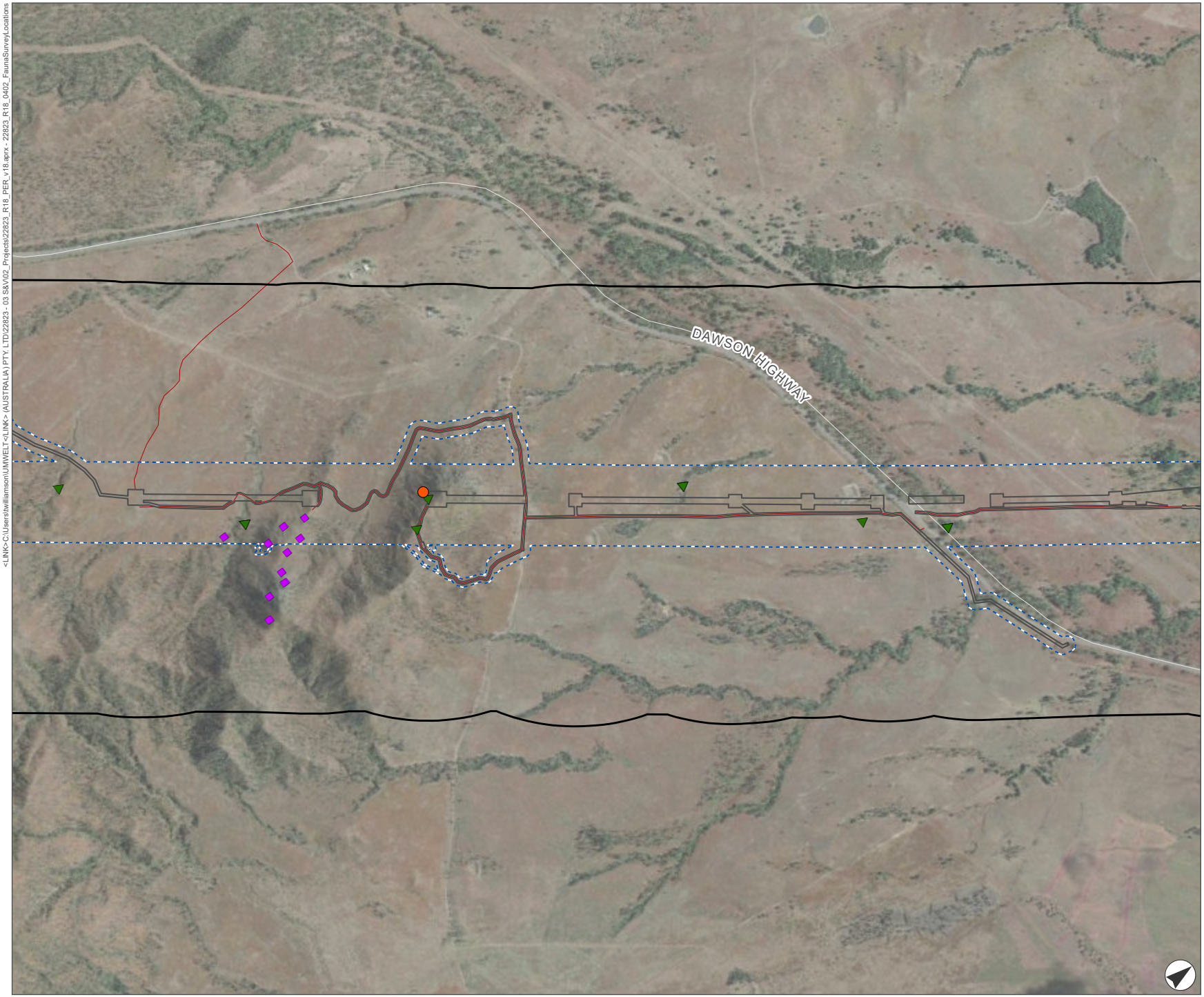


FIGURE 4.2-8

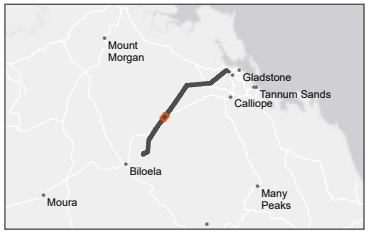
Fauna Survey Locations

Legend

- Roads
- Existing Access Tracks
- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Survey Locations

- Habitat Assessment
- Active Search
- Bird Survey
- Call Playback
- Spotlight
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- Camera
- Water Mouse Habitat Assessment



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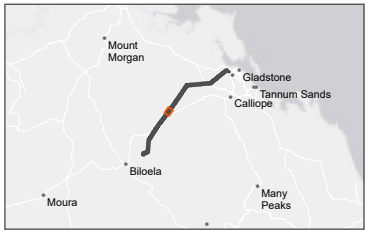
FIGURE 4.2-9
Fauna Survey Locations

Legend

- Roads
- Watercourse
- Existing Access Tracks
- Railway
- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Survey Locations

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Kilometres

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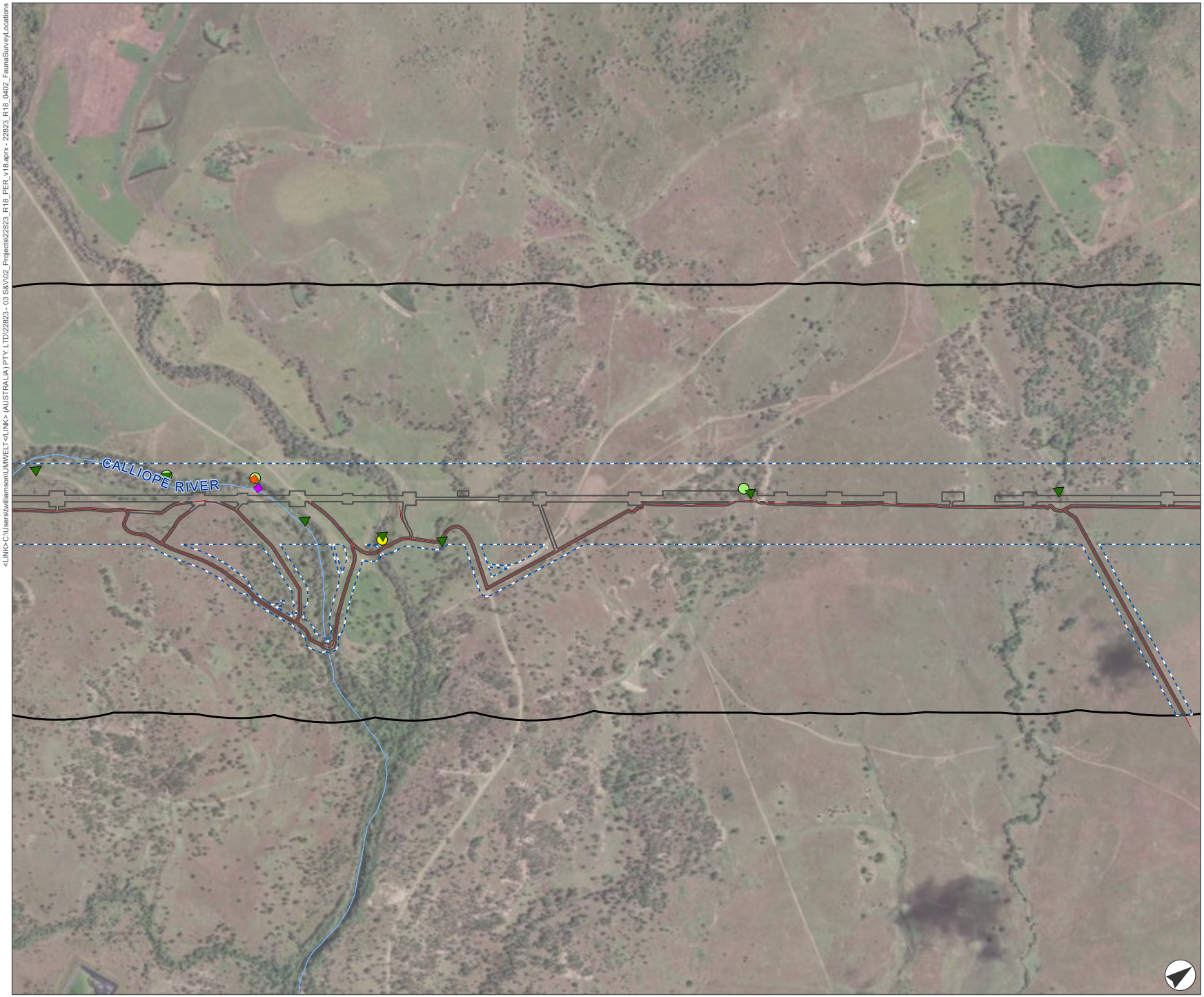


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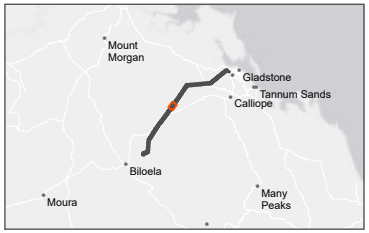
Fauna Survey Locations

Legend

- Watercourse
- Existing Access Tracks
- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Survey Locations

- Habitat Assessment
- Active Search
- Bird Survey
- Call Playback
- Spotlight
- Anabat Swift
- Camera
- Water Mouse Habitat Assessment



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Kilometres

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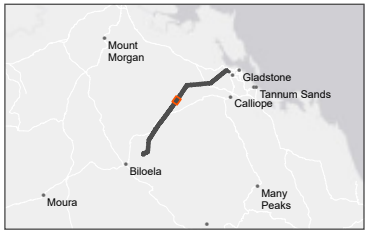
Fauna Survey Locations

Legend

- Existing Access Tracks
- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Survey Locations

- Habitat Assessment
- Active Search
- Bird Survey
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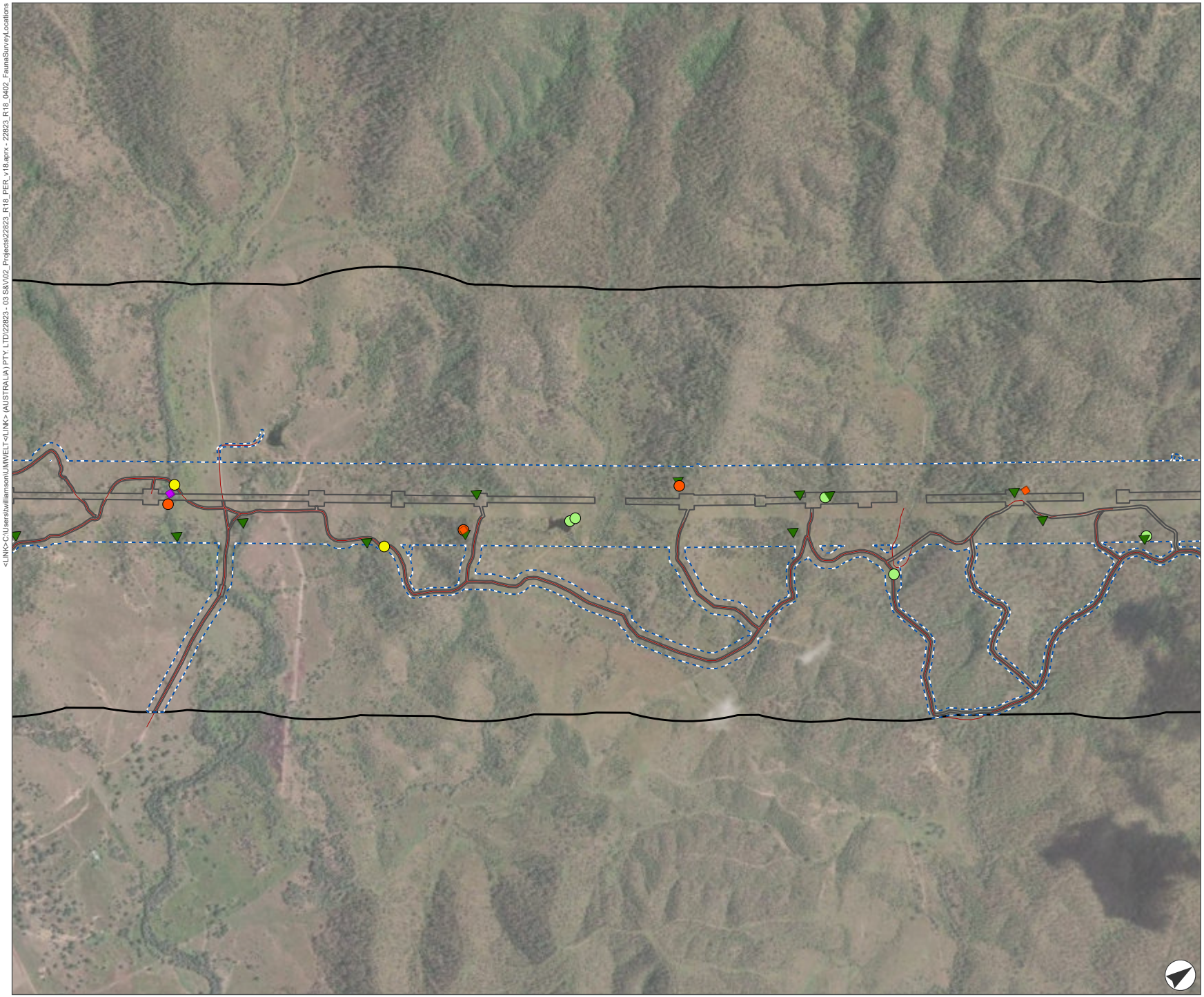


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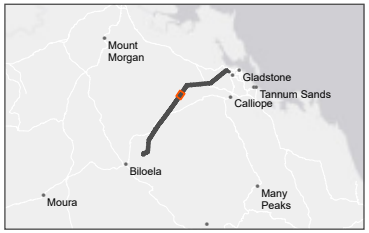
Fauna Survey Locations

Legend

- Existing Access Tracks
- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Survey Locations

- Habitat Assessment
- Active Search
- Bird Survey
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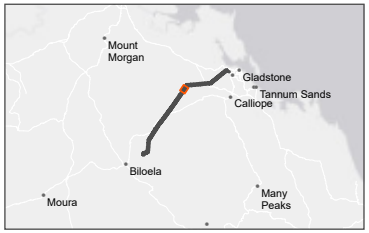
Fauna Survey Locations

Legend

- Existing Access Tracks
- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Survey Locations

- Habitat Assessment
- Active Search
- Bird Survey
- Call Playback
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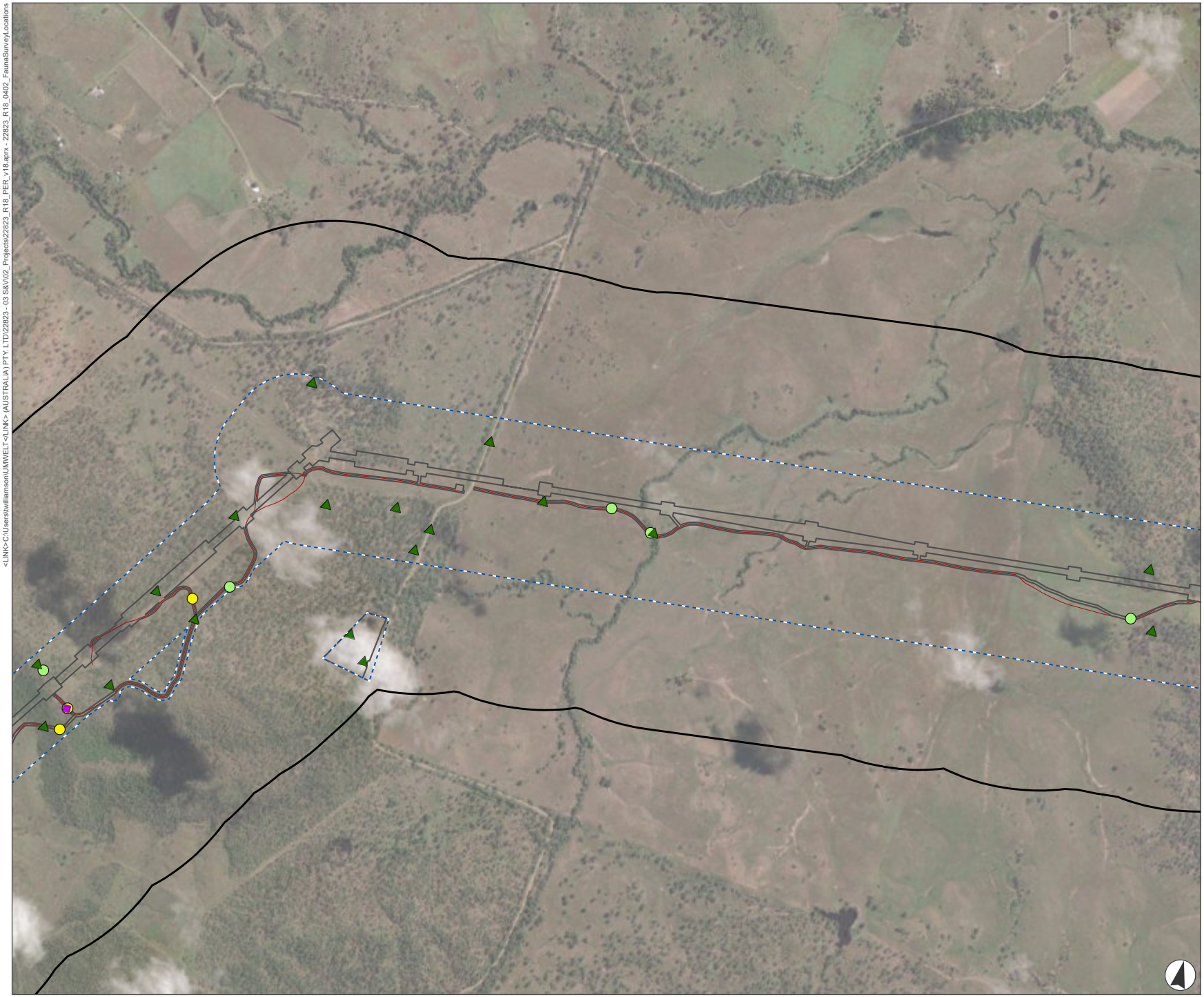


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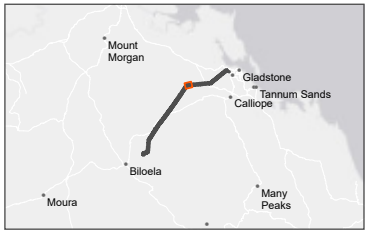
Fauna Survey Locations

Legend

- Existing Access Tracks
- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Survey Locations

- Habitat Assessment
- Active Search
- Bird Survey
- Call Playback
- Spotlight
- Anabat Swift
- Camera
- Water Mouse Habitat Assessment



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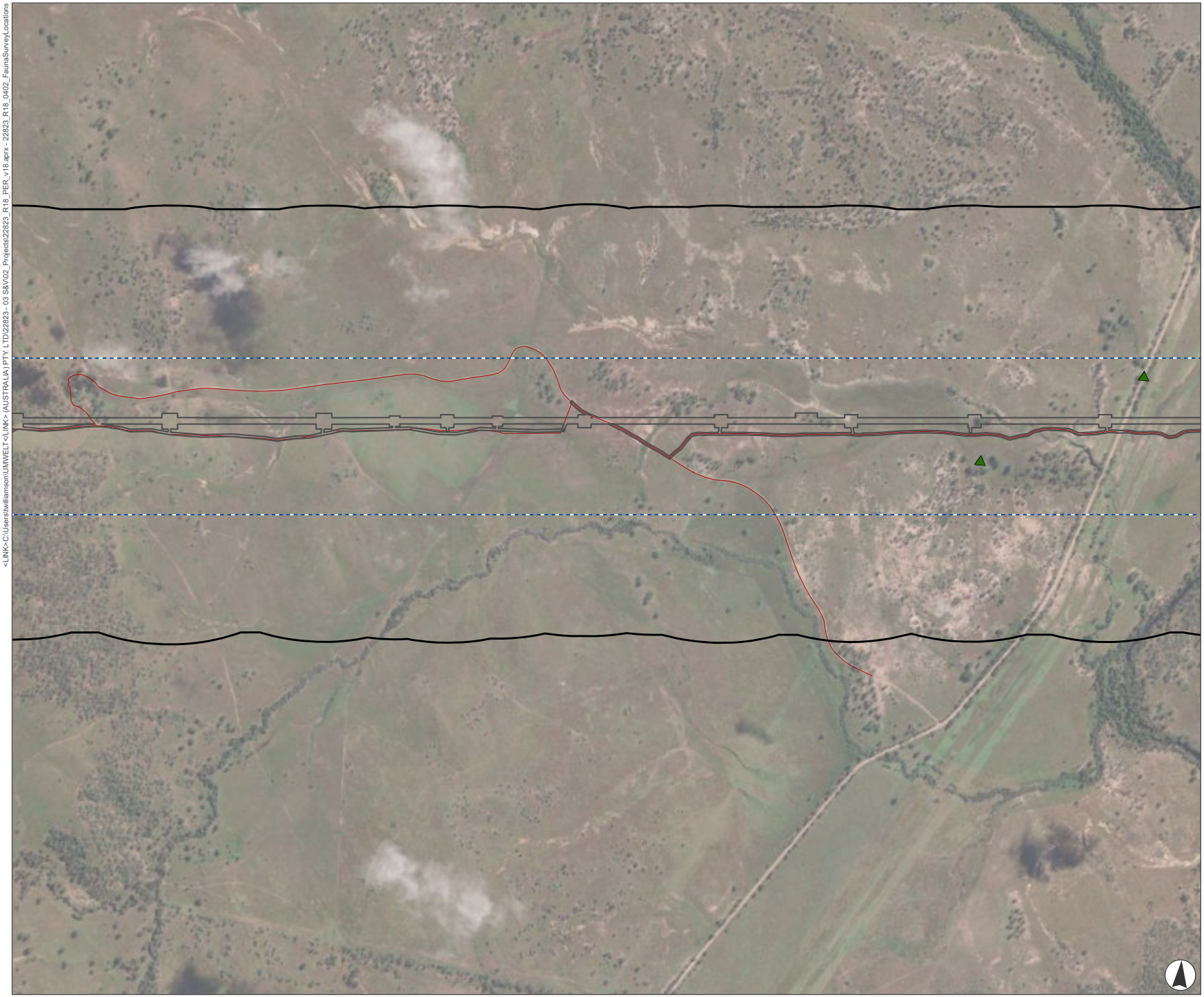


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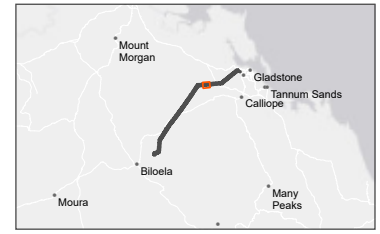
Fauna Survey Locations

Legend

- Existing Access Tracks
- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Survey Locations

- Habitat Assessment
- Active Search
- Bird Survey
- Call Playback
- Spotlight
- Anabat Swift
- Camera
- Water Mouse Habitat Assessment



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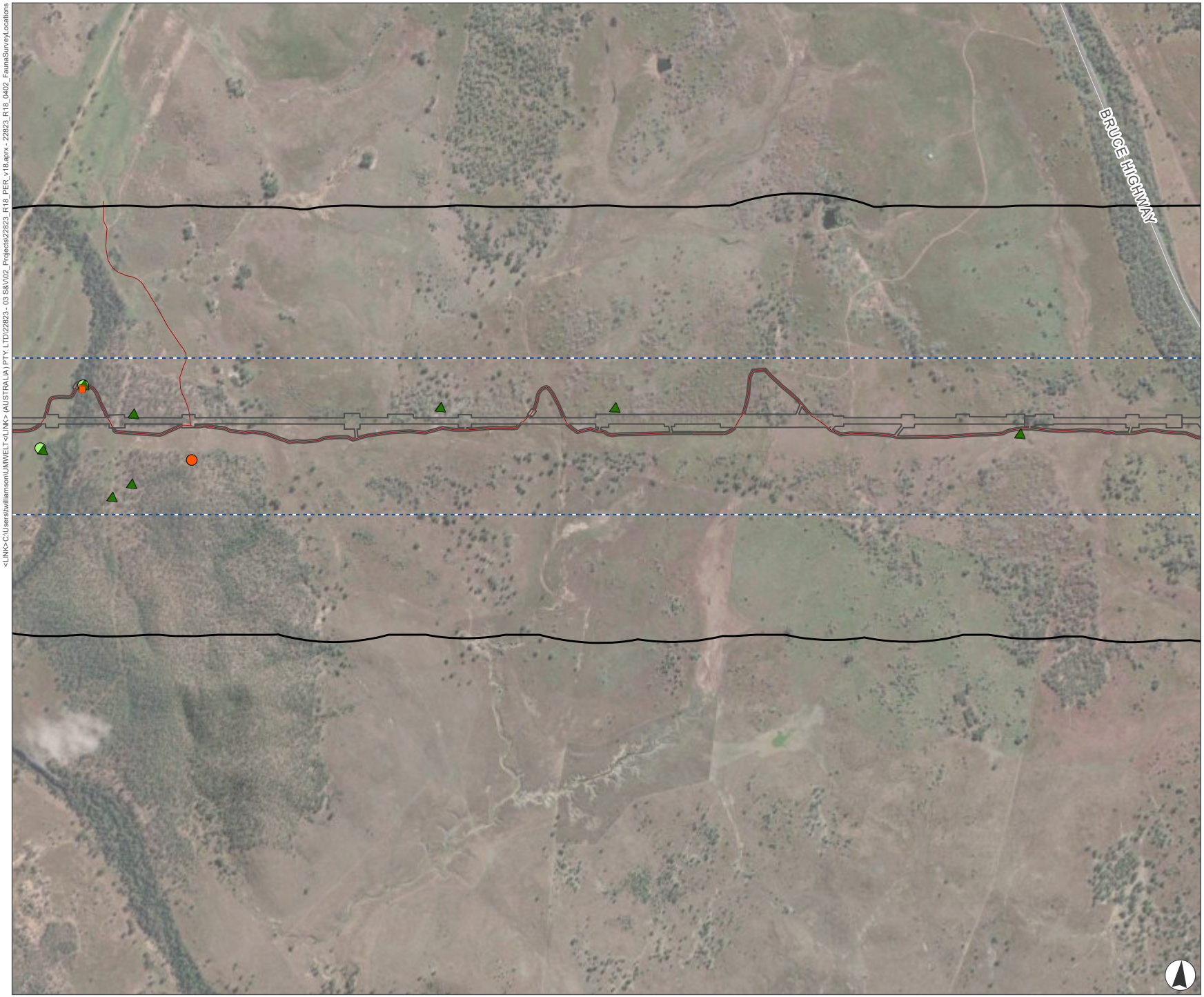
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FIGURE 4.2-16

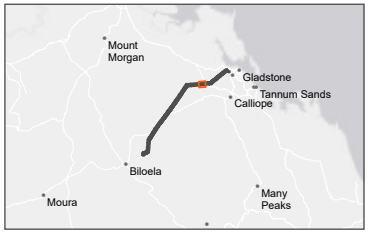
Fauna Survey Locations

Legend

- Roads
- Existing Access Tracks
- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Survey Locations

- Habitat Assessment
- Active Search
- Bird Survey
- Call Playback
- Spotlight
- Anabat Swift
- Camera
- Water Mouse Habitat Assessment



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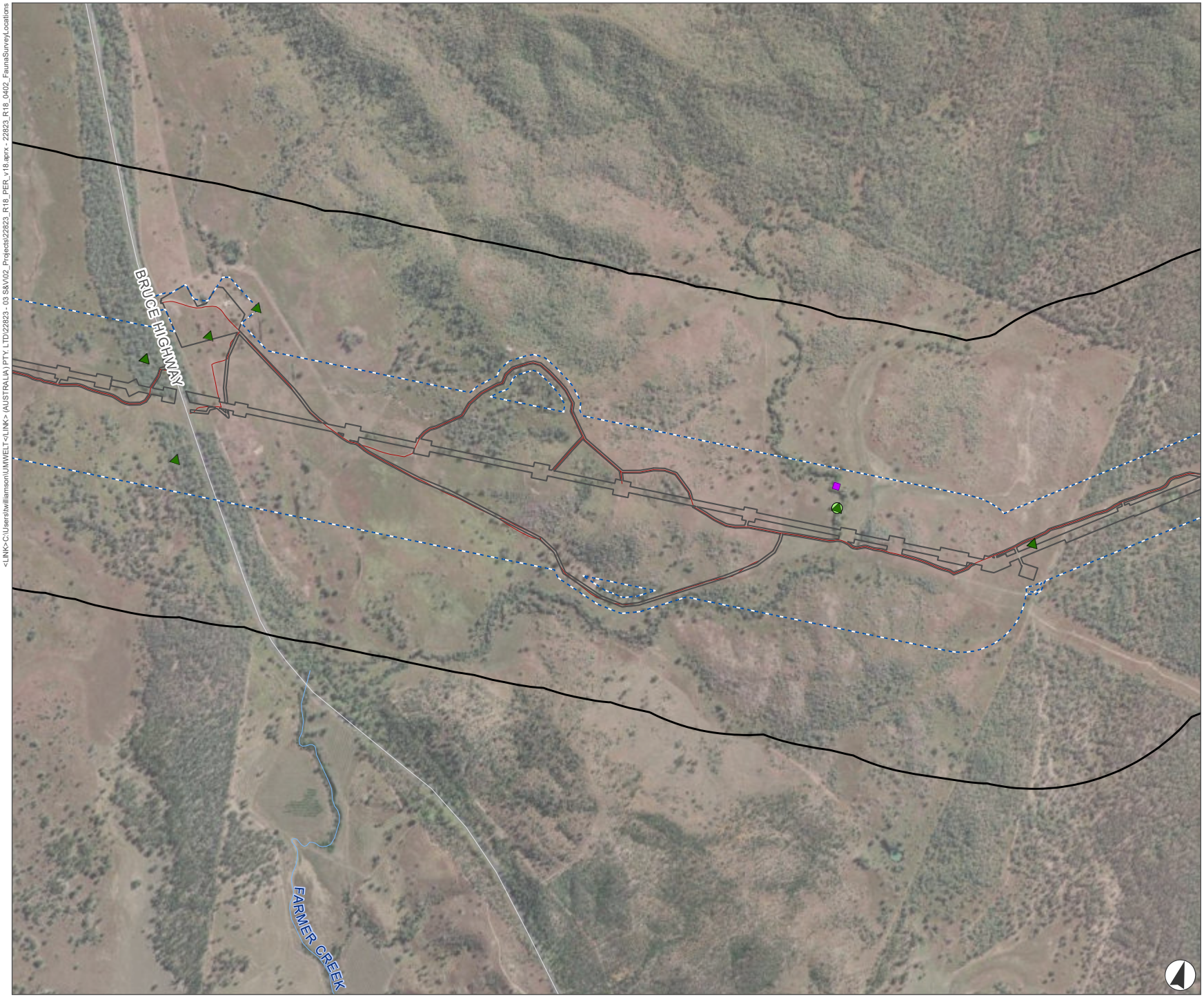


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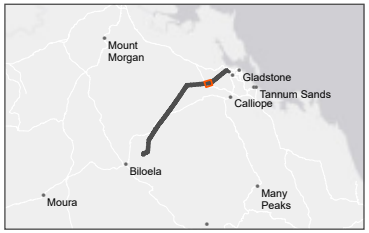
Fauna Survey Locations

Legend

- Roads
- Existing Access Tracks
- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Survey Locations

- Habitat Assessment
- Active Search
- Bird Survey
- Call Playback
- Spotlight
- Anabat Swift
- Camera
- Water Mouse Habitat Assessment



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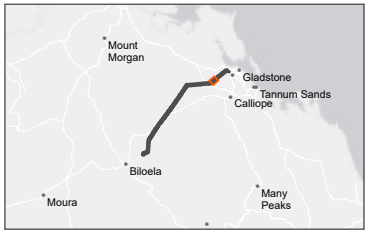
Fauna Survey Locations

Legend

- Existing Access Tracks
- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Survey Locations

- Habitat Assessment
- Active Search
- Bird Survey
- Call Playback
- Spotlight
- Anabat Swift
- Camera
- Water Mouse Habitat Assessment



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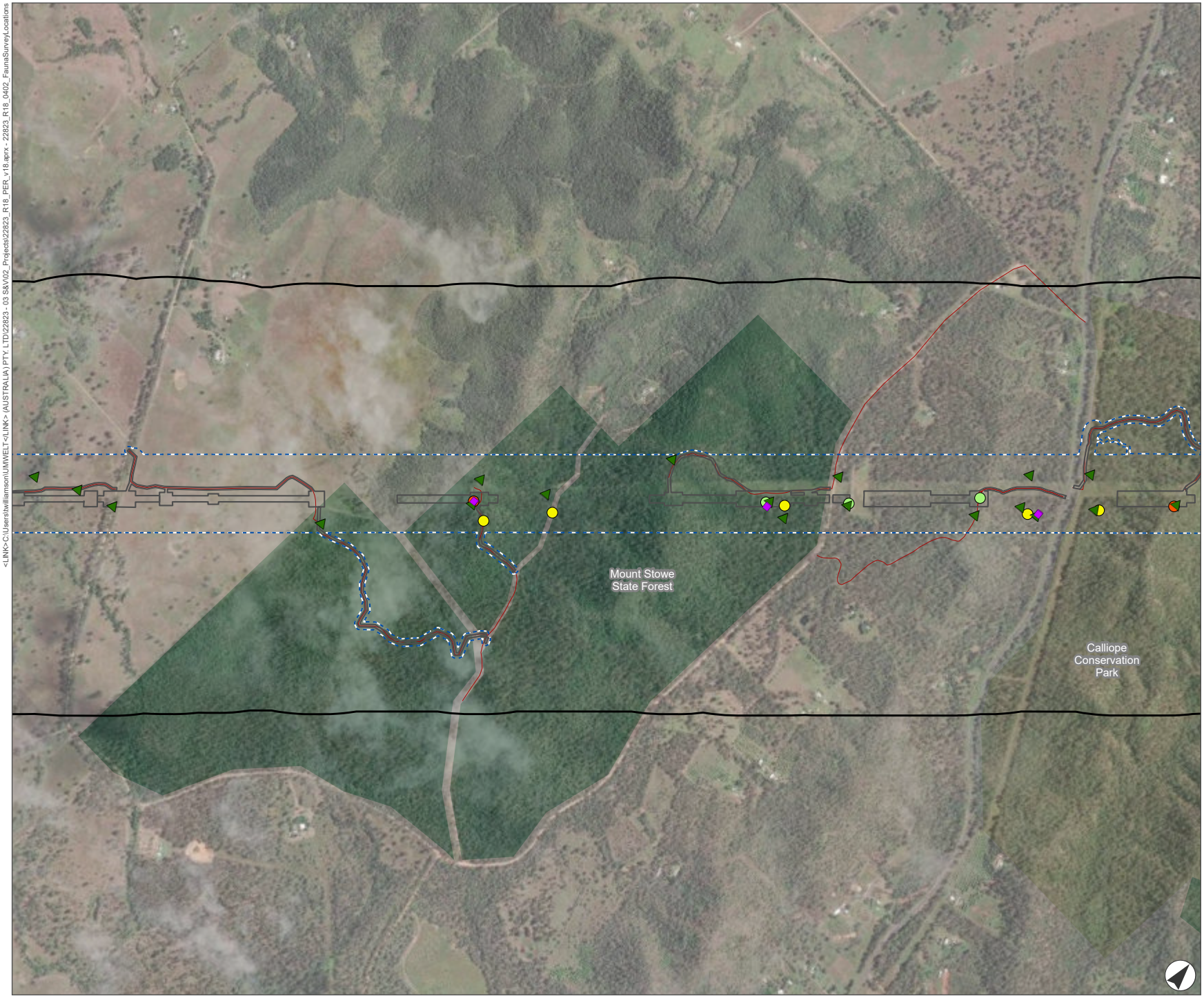


FIGURE 4.2-19

Fauna Survey Locations

Legend

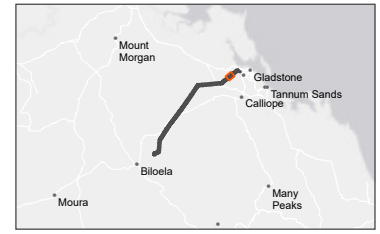
- Existing Access Tracks
- Field Survey Extent
- Disturbance Footprint
- Project Area

Protected Areas

- Conservation Park
- State Forest

Fauna Survey Locations

- Habitat Assessment
- Active Search
- Bird Survey
- Call Playback
- Spotlight
- Anabat Swift
- Camera
- Water Mouse Habitat Assessment



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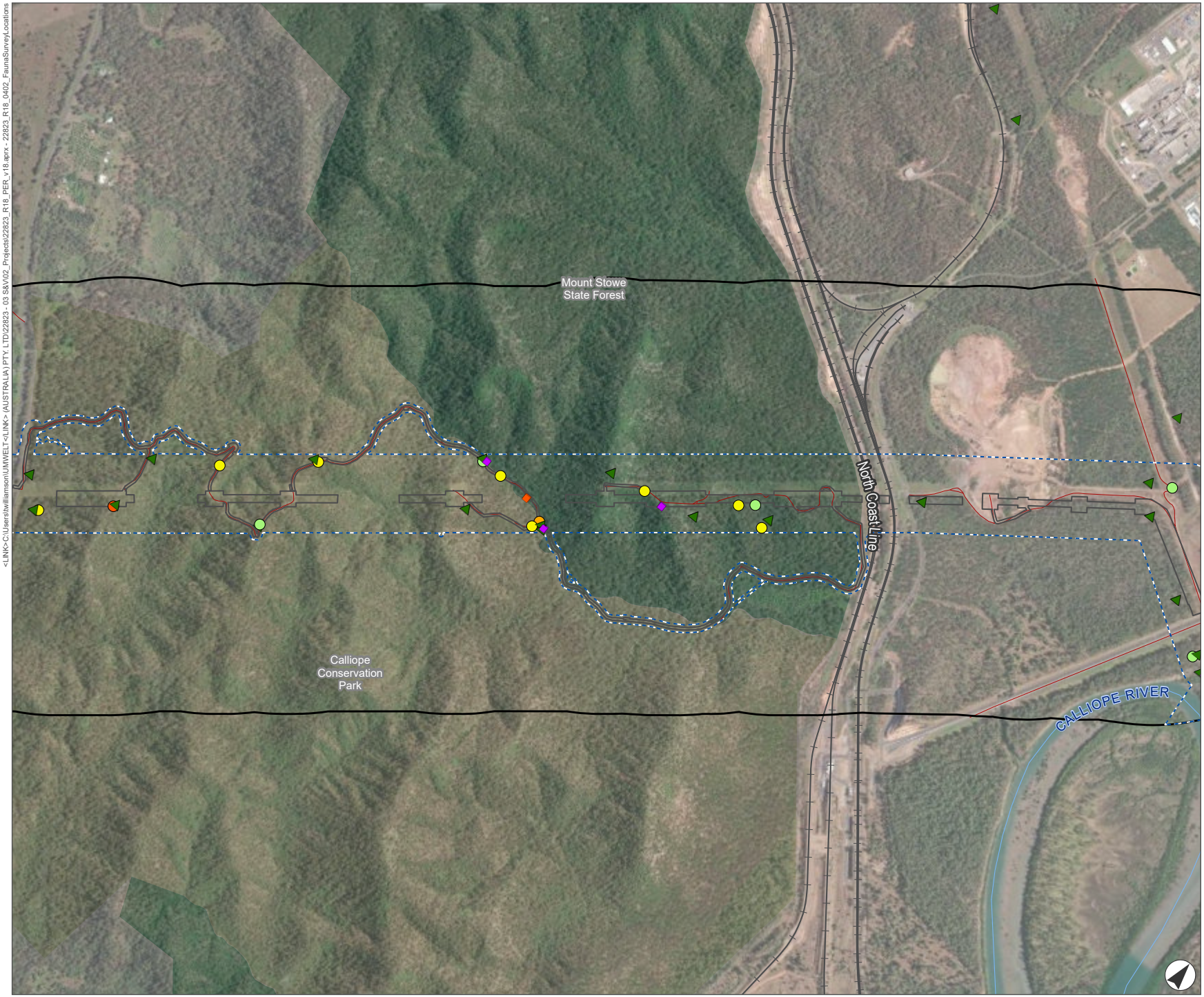


FIGURE 4.2-20

Fauna Survey Locations

Legend

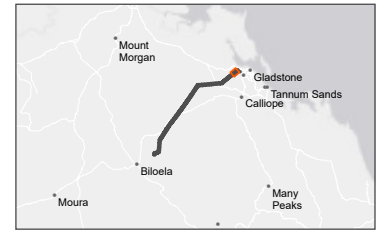
- Watercourse
- Existing Access Tracks
- Railway
- Field Survey Extent
- Disturbance Footprint
- Project Area

Protected Areas

- Conservation Park
- State Forest

Fauna Survey Locations

- Habitat Assessment
- Active Search
- Bird Survey
- Call Playback
- Spotlight
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- Camera
- Water Mouse Habitat Assessment



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FIGURE 4.2-21

Fauna Survey Locations

Legend

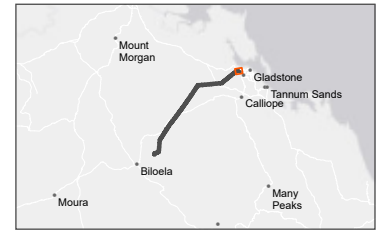
- Roads
- Watercourse
- Existing Access Tracks
- Railway
- Field Survey Extent
- Disturbance Footprint
- Project Area

Protected Areas

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Fauna Survey Locations

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4.1.7.1 Habitat Characterisation Assessments

Three types of habitat assessments were conducted during the field surveys:

- general habitat assessments
- targeted habitat assessments
- habitat quality assessments.

The habitat assessment type and relevant quantity have been outlined in **Table 4.6**.

Table 4.6 Habitat Assessment Types and Quantities

Type	Assessments Undertaken
General Habitat Assessment	219
Targeted Habitat Assessment	150
Habitat Quality Assessment	53
Total	**422**

General Habitat Assessments

General habitat assessments which characterise fauna habitat values were undertaken within all representative vegetation types within the Project Area. The habitat assessments followed guidance by Eyre et al. (2022) recording information in a standardised manner. These assessments identified the availability of habitat resources and the capacity to support main fauna groups as well as informing future site selection for targeted survey methods. Information on general habitat features and condition collected included:

- landform, vegetation structure, RE, vegetation condition
- soil texture and colour
- presence and abundance of foraging resources such as fleshy fruiting species, seeding grasses, flowering eucalypts and mistletoe
- presence and abundance of sheltering and nesting resources such as decorticating bark, hollow trees and logs, fallen woody debris, leaf litter, soil cracks, rocky features such as surface rocks, boulders, overhangs and caves, grass tussocks, termite mounds, gilgais and burrows
- general disturbances.

Targeted Habitat Assessments

Targeted habitat assessments were undertaken to further identify the extent, condition and value of habitat within the Project Area, and as such, the likely occupancy/useability of these habitats by target threatened fauna species, in terms of breeding, shelter, roosting, denning, foraging and dispersal. These assessments helped to locate suitable areas for targeted field surveys (i.e. live trapping, active searches or spotlighting) and to determine species likelihood of occurrence. Habitat assessments were undertaken for the following target fauna species:

- Collared delma (*Delma torquata*)
- Koala (*Phascolarctos cinereus*)
- Greater glider (*Petauroides volans*)

- Northern quoll (*Dasyurus hallucatus*)
- Ghost bat (*Macroderma gigas*)
- Squatter pigeon (southern) (*Geophaps scripta scripta*)
- Yellow-bellied glider (southeastern) (*Petaurus australis australis*)
- Water mouse (*Xeromys myoides*).

Targeted habitat assessments were conducted over 50 m x 50 m plots to ensure quantitative data could be captured, except for in the case of ghost bat surveys, as the assessment unit of the plots differed depending on the size of the rocky outcrop/cave structure.

Information collected during species-specific habitat assessments included habitat features identified from the desktop assessment including SPRAT, approved species Conservation Advice, Department guidelines or by the guidance of suitably qualified personnel conducting the surveys. An overview of the data captured specifically to each species during each habitat assessment is provided in **Table 4.7**.

Table 4.7 Species-specific Habitat Assessment Data

Threatened Species	Data Captured for Each Habitat Assessment	Relevant State and Commonwealth Guidance
Collared delma	• Embedded rock presence and soil contact • Tussock grass species and coverage • Understorey density (e.g. openness) • Tree canopy species and forest type • Litter cover, structure and depth • Slope orientation and aspect • Soil type • Connectivity of habitat • Presence and severity of disturbance.	• *Approved Conservation Advice for Delma torquata (Collared Delma)* (Department of the Environment, Water, Heritage and the Arts, 2008b) • *Draft Referral guidelines for the nationally listed Brigalow Belt reptiles* (Department of Climate Change, Energy, the Environment and Water, 2023e).
Ghost bat	• Presence of adit/cave • Number of entry points • Roost category rating (1 to 4) as per bat call wa pty ltd, 2022 • Determination of habitat and utilisation category • Height and width of entrance (m) • Depth of cave (m) • Presence/number of chambers suitable for roosting • Details and dimensions of any chimneys, cracks or tunnels from inside of cave.	• *Conservation Advice Macroderma gigas ghost bat* (Threatened Species Scientific Committee, 2016c) • *A review of ghost bat ecology, threats and survey requirements* (Bat Call WA Pty Ltd, 2021) • *Targeted species survey guidelines Ghost Bat Macroderma gigas* (Hourigan, 2011) • *Northern Territory guidelines for surveying for the ghost bat at the landscape scale* (Laura Ruykys et al., 2024).

Threatened Species	Data Captured for Each Habitat Assessment	Relevant State and Commonwealth Guidance
Greater glider	• Presence or abundance of tree hollows • Hollow abundance per ha • Hollow size class • Species of tree/s with hollow • Type of hollow (branch, trunk, spout etc.) • number of trees diameter at breast height (dbh) >30 cm in 50 x 50 m plot • number of trees dbh >50 in 50 x 50 m plot • Habitat context (part of large contiguous area, narrow corridor, riparian vegetation etc.) • Age of vegetation (also informed by historical aerial imagery) • Threats • Determination of habitat.	• *Conservation Advice for Petauroides volans (greater glider (southern and central))* (Department of Climate Change Energy the Environment and Water, 2022) • *Guide to greater glider habitat in Queensland* (Department of the Environment and Science, 2022) • *Survey Guideline for Australia's Threatened Mammals* (Department of Sustainability, Environment, Water, Population and Communities, 2011) • *Forest Protection Survey Program: Survey Guideline–Spotlighting and Call Playback (V4.1)* (Jemma Cripps et al., 2018).
Koala	• Evidence of koala (scratches, scats, direct observation) • Structural formation of the vegetation community • Koala food tree abundance • Food tree percent in the canopy • Species of food trees presence • Habitat context (part of large contiguous area, narrow corridor, riparian vegetation etc.) • Threats.	• *Identifying Habitat for the Endangered Koala* (Department of Climate Change, Energy, the Environment and Water, 2022d) • *Conservation Advice for Phascolarctos cinereus (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory* (Department of Agriculture Water and the Environment, 2022c) • *A review of koala habitat assessment criteria and methods* (K. Youngentob et al., 2021) • *National Recovery Plan for the Koala Phascolarctos cinereus* (Department of Agriculture Water and the Environment, 2022d) • *Survey Guideline for Australia's Threatened Mammals* (Department of Sustainability, Environment, Water, Population and Communities, 2011).
Northern quoll	• Evidence of northern quoll (den, scats, directing sighting) • Broad vegetation type • Distance to water • Relief • Boulder cover	• *National Recovery Plan for the Northern Quoll Dasyurus hallucatus* (Hill & Ward, 2010a) • *Conservation Advice Northern Quoll (Dasyurus hallucatus)* (Department of

Threatened Species	Data Captured for Each Habitat Assessment	Relevant State and Commonwealth Guidance
	• Boulder connectivity • Presence or abundance of ground hollows • Native grass cover • Exotic grass cover • Soil type • Threats • Determination of habitat and utilisation category.	Climate Change, Energy, the Environment and Water, 2021) • *EPBC Act Referral Guidelines for the Endangered Northern Quoll Dasyurus hallucatus* (Department of the Environment, 2016) • *Survey Guideline for Australia's Threatened Mammals* (Department of Sustainability, Environment, Water, Population and Communities, 2011).
Squatter pigeon (southern)	• Landform element • Landform pattern • Soil/substrate type • Rocky features • Distance to water • Canopy cover • Native ground cover • Bare ground cover • Litter cover • Weed cover • Permanence of water • Water type • Water nature (e.g., natural, artificial, natural but modified) • Water permanency • Water feature shape and physical characteristics • Water feature aquatic habitat characteristics • Bank slope • Threats • Determination of habitat and utilisation category.	• *Conservation Advice–Squatter Pigeon (Geophaps scripta scripta)* (Threatened Species Scientific Committee, 2015c) • *Survey Guideline for Australia's Threatened Birds* (Department of Environment, Water, Heritage and the Arts, 2010).
Water Mouse	• Presence of suitable habitat including mangrove, saltmarsh, sedgeland, supralittoral, freshwater wetland, clay pans • Presence of potential nests and condition if present • Presence of supralittoral zones • Hydrological condition • Suitable prey availability (crustaceans (e.g., grapsid crabs), marine pulmonates, polyclads, marine bivalves).	• *National Recovery Plan for the Water Mouse (Xeromys myoides)* (Department of Climate Change, Energy, the Environment and Water, 2022g) • *Referral Guideline for the Vulnerable Water Mouse Xeromys myoides* (Department of the Environment, 2015c).

Threatened Species	Data Captured for Each Habitat Assessment	Relevant State and Commonwealth Guidance
Yellow-bellied glider (south-eastern)	• Presence or abundance of tree hollows • Hollow abundance per ha • Hollow size classes (small, medium, large) • Species of trees with hollows • Type of hollow (branch, trunk, spout, etc.) • Number of hollow-bearing trees with dbh (diameter at breast height) >30 cm and >50 cm within 50 x 50 m plots • Presence of potential den trees (large, mature eucalypts likely to form hollows) • Presence, abundance and species of sap-feed trees showing characteristic "V"-shaped sap incisions indicating use by yellow-bellied gliders • Species of trees tapped for sap (e.g. Smooth-barked eucalypts, *Corymbia*, *Angophora*, *Lophostemon*).	• *Conservation Advice for Petaurus australis australis (yellow-bellied glider (south-eastern))* (Department of Agriculture Water and the Environment, 2022b) • *Survey Guideline for Australia's Threatened Mammals* (Department of Sustainability, Environment, Water, Population and Communities, 2011). • *Forest Protection Survey Program: Survey Guideline–Spotlighting and Call Playback (V4.1)* (Jemma Cripps et al., 2018).

4.1.7.2 Habitat Quality Assessments (BioCondition and Modified Habitat Quality Assessment)

Habitat quality assessments were undertaken in accordance with the *Guide to Determining Terrestrial Habitat Quality (version 1.2)* (Department of Environment and Science, 2020c). A total of 53 habitat quality assessments were conducted in the Project Area and surrounding region in representative areas of threatened fauna species habitat and included the following assessments:

- Landscape-scale attributes–describes the surrounding landscape of the subject area, and the influence this has on the vegetation quality.
- Site-based attributes–provide an indication of the general vegetation condition of an area.
- Species habitat attributes–determine the ability of an area to support a particular fauna species based on that species' specific habitat requirements.

Prior to the habitat quality assessment surveys, the matter unit (MU) and assessment unit (AU) were delineated and mapped to inform field survey and ensure adequate sampling replication throughout the Project Area where significant residual impacts may occur on MUs.

Delineation of units followed:

- MU–being the habitat utilisation type of the target MNES matter, e.g. koala habitat
- AU–condition types mapped within the mapped area of the MU e.g. climate refugia.

The MUs were delineated within the Project Area as per habitat modelling rules detailed for each MNES in **Section 8.0**. These assessment methodologies are discussed in detail in the following sections.

Landscape Scale Attributes

As the Project Area is located within a 'fragmented landscape', the landscape surrounding the Project Area and its influence on the site's vegetation quality is measured via assessment of the following four attributes:

- size of patch
- context
- connectivity
- ecological corridors.

The assessment of landscape-scale attributes was undertaken in a desktop setting as per the *Guide to Determining Terrestrial Habitat Quality* (Department of Environment and Science, 2020c), which refers to the methodology described in the *BioCondition Assessment Manual* (Eyre et al., 2015). A landscape-scale attribute numerical score out of 20 was generated.

Site-based Attribute Assessment

Site-based attribute assessment was undertaken as per the *Guide to Determining Terrestrial Habitat Quality* (Department of Environment and Science, 2020c), which refers to the methodology described in the *BioCondition Assessment Manual* (Eyre et al., 2015).

A total of 55[3] BioCondition assessments were conducted involving the collection of the following 13 site-based attributes within a 100 m x 50 m nested sampling plot:

- recruitment of species in the ecologically dominant layer
- native tree species richness
- native shrub species richness
- native grass species richness
- native forb species richness
- tree canopy height
- tree canopy cover
- shrub canopy cover
- native perennial grass cover
- organic litter cover
- number of large trees
- coarse woody debris abundance
- non-native plant cover.

[3] Includes two BioCondition sites used as vegetation reference condition for mangrove vegetation (RE 12.1.3).

Species Habitat Attribute Assessment

Species habitat quality attributes are designed to assess the capacity of a habitat area to support a species for all or part of its life. Species specific habitat requirements were researched using available literature and the knowledge of experienced, suitably qualified ecologists for each potentially occurring threatened species (as determined by the desktop assessment in **Section 4.1.2**).

Three measurable habitat attributes are assessed against a series of species-specific environmental indicators. Each environmental indicator is assigned a score from 0–25, where 0 represents the lowest quality and/or availability, and 25 represents the highest quality and/or availability.

Measured habitat attributes include:

- quality and availability of food and habitat required for foraging
- quality and availability of habitat required for shelter and breeding
- quality and availability of habitat required for mobility.

In addition to the listed attributes, habitat is assessed for the absence of threats. Each identified threat is assessed according to scope and severity against the threat matrix, provided in the *Guide to determining terrestrial habitat quality* (Department of Environment and Science, 2020c). Threats were assessed on the following principles:

- Scope of threats regarding what percentage of the population or habitat within the matter area will be affected over the next ten years or three generations.
- Low scores reflect higher percentage (80–100%) of population or habitat being destroyed while high scores are assigned where a smaller portion (1–19%) of habitat or population is slightly degraded or negligibly affected.
- Severity of threat assesses what percentage for the population, or its habitat will be affected by the threat.
- Low scores being allocated when 80–100% of the population or its habitat will be affected, and high scores being allocated when the threat is negligible and will affect only a small proportion (1–5%) of a species habitat or population.

Habitat quality scoring criteria and justification is provided in the Offset Management Plan (OMP) (**Appendix F**).

Fauna Detection Methods

Various methods specific to detecting threatened fauna were utilised to maximise the likelihood of species detection. These included both active and remote methods, including:

- active methods:
  - active searches for fauna, including signs of fauna (scat, tracks, scratches etc.)
  - bird surveys, including targeted surveys for squatter pigeon
  - spotlighting and call playback.
- remote methods:
  - baited motion detecting cameras
  - ultrasonic call detectors
  - incidental finds.

Each of these methods are described in **Table 4.8**.

Table 4.8 Fauna Field Survey Techniques and Effort

Survey Technique	Description	Survey Effort
Habitat Assessments	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: • Koala food and potential shelter trees • hollow bearing trees and stags • mistletoe • fallen logs, woody debris and leaf litter • rocky features such as surface rocks, boulders, crevices, overhangs and caves • proximity to water. Habitat assessments were used to inform habitat modelling for each of the potentially occurring or known threatened flora or fauna species.	422 sites
Diurnal Bird Surveys	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 accessible.	27 person hours
Remote Camera Trapping	Automated camera traps were deployed in representative habitats to record visitation by nocturnal and diurnal animals. Camera traps were typically baited with a mixture of rolled oats, peanut butter, honey and vanilla essence, and chicken necks. Camera traps targeting water mouse were baited with a mixture of sardines, pilchards and prawns. Analysis of still photos captured on cameras was undertaken by qualified ecologists. Captured images of fauna were identified to species level where possible.	1,197 trap nights
Acoustic Bat Call Detection	Anabat Swift devices were deployed in representative microbat habitat including caves and rock crevices, natural flyways, and along watercourses to record the presence of microbats. Data recorded on the bat recorders were analysed by a qualified specialist, Greg Ford of Balance! Environmental. The format and content of the analysis summary reports comply with nationally accepted standards for the interpretation and reporting of Anabat data (Reardon, 2003).	147 nights

Survey Technique	Description	Survey Effort
Spotlighting and Call Playback	Spotlighting was undertaken on foot targeting greater glider (southern and central), yellow-bellied glider (south-eastern), ghost bat and koala habitat within eucalyptus woodland. Spotlighting was also undertaken from the passenger window of a slow-moving vehicle. Call playback surveys were also undertaken targeting koala and yellow-bellied glider within suitable habitat.	51 person hours
Active Searches	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) and black-breasted button-quail. Disturbance to microhabitat features and reptiles was kept to a minimum. Active searches were also completed opportunistically at habitat assessment sites.	35 person hours
Opportunistic Sightings	All fauna species observed incidentally throughout the field surveys were recorded.	76 days

4.1.7.3 Targeted Collared Delma Surveys

Targeted surveys for the vulnerable collared delma were undertaken in accordance with the *Draft Referral guidelines for the nationally listed Brigalow Belt reptiles* (Department of Climate Change, Energy, the Environment and Water, 2023e) and *Approved Conservation Advice for* Delma torquata *(Collared Delma)* (Department of the Environment, Water, Heritage and the Arts, 2008b).

The targeted survey was conducted at a time of year when the species is most reliably detectable, in accordance with available scientific literature. A targeted survey was undertaken in May 2025 during which time the species is less mobile and easier to located given the cooler temperatures and reduced movement of the species. During this targeted survey, two individuals were found demonstrating efficacy of the survey method and timing during which the survey was undertaken. The following sections provide further information regarding the surveys undertaken for this species.

Habitat Identification and Assessment

Potential habitat for collared delma was identified during preliminary habitat mapping and ground truthing surveys. Habitat assessment focused on structural characteristics known to be important for the species, including areas with sparse to moderate native ground-layer vegetation, scattered tussocks of grasses and sedges, patches of leaf litter, and the presence of rocks, logs, and surface debris suitable for shelter. Soils in these areas generally comprised sandy clay loam, with bare ground mostly absent and coarse litter common. Sites containing exotic pasture or heavily compacted soils were excluded from the targeted search effort unless adjacent to suitable native vegetation or where these areas retained some degree of habitat suitability for the species.

The specific habitat features recorded for the collared delma at each habitat assessment site is outlined in **Table 4.7** and included slope and orientation, soil type and rock presence, tussock grass species and coverage and litter cover, structure and depth. In total, 404 habitat assessments were undertaken to determine suitability of available habitat for collared delma.

Diurnal Searches

A total of 25 person hours across 26 sites was dedicated to undertaking diurnal searches for collared delma within areas considered suitable habitat for the species. At each site, observers systematically searched the ground layer for shelter sites, including turning over surface rocks, logs, timber, and other debris, and carefully replacing them after inspection. Grass tussocks and leaf litter were also gently parted to detect individuals.

Each search was conducted by two observers with the aim of completing 1 person-hour per site. The survey method was undertaken via a meaningful meander to provide even coverage of the target habitat and to intensify search effort in areas that provided micro habitat features conducive to finding the species. The quantity of individuals found during diurnal searches was recorded along with habitat features. Additionally, search tracks were recorded during the surveys (**Figure 4.2**).

4.1.7.4 Targeted Ghost Bat Surveys

Targeted surveys for the vulnerable ghost bat were undertaken in accordance with survey guidelines outlined in the *Targeted species survey guidelines Ghost Bat Macroderma gigas* (Hourigan, 2011) and other relevant State and Commonwealth guidance. These surveys were designed to identify potential roosting and foraging habitats, detect evidence of species presence, and determine the proximity of any maternity or day roosts that may occur within the Project Area. Methods included habitat identification and assessment, maternity roost searches, spotlighting, and acoustic monitoring.

Habitat Identification and Assessment

Habitat identification focused on locating features suitable for ghost bat roosting and foraging. Day roosts and maternity sites for ghost bats are typically located in caves, disused mines, rock overhangs, and occasionally in deep crevices within cliff faces. The Project Area was systematically assessed via desktop assessment, including contour mapping, aerial imagery, Project LiDAR and field surveys. Particular attention was paid to rocky escarpments, sandstone outcrops, as well as historic mining areas where adits or shafts could provide roosting habitat.

During field surveys, potential roost structures were spatially recorded, photographed, and described in terms of:

- presence of adit/cave
- number of entry points
- roost category rating (1 to 4) as per Bat Call WA Pty Ltd (2022)
    - Category 1: maternity/diurnal roost sites with permanent ghost bat occupancy
    - Category 2: maternity/diurnal roost caves with regular occupancy
    - Category 3: diurnal roost caves with occasional occupancy
    - Category 4: nocturnal roost caves with opportunistic usage.
- determination of habitat and utilisation category

- height and width of entrance (m)
- depth of cave (m)
- presence/number of chambers suitable for roosting
- details and dimensions of any chimneys, cracks or tunnels from inside of cave.

Foraging habitat was assessed in relation to vegetation structure, prey availability, and proximity to roosts, with open woodland edges, riparian corridors, and areas supporting high insect biomass noted as potential high-use foraging zones.

Roost Searches

Project LiDAR was used to identify a total of 19 potential maternity or nocturnal roost locations within and adjacent to the Project Area, as these are of critical conservation importance. Surveys targeted caves, mine shafts, and overhangs that met the structural and microclimatic requirements for breeding colonies, particularly warm, humid, and sheltered sites.

Entry into suitable structures was conducted only where it was safe and permissible to do so, with inspections carried out during daylight hours to reduce disturbance. Evidence sought included concentrations of prey remains (often large insect wings or small vertebrate skulls), accumulations of guano, and strong ammonia-like odours. Where roost structures were identified but inaccessible, binoculars and high-powered torches were used for internal visual assessment from the entrance.

Spotlighting Surveys

Spotlighting surveys were undertaken to detect ghost bats in flight and to confirm activity in the vicinity of potential roosts and within suitable foraging and dispersal habitat. Surveys were conducted during the first three hours after sunset, coinciding with peak foraging activity. High-lumen LED spotlights and head torches were used to scan flight paths around cave entrances, cliff lines, along riparian corridors and amongst lower branches of the canopy in woodlands. Observers looked for distinctive flight characteristics, such as slow, manoeuvrable wingbeats and gliding behaviour, as well as size and wing shape, which differentiate ghost bats from other microchiropteran species.

Spotlighting was conducted from fixed observation points near potential roost entrances, as well as during slow-walking transects in suitable foraging areas. Any detections were recorded with GPS location, time, and behavioural notes (e.g. entering or exiting a roost, foraging, or social interactions).

Spotlighting survey efforts are captured in **Table 4.8**.

4.1.7.5 Targeted Northern Quoll Surveys

Targeted surveys for the vulnerable northern quoll were undertaken in accordance with the *EPBC Act survey guidelines for Australia's threatened mammals* (Department of Sustainability, Environment, Water, Population and Communities, 2011), relevant State-based survey protocols, and best practice methods recommended in the species' conservation advice and as outlined in **Table 4.6.** Surveys were designed to identify suitable habitat, optimise detection of the species, and assess potential utilisation of the Project Area by the species.

Habitat Identification and Assessment

Potential northern quoll habitat was identified through a combination of the desktop assessment and field surveys. The desktop assessment incorporated review of aerial imagery, contour mapping, regional ecosystem mapping, and species records from online databases (Atlas of Living Australia (ALA) and WildNet). Potential caves and areas with suitable rocky outcropping were identified via desktop using aerial imagery, contour mapping and LiDAR analysis. Known habitat associations for the species were considered, including rocky escarpments, boulder piles, and rugged ranges, along with structurally complex open woodlands and riparian corridors. Habitat assessments were conducted at 422 sites across the Project Area, documenting habitat structure, floristic composition, and the availability of key resources such as denning and refuge sites. Disturbance factors, including weeds, grazing, vegetation clearance and fire history, were also recorded (**Table 4.9**).

Diurnal Searches

Diurnal searches were undertaken to locate potential den sites and signs of northern quoll activity. Surveyors systematically traversed accessible areas of suitable habitat. Effort totalled 31 person-hours over 18 days. Searches targeted rock crevices, hollow logs, tree hollows, and ground debris for evidence such as scats, tracks, prey items or scratch marks. The condition, quantity, and distribution of potential refuge sites was recorded in accordance with the habitat assessment methods outlined in **Section 4.1.7.1**.

Camera Trapping Surveys

Camera trapping was undertaken to detect activity of northern quoll within the Project Area. A total of 60 motion-activated cameras were deployed across 25 sites representing a range of habitat types identified as suitable for the species. Cameras were mounted at approximately 50 cm height and positioned to capture activity along animal paths, near den entrances, and at bait stations. Cameras were baited with generic mammal bait and chicken necks (**Table 4.8**) to increase detection probability. Cameras were deployed for 1,061 nights. Images were reviewed for evidence of northern quoll and other fauna species by a suitably qualified ecologist.

4.1.7.6 Targeted Water Mouse Surveys

Targeted surveys for the vulnerable water mouse were undertaken in accordance with the Commonwealth's *Referral guideline for the vulnerable water mouse Xeromys myoides* (Department of the Environment, 2015c) and the *National Recovery Plan for the Water Mouse (Xeromys myoides)* (Department of Climate Change, Energy, the Environment and Water, 2022g).

Surveys were conducted at two sites located on either side of the Calliope River (Site A–Wiggins Coal Terminal and Site B–Powerlink Substation) (**Figure 4.2**). The assessment consisted of:

- 16 habitat assessments
- diurnal searches (2 hr 48 mins)
- camera trapping (136 camera trap nights).

This methodology was designed to identify and assess suitable habitat, search for signs of occupation, and confirm presence through targeted detection methods.

Habitat Identification and Assessment

Habitat assessments and fauna observations were undertaken at both sites to supplement existing data. Vegetation types, the presence of predator and prey species, supralittoral banks, hollow-bearing mangrove trees, and disturbance features were recorded, in line with the referral guidelines. Areas were assessed against key water mouse habitat characteristics, including mangrove and saltmarsh zones with potential nesting features such as hollow trunks, mounds with crab or shell remains, and areas of structurally complex root systems within suitable habitat areas.

Diurnal Searches

Diurnal searches for water mouse nesting structures and prey remains were conducted over a total of 2 hours and 48 minutes across both sites, meeting the referral guidance of 1–2 hours of search effort per hectare of suitable habitat. Searches targeted microhabitat features likely to support water mouse activity, including mud banks with salt couch cover, burrows with mud slides, and log piles in intertidal and supralittoral zones. All signs were recorded spatially to inform habitat mapping and assessment of potential utilisation by the species.

Camera Trapping

Camera traps were deployed at 30 locations across Site A and Site B for a maximum of 5 nights, totalling 136 trap nights, meeting the referral guidance of 100 trap nights per hectare of suitable habitat. Of the 30 cameras deployed, 23 were located at Site A and 7 at Site B (**Figure 4.2**). Site A received a higher camera density due to its greater diversity of microhabitat features, while Site B was relatively homogenous. Cameras were positioned to target potential denning structures and other features consistent with water mouse habitat, as identified in the referral guidelines and through consultation with ecologists experienced in water mouse trapping. Cameras were baited with a mix of green tiger prawns, pilchards, sardines, and cat food, and were checked regularly to ensure correct operation and to re-bait as required. Cameras with low detection rates were relocated to alternative features during the survey period to maximise detection potential.

4.1.8 Survey Effort and Adequacy

Threatened species that were identified as potentially occurring in early iterations of the likelihood of occurrence assessment were considered for targeted survey efforts, where appropriate.

Species not subject to targeted surveys were those found to have no or unreliable records in the desktop search extent, no or limited suitable habitat within the Project Area or do not have a distribution that overlaps with the Project Area. Whilst these species were not specifically targeted, survey techniques and effort employed to date are likely to have been suitable at detecting presence and suitable habitat.

Survey effort and techniques employed to target threatened species were determined based on the DCCEEW survey guidelines, referral guidelines and recently published literature where appropriate.

Where practical, the survey guidelines have been met as detailed in **Table 4.9**. Where survey guidelines have only partially been met due to their impracticality at this scale, effort is still considered sufficient due to the nature of the Project Area and the adoption of other techniques such as habitat assessments where presence of suitable habitat resources has been used as a surrogate for presence.

Table 4.9 Survey Effort and Adequacy

Species	Relevant Guidelines	Recommended Methodology	Total Survey Effort Undertaken	Survey Adequacy
Threatened Ecological Communities				
Brigalow (*Acacia harpophylla* dominant and co-dominant) (Brigalow TEC)	*Approved Conservation Advice for the Brigalow (Acacia harpophylla dominant and co-dominant) ecological community* (DoE, 2013).	No recommended methodology, desktop attributes and field data collection to a level to respond to TEC key diagnostic characteristics and condition thresholds.	• 3 TEC assessments.	**Guidelines met** TEC assessments within patches of synonymous REs or vegetation communities are considered adequate. Where required, these assessments have been substituted with desktop data or conservative assumptions have been made.
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions (SEVT TEC)	*Conservation Advice for Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions* (Department of Climate Change, Energy, the Environment and Water, 2023).		No key diagnostic characteristics or condition thresholds determined for this TEC, determination of RE adequate for confirmation of TEC.	
Subtropical and Temperate Coastal Saltmarsh (Coastal Saltmarsh TEC)	*Conservation Advice for Subtropical and Temperate Coastal Saltmarsh* (Department of Sustainability Environment Water Population and Communities, 2013).		• 1 TEC assessment. Other patches assumed to be of same condition but were inaccessible.	
Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions (Eucalypt Floodplain Forest TEC)	*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		• 10 TEC assessments.	

Species	Relevant Guidelines	Recommended Methodology	Total Survey Effort Undertaken	Survey Adequacy
	Change, Energy, the Environment and Water, 2022a).			
Threatened Flora				
Cycas megacarpa	There are no Commonwealth-approved species-specific survey guidelines.	There is no published methodology for surveying *Cycas megacarpa*, however, methods have been developed through consultation of scientific literature (**Section 4.1.6.1**). *Cycas megacarpa* is easily distinguished from other cycad species by its large glaucous seeds as well as its green leaves with moderate broad leaflets. Fruiting cones are produced between May and February. Seeds become ripe from March onwards and drop from the tree.	Targeted surveys were undertaken in areas of suitable habitat following methods provided in **Section 4.1.6.1**.	**Guidelines met.** A targeted survey approach was adopted for *Cycas megacarpa* in consultation with the Queensland Herbarium. The survey effort reflected these guidelines but was adapted to accommodate the steep terrain.
Threatened flora	*Flora survey guidelines–protected plants*.	Random meander technique (Cropper, 1993) in areas of suitable habitat.	Opportunistic surveys were undertaken in area of suitable habitat for threatened flora species.	**Guidelines met.** Opportunistic surveys are considered suitable.
Threatened Fauna				
Australian painted snipe (*Rostratula australis*)	*Survey guidelines for Australia's threatened birds.*(Department of Environment, Water, Heritage and the Arts, 2010) *EPBC Act Policy Statement 3.21: Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act*	• Targeted stationary observations: 10 hours over 5 days. • Land-based area searches or line transects: 10 hours over 3 days. • Spotlighting: no minimum survey effort recommended.	• 422 habitat assessments. • Diurnal bird surveys undertaken throughout all field surveys. • Opportunistic surveys of wetlands. • Incidental spotlighting at wetlands and dams.	**Guidelines met.** Area search effort exceeds the recommended survey effort for the species. Stationary observations were undertaken at areas of best habitat during the baseline surveys, however, this was not conducted at dawn or dusk. Spotlighting at suitable

Species	Relevant Guidelines	Recommended Methodology	Total Survey Effort Undertaken	Survey Adequacy
	listed migratory shorebird species (Department of the Environment and Energy, 2017a).			wetlands was also undertaken. The combination of diurnal bird surveys and habitat assessments across the field program provide adequate survey effort.
Black-breasted button-quail (*Turnix melanogaster*)	*Survey guidelines for Australia's threatened birds.*(Department of Environment, Water, Heritage and the Arts, 2010) *National Recovery Plan for Black-breasted Button-quail (Turnix melanogaster).*(Department of Climate Change, Energy, the Environment and Water, 2022e), *Distribution of Black-breasted Button-quail Turnix melanogaster in the Great Sandy Region, Queensland and associations with vegetation communities* (Webster, et. al, 2022).	Area searches for the species in representative habitat or transect surveys. Recommended effort is 15 hours over 3 days within an area of 50 ha. Or 6 x 5–10 minute searches within an area of 1 ha. Longer surveys may be required in complex habitats. Platelets may indicate presence of birds but are not conclusive as these are also made by other button-quail species.	• 422 habitat assessments. • Diurnal bird surveys undertaken throughout all field surveys. • Walking surveys/flushing in suitable habitat. • Active searches for platelets and scats undertaken in suitable habitat.	**Guidelines met.** The recommended survey methods were employed, and there are no seasonality constraints for this species. The combination of diurnal bird surveys, flushing surveys and active searches across the field program provide adequate survey effort.
Collared delma (*Delma torquata*)	*Draft referral guidelines for the nationally listed Brigalow Belt reptiles* and the *Survey Guidelines for Australia's Threatened Reptiles.*	• Undertake diurnal active searches in appropriate habitats: ○ Search microhabitats, such as carefully turning woody debris and rocks and raking through leaf litter	• 404 habitat assessments, noting the presence of key microhabitat features. • 25 person hours of active searches in	**Guidelines met.** Surveys employed relevant methodologies (direct and indirect). While the surveys were not undertaken during summer, the conditions were hot and

Species	Relevant Guidelines	Recommended Methodology	Total Survey Effort Undertaken	Survey Adequacy
		○ Survey over a maximum of 1.5 person hours per ha for habitats of average complexity ○ Survey over a minimum of 3 days. • Undertake pitfall trapping during late spring to summer: ○ A series of pitfall trap lines comprising six 4–10 L buckets and funnel traps spread along a 15 m fence would be an appropriate trap design. As a general rule, surveys should only be undertaken from late September through to late March when weather conditions are warm, not too dry and maximum temperatures are greater than 25°C on most survey days. As collared delma are a diurnal species the optimal time to survey are early mornings (within 4 hours of sunrise) and late afternoons to early evenings.	locations of identified potential habitat. As pitfall trapping is considered less effective than active diurnal searches in locating the species (Porter, 1998), only active search were undertaken during the survey program.	dry, with maximum temperatures greater than 25°C (**Section 4.1.7.3**). Although not all recommended methods have been employed (e.g. pitfall trapping), habitat assessments and active searches have supplemented the survey effort and overall, it is considered sufficient.
Ghost bat (*Macroderma gigas*)	*Targeted species survey guidelines Ghost Bat Macroderma gigas* (Hourigan, 2011).	The species disperse out of maternity roosts during winter and autumn. • Walking transects with a hand-held bat detector and spotlight: 8 detector hours over 4 nights. • Harp traps and mist nets (optional): a minimum of 8 trap nights over 4 nights, plus 8 mist	• 422 habitat assessments. • 51 person hours of spotlighting on foot and by vehicle covering a range of habitat ranges. • 19 potential roost site searches.	**Guidelines partially met.** Field surveys did not include the use of harp or mist nets. However, spotlighting was completed in areas of representative habitat across the Project Area. No known maternity roosts are located within or nearby to the

Species	Relevant Guidelines	Recommended Methodology	Total Survey Effort Undertaken	Survey Adequacy
		net hours over 4 nights (optional). • Roost searches: 2 hours per survey day.		Project Area. Potential roosts identified on the desktop assessment were inspected. Field surveys have been undertaken during autumn-winter (in the non-breeding season). Although not all recommended methods have been employed, habitat assessments have supplemented the survey effort and overall, it is considered sufficient.
Greater glider (southern and central) (*Petauroides volans*) **Yellow-bellied glider (south-eastern) (*Petaurus australis australis*)**	*Survey Guidelines for Australia's Threatened Mammals* (Department of Sustainability, Environment, Water, Population and Communities 2011), *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland* (Eyre et al., 2018), *Guide to Greater Glider Habitat in Queensland* (DAWE 2022), Arboreal mammal survey methods identified by (Department of Sustainability Environment Water Populations and Communities, 2011).	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 • 2 hours/ha • Stag watching: ○ 30 minutes before dusk and 60 minutes after sunset (90 minutes per stag) • Spotlight surveys in suitable vegetation types • 2 x 200 m transects per 5 ha • maintain 100 m intervals between transects • Cage trapping. **Cage trapping:** only required if not undertaking camera trapping and not	Methods relevant to the detection of greater glider included: • 422 habitat assessments including collection of DBH data. • 51 person hours of spotlight searching on foot and by vehicle within representative greater glider habitat. • Call playback has been included as this is a relevant detection method for yellow-bellied glider. Calls were played for approximately 2 minutes at a time with 3 rounds per spotlighting	**Guidelines met** As recommended, the field program employed both direct and indirect methods. Spotlighting effort was undertaken to detect both species in areas of representative habitat, and this included call playback for yellow-bellied glider. Habitat assessments supplemented the targeted survey effort to support the identification of suitable habitat for both species and overall is considered sufficient.

Species	Relevant Guidelines	Recommended Methodology	Total Survey Effort Undertaken	Survey Adequacy
		considered further. As per Eyre et al. 2018, spotlighting transects are the most effective method. As per Department of the Environment and Science, 2022, tree DBH has been identified as a key characteristic in determining greater glider habitat. Where possible, survey effort should target habitat known to be suitable for listed species.	site in suitable habitat for the species.	
Grey-headed flying fox (*Pteropus poliocephalus*)	*Survey guidelines for Australia's threatened bats* (Department of the Environment, Water, Heritage and the Arts, 2010), *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland* (Eyre et al., 2018).	Surveys based on direct sightings are unreliable due to the species' irregular distribution, so the most effective approach combines database searches, consultation with local knowledge, and targeted field surveys. Prior to surveys, records of known camps should be reviewed from government databases, literature, and community networks. Diurnal surveys should focus on detecting roosts through visual observation, calls, odour, and droppings, with dusk or aerial surveys used where necessary. Vegetation surveys are also essential to confirm the presence of key food plants and feeding habitat, using both existing maps and field verification by botanists. At night, walking transects, audio recordings, or observations around fruiting plants	• 422 habitat assessments including collection of DBH data. • 51 person hours of spotlight searching on foot and by vehicle. • In addition to the above, a roost survey was undertaken at an unmarked roost location along Callide Creek immediately west of the Project and did not detect the species.	**Guidelines met** As recommended, the field program employed both direct and indirect methods. Spotlighting effort was undertaken to detect both species in areas of representative habitat including beyond the Project Area in an attempt to detect the species from the broader landscape. Habitat assessments supplemented the targeted survey effort to support the identification of suitable habitat for this species and overall is considered sufficient.

Species	Relevant Guidelines	Recommended Methodology	Total Survey Effort Undertaken	Survey Adequacy
		can help detect feeding and flying bats.		
Koala (*Phascolarctos cinereus*)	*A review of koala habitat assessment criteria and methods*. *The EPBC Act referral guidelines for the Endangered koala* (Department of Climate Change, Energy, the Environment and Water, 2022c), *Survey Guidelines for Australia's Threatened Mammals* (Department of Sustainability, Environment, Water, Population and Communities 2011).	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, spotlighting, mark-resight or mark-recapture, thermal detection drones, radio-tracking, camera traps and detection dogs. Indirect methods include scratching's, SATs 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.	• 422 habitat assessments. • 51 person hours of spotlight searching on foot and by vehicle within representative koala habitat. • Call playback of koala mating calls within suitable habitat. Calls were played for approximately 2 minutes at a time with 3 rounds per spotlighting site. A total of 1,061 camera trap nights were conducted in suitable habitat.	**Guidelines met.** As recommended, the field program employed both direct and indirect methods. Spotlighting effort was undertaken in areas of representative habitat, and this included call playback. Habitat assessments supplemented the survey effort and overall is considered sufficient.
Marine turtles	*National Guidelines for the Survey of Cetaceans, Marine Turtles and the*	Marine turtle surveys should focus on both nesting beaches and in-water habitats. Nesting beach	Targeted surveys for marine turtles were not undertaken as suitable habitat for these	**Guideline not met** Effort associated with the detection of marine turtles

Species	Relevant Guidelines	Recommended Methodology	Total Survey Effort Undertaken	Survey Adequacy
	Dugong (DCCEEW, 2024b).	monitoring involves standardised night or dawn patrols to record nesting activity, track counts, and species identification, while in-water surveys use transects, capture–mark–recapture, or satellite telemetry to assess abundance, distribution, and movements. Survey design must account for seasonal variation in nesting and foraging, ensure repeatability, and incorporate local environmental conditions. Combining methods over multiple seasons provides the most reliable population and habitat-use data.	species occurs outside of the Disturbance Footprint. Surveys relevant to marine turtles were limited to intertidal systems to confirm the presence of suitable nesting habitat however suitable habitat was not identified.	was not undertaken in strict accordance with the relevant guideline as suitable habitat for these species will not be impacted by the project. Whilst the guideline does outline details relating to the assessment of suitable nesting habitat for this species, areas that have the potential to occur as nesting habitat have been ground-truthed as being unsuitable.
Northern quoll (*Dasyurus hallucatus*)	*Survey Guidelines for Australia's Threatened Mammals* (Department of Sustainability, Environment, Water, Population and Communities 2011) *EPBC Act referral guideline for the endangered northern quoll Dasyurus hallucatus*.	Reconnaissance survey: • Can be undertaken at any time of year • Remote camera trapping in areas of suitable habitat • Daytime searches for suitable habitat and latrines. Targeted survey: • The EPBC Act referral guidelines note that "In Queensland, conformity with State survey guidelines is recommended noting that camera trapping is recommended over cage trapping" (Department of the Environment, 2016). • Camera traps should specifically target any special landscape features.	• 422 habitat assessments, which included searches for suitable denning sites. • Deployment of 28 remote cameras during the reconnaissance survey (in March 2023), and 32 remote cameras during the targeted survey (in July 2024) in locations of identified as potential habitat. Cameras were baited using a combination of chicken coupled with a bolus of rolled oats, peanut butter, honey and vanilla essence, for a total of 1,061 camera	**Guidelines met.** Habitat assessments were conducted throughout the field survey program to identify potential areas of habitat critical to the survival of the species. Camera traps were deployed during both a reconnaissance and targeted survey. The targeted survey was conducted just prior to the breeding season in Queensland when individuals are most active.

Species	Relevant Guidelines	Recommended Methodology	Total Survey Effort Undertaken	Survey Adequacy
		Spotlighting: • No minimum survey effort recommended.	trap nights in suitable habitat.	
Painted honeyeater (*Grantiella picta*)	*Targeted species survey guidelines for the painted honeyeater* (Rowland, 2012). *Survey guidelines for Australia's threatened birds.*(Department of Environment, Water, Heritage and the Arts, 2010).	In the non-breeding season, birds show up in random areas outside their core habitat (usually in association with fruiting mistletoes) either singly or in small groups. Calling is also infrequent and are more nomadic in their behaviour. Area searches: 4 hours over 4 days.	• 422 habitat assessments. • Diurnal bird surveys undertaken throughout all field surveys. The Project Area is outside of the breeding range of the species and can be detected from March to September (i.e. outside the breeding season). • Active searches for feathers and mistletoe undertaken at each habitat assessment site.	**Guidelines met.** The recommended survey methods were employed during peak activity periods to detect the species. The baseline surveys were undertaken when the species is potentially present within the region. The combination of diurnal bird surveys, mistletoe searches and incidental records across the field program provide adequate survey effort.
Squatter pigeon (southern) (*Geophaps scripta scripta*)	*Survey guidelines for Australia's threatened birds.*(Department of Environment, Water, Heritage and the Arts, 2010).	Area searches for the species in representative habitat or transect surveys. Recommended effort is 15 hours over 3 days within an area of 50 ha; or 6 x 5-10 minute searches within an area of 1 ha. Longer surveys may be required in complex habitats. Flushing surveys. Recommended effort is 10 hours over 3 days within an area of 50 ha.	• 422 habitat assessments. • Diurnal bird surveys undertaken throughout all field surveys. • Walking surveys/flushing in suitable habitat. • Tracks, watercourses and water bodies (farm dams) were targeted whilst surveying to detect the squatter pigeon (southern). • Active searches for feathers and nests	**Guidelines met.** The recommended survey methods were employed, and there are no seasonality constraints for this species. The combination of diurnal bird surveys, flushing surveys and incidental records across the field program provide adequate survey effort.

Species	Relevant Guidelines	Recommended Methodology	Total Survey Effort Undertaken	Survey Adequacy
			undertaken at each habitat assessment site.	
Water mouse (*Xeromys myoides*)	*Referral guideline for the vulnerable water mouse Xeromys myoides* (Department of the Environment, 2015c). *Survey Guidelines for Australia's Threatened Mammals* (Department of Sustainability, Environment, Water, Population and Communities 2011).	The referral guidelines note that "proponents proposing actions in, adjacent to or nearby habitat that is already known to be critical to the survival of the water mouse should adopt less invasive surveys for the water mouse by using remote movement-activated cameras and active searching to confirm extant status".	• The Project Area occurs in an area mapped as species 'known to occur'. • 16 species-specific habitat assessments, plus 25 general habitat assessments in suitable habitat. • Active searches for nest mounds, tracks and middens. • 136 camera trap nights in suitable habitat.	**Guidelines met.** Field surveys included camera traps in representative habitat, active searches for nests and habitat assessments. Habitat assessments have supplemented the survey effort and overall, it is considered sufficient.
Migratory Birds				
Terrestrial migratory birds	*Draft Referral Guideline for 14 Birds Listed as Migratory Species Under the EPBC Act.* (Department of the Environment, 2015b) *Survey guidelines for Australia's threatened birds.*(Department of Environment, Water, Heritage and the Arts, 2010).	For oriental cuckoo during migration, it is recommended that surveys be undertaken over standardised timed periods. Surveys and assessments should also consider habitat (and specific locations) that is suitable and important for migration passage. While there are no standard survey techniques for white-throated needletail and fork-tailed swift, they should be counted by an experienced person from elevated viewpoints (if present). The species occupancy within the Project Area is as follows: • **Oriental cuckoo:** September to May	• 422 habitat assessments. • Diurnal bird surveys undertaken throughout all field surveys. • Bird species were recorded incidentally throughout the survey program both visually and aurally.	**Guidelines met.** The combination of habitat assessments, diurnal bird surveys and incidental sightings provide adequate survey effort to detect migratory species. Surveys have been conducted when all potential species are present within Australia.

Species	Relevant Guidelines	Recommended Methodology	Total Survey Effort Undertaken	Survey Adequacy
		• **White-throated needletail:** September to April • **Fork-tailed swift:** October to April.		
Migratory shorebirds/water birds	*Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species* (Department of the Environment and Energy, 2017a).	Bird surveys in suitable habitat. Replicate surveys should be considered. Surveys should be conducted during the day and consist of area searches or line transects in suitable habitat (i.e. wetland or other waterbodies and their surrounding vegetation. Surveys should be conducted for the between late August and April, when migratory species arrive and depart in Australia.	• 28 habitat assessments. • Diurnal bird surveys undertaken throughout all field surveys. • Opportunistic surveys of wetlands.	**Guidelines met.** Surveys have been undertaken during the shorebird's occupancy within Australia (3 x in March 2023, 4 x in April 2023, 2 x in May 2023 and 1 in August 2024). Bird surveying has been completed during all surveys. To supplement the search effort targeted habitat assessments were conducted throughout all surveys.

4.1.9 Survey Limitations

Limitations for field surveys have been identified and are detailed in **Table 4.10**. The desktop assessment is used to supplement the field surveys effort.

Despite the identified limitations, survey effort and coverage overall are 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 in the assessment.

Table 4.10 Survey Limitations

Survey Limitation	Detail
General Ecology	
Terrain	Terrain was rugged and sometimes inaccessible due to the steepness and the associated safety risk. Vehicle tracks were available to all existing towers but often not in between. At several locations, these areas were observed from a distance from the transmission towers. Where access was unavailable, State RE mapping was applied in place of ground-truthed vegetation.
Season	Surveys have been undertaken across summer, autumn and winter. Fauna species with seasonal survey requirements in spring may not have been captured during the survey and this has been taken into consideration when determining the likelihood of occurrence (**Section 4.1.3**). After a review of scientific literature, flora species that may possibly occur have year-round identifiable characteristics, making these species observable across any climatic season.
Flora	
Site Access	Access to a single property was restricted during July 2025 field surveys for *C. megacarpa*. The overall estimate of this species within the Field Survey Extent is less due to this restriction.
SEVT	Floristic sampling and searches for threatened species were restricted in the SEVT communities due to the closed and complex vegetation structure, presence of thorned plants and steep terrain where this community occurs. This has been taken into consideration when determining the likelihood of occurrence (**Section 4.1.3**).
Fauna	
Fauna activity	The detection of fauna activity and estimates of relative abundance and occurrence of species during field surveys can vary in response to the following: • recent environmental events, such as bushfire • change in fauna movement and activity from seasons (i.e. spring versus summer) • species that have large home ranges can make detection challenging as the species may not be present in this part of their home range during the survey period • certain species may be difficult to detect as they occur in low densities within the Project Area, or they are a cryptic species.

4.1.10 Data Analysis and Mapping

4.1.10.1 Vegetation Mapping

Spatially defined vegetation data collected during the field survey (**Section 4.1.5**) was imported into the ESRI Geographic Information Systems (GIS) program ArcGIS Pro. Each vegetation site had been assigned an RE based on vegetation, geology and landform using the REDD (**Section 4.1.5**). RE boundaries were defined using aerial imagery and field validated data to interpolate polygons as described in Neldner et al. (2025).

Vegetation and habitat boundaries were validated and re-defined following additional field surveys where necessary, and final ground-truthed regional ecosystem mapping was produced. Mapping was conducted in accordance with (Neldner et al., 2025). Field survey sites were used to verify vegetation to aid aerial photographic interpretation (API). The final mapped product is considered accurate at a 1:10,000 scale. The visual distinctness of vegetation communities within aerial photography and supporting site survey data allowed for the identification of REs across the landscape based on landscape position, visual signature (texture, pattern, and colour) and structure allowing the allocation of homogenous REs. The allocation of homogenous polygons avoids the mapping of heterogenous polygons (multiple units or REs per vegetation community) enabling refined and accurate species-specific habitat modelling.

4.1.10.2 MNES Habitat Modelling

Habitat modelling was completed for the EPBC Act listed threatened flora and fauna species that are known or potentially occurring within the Project Area.

'Modelling criteria' was primarily based on habitat requirements as specified by the MNES's Conservation Advice or SPRAT profile. As required, other publicly available datasets or literature was reviewed to inform the modelling rules including relevant species recovery plans (where available), referral guidelines, approved conservation advice and listing advice, management plans, peer-reviewed journal articles and species habitat descriptions from ALA.

Habitat assessments collected during the field surveys, species records (public and survey records), and Project vegetation mapping was used to map potential habitat per MNES according to the modelling rules. Habitat modelling considered REs, surface geology, contours, aspect, LiDAR analysis and presence of microhabitat features, such as hollows, leaf litter, boulders and soil cracks.

Although REs/vegetation communities form the basis of the fauna habitat types discussed in this assessment, the presence and abundance of required habitat resources as determined through field surveys was considered foremost when assessing if suitable for a particular MNES. The modelling criteria are detailed for each MNES in **Section 8.0**.

Within the Project Area, outside of areas which were field surveyed, MNES habitat modelling is derived from the MNES modelling criteria applied to Queensland Government Regional Ecosystem mapping without any specific or detailed habitat assessment. The Regional Ecosystem mapping dataset often contains heterogeneous polygons which may include several vegetation communities for an individual polygon. Where a heterogenous polygon occurred, the dominant was used to provide the basis for the MNES habitat modelling outside of areas which were field surveyed. As a consequence, the accuracy of the MNES habitat mapping which utilises Regional Ecosystem mapping is dependant of the accuracy of the source data.

Species of National Environmental Significance

The SNES dataset (Department of Climate Change, Energy, the Environment and Water, 2024b) was utilised to identify the species distribution and inform the extents of habitat models across the Field Survey Extent.

Review of Potential Habitat Models

The Queensland Government (Department of Environment and Science, 2022) has developed potential habitat models for 134 Queensland threatened and priority fauna species using Maxent. A review of these models against Project habitat mapping and/or species records was completed for known and potentially occurring threatened fauna species with more complex habitat definitions, where available. While for some species the modelling has been used to further justify conclusions regarding mapping appropriateness or the degree of conservativism, no changes to the mapping were made based on this review.

The models are supported by an explanatory paper titled *Potential habitat modelling methodology* (Queensland Herbarium, 2021). As described in the methodology, potential habitat models aim to predict the probable distribution of suitable species habitat based on input variables likely to test their biological tolerance limits. Potential habitat models are unable to predict if the modelled habitat is currently occupied by that species and are not intended as a substitute for field survey by skilled observers. Potential habitat models inform species surveys, planning, management, and recovery.

Habitat modelling predicts the likelihood of an area being suitable for the species, ranging from <10 (highly unlikely to be suitable) to 90–100% (highly likely to be suitable). Vetted, post-1975 species presence records compiled by the former Department of Environment and Science (now DETSI) with a location precision of 2,000 m or better are utilised by the fauna models. Models are based on seven environmental layers:

- annual mean temperature
- temperature seasonality (coefficient of variation)
- annual precipitation
- mean moisture index of the lowest quarter moisture index
- pre-clearing broad vegetation group (1:1M)
- landzone and terrain ruggedness.

All models in this dataset have the equal training sensitivity and specificity logistic threshold applied. Pre-clearing vegetation is the vegetation prior to clearing and is reconstructed across Queensland based on interpretation of landscape as depicted on aerial photos or satellite imagery (Landsat, Spot), and ground-truthed using a sample of known points. Pre-clearing potential habitat models are clipped to Remnant Vegetation Cover 2019 to map potential habitat which remained as remnant vegetation in 2019.

Draft potential habitat models were assessed by experts for feasibility and to identify if any post-hoc refinement of the modelled distribution were required. Some species may be known with a high degree of confidence to have specific habitat requirements not incorporated into the development of the model. Where spatial products are available, e.g. discrete soil types, models can be clipped to produce a more refined product.

Ghost Bat LiDAR Analysis

Habitat mapping within the Project Area was undertaken using multiple data inputs including habitat assessments collected during the field survey, geology, ground-truthed vegetation, RE mapping and the following raster datasets derived from LiDAR data:

- Digital Terrain Model (DTM)
- Digital Elevation Model (DEM).

Generally, DEM was used to determine areas of bare earth and slopes.

Cliff Slope Analysis

Identification of potential cliff/caves areas were identified by using the DEM data that was derived from Project LiDAR and State elevation datasets. This analysis was specifically utilised to predict potential locations suitable for ghost bat roosts or potential breeding locations. By performing a slope analysis across the DEM, areas of steep/sheer topography were identified.

To aid in the areas of identification, the slope analysis was conducted across the following ranges/bands:

- $60–70^0$
- $70–80^0$
- $80–90^0$.

These slope ranges were then digitised into areas per slope range and then generalised further into regions by joining adjacent areas of similar slope range with a 5 m distance. Isolated areas smaller than 2 m^2 were removed from the generalised areas, as these isolated areas were deemed less likely to be of significance.

Nineteen of the more significant locations identified in the desktop analysis were later checked in the field. There was found to be correlation from the desktop data to areas of overhangs, cliffs, steep creek/river banks and some large boulders but of the 19 sites checked; no cave structure suitable for ghost bat were identified.

Woody Koala Habitat LiDAR Analysis

Given the size of the Project Area, it was not practical to map non-remnant woody vegetation using field data. Instead, Koala dispersal habitat within the Project Area was further categorised using the Queensland Statewide Landcover and Trees Study (SLATS) 2023–woody vegetation extent mapping and current (2025) Project LiDAR.

The SLATS 2023 dataset is the most current version of the mapping available and was published on 5 August 2025. The scale of the woody extent dataset is intended to capture features visible at a nominal map scale of 1:10,000: stands of woody vegetation greater than 0.5 ha with a canopy density greater than 10% crown cover will be classified as woody. A minimum width of 20 m applies to linear features. SLATS data was overlaid with mapped koala dispersal habitat to delineate potential woody vegetation which may characterise areas providing function support to this species. The classification of woody vegetation within koala dispersal habitat totalled 2051.1 ha. It should be noted that the SLATS data does not differentiate trees or shrubs; and for example, includes clumps of exotic *Lantana camara** if present, and does not distinguish by woody vegetation height.

To further refine potential woody dispersal habitat a desktop assessment was undertaken to identify vegetation taller than 4 m in non-remnant koala dispersal habitat. A 4 m height threshold was applied to individual trees or stands of vegetation which provide for the safe movement between other areas of suitable habitat and are likely to offer temporary refuge from daytime heat and predators. Juvenile trees less than 4 m are typically unable to physically support an individual koala. Similarly, shrubs less than 4 m were also deemed to be unsuitable as being considered as woody vegetation suitable for koala dispersal. This threshold aligns with the Qld Offset policy definition of a non-juvenile koala habitat tree (Department of Environment and Science, 2020d).

This spatial process utilised 2025 project LiDAR data along the Disturbance Footprint to generate a series of elevation surfaces. A digital elevation model (DEM) was created from ground-classified LiDAR points at 1 m resolution, while a corresponding digital surface model (DSM) was produced using all LiDAR returns. Subtracting the DEM from the DSM generated a canopy height model (CHM), representing absolute vegetation heights across the project area.

The CHM was filtered to isolate vegetation exceeding 4 m, and these areas were converted into vector polygons for further spatial analysis. Adjacent polygons within a 3 m horizontal radius were merged to create more generalised vegetation extents. Known powerline corridors were then removed to avoid misclassification.

The refined dataset was clipped to the Project Disturbance Footprint, including zones of existing, selective, and full clearing. The final mapped extent identified approximately 26.92 hectares of vegetation with a height of 4 m or greater.

4.1.11 Significant Impact Assessment

SIAs were undertaken in accordance with the *Significant Impact Guidelines 1.1–MNES* (Department of the Environment, 2013a), and have utilised relevant information from Approved Conservation Advices, Listing Advices, SPRAT profiles, National Recovery Plans and peer reviewed journal articles to establish conclusions. Significant impact assessments were undertaken for species known to occur or considered as potentially occurring with the Project Area. The precautionary principle has been applied when deciding whether or not the Project is likely to have a significant impact on a value, as per the *Significant Impact Guidelines 1.1–MNES* (Department of the Environment, 2013b).

In line with the *Significant Impact Guidelines 1.1–MNES* (Department of the Environment, 2013b), only the adverse impacts on the species that may arise as a result of the Project have been considered (and not potential beneficial impacts). Although included in the broader discussion of potential impacts, it is acknowledged that rehabilitation (which may be considered a beneficial impact) does not negate or offset the loss of habitat. The assessment of significance has been made independent of these measures.

Where it was evident an MNES would not be impacted (directly or indirectly) by the Project due to its location in the Project Area relative to the Disturbance Footprint (i.e. >150 m from the Disturbance Footprint), this MNES value was not subject to a full significant impact assessment.

According to the *Significant Impact Guidelines 1.1–MNES* (Department of the Environment, 2013b), a significant impact is defined as an action which is likely to have a notable negative impact on 'habitat critical for the survival of the species', an 'important population' or 'important habitat' for a migratory species. In the absence of species-specific policy guidelines or recovery plans, the definitions from the *Significant Impact Guidelines 1.1–MNES* (Department of the Environment, 2013b) for 'population of a species', 'important population', 'habitat critical for the survival of the species' and 'important habitat' were applied to relevant threatened or migratory species impact assessments. These are:

- **Population of a species** is an occurrence of the species in a particular area. In relation to critically endangered, endangered or vulnerable threatened species, occurrences include but are not limited to:
    - a geographically distinct regional population, or collection of populations, or
    - a population, or collection of populations, that occurs within a particular bioregion.
- **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 as 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.
- **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 habitat** for a migratory species refers to habitat that is:
    - utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the species, and/or
    - of critical importance to the species at particular life-cycle stages, and/or
    - utilised by a migratory species which is at the limit of the species range, and/or
    - within an area where the species declining.

For some MNES, the key terms described above are defined in the associated SPRAT profile, referral guideline, Listing Advice or Conservation Advice. Where this occurs, the specific definition is used in lieu of the generic definitions, as described in **Table 4.11**.

Table 4.11 MNES with Specific 'Habitat Critical' and/or 'Important Population' Definitions

Species	Source
Threatened Ecological Communities	
Eucalypt Floodplain Forest TEC	*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, 2022a).
SEVT TEC	*Approved Conservation Advice for Semi-evergreen Vine Thickets of the Brigalow Belt (North and South) and Nandewar Bioregions* (Department of Climate Change, Energy, the Environment and Water, 2023).
Threatened Flora	
C. megacarpa	*National Multi-species Recovery Plan for the cycads, Cycas megacarpa, Cycas ophiolitica, Macrozamia cranei, Macrozamia lomandroides, Macrozamia pauli-guilielmi and Macrozamia platyrhachis* (Queensland Herbarium, 2007a).
Threatened Fauna	
Australian painted snipe	*Approved Conservation Advice for Rostratula australis (Australian painted snipe)* (Department of Sustainability, Environment, Water, Population and Communities, 2013).
Black-breasted button quail	*National Recovery Plan for Black-breasted Button-quail (Turnix melanogaster)* (Department of Climate Change, Energy, the Environment and Water, 2022e).
Collared delma	*Approved Conservation Advice for Delma torquata (Collared Delma)* (Department of the Environment, Water, Heritage and the Arts, 2008b).
Common greenshank	*Conservation Advice for Tringa nebularia (common greenshank)* (Department of Climate Change, Energy, the Environment and Water, 2024e).
Curlew sandpiper	*Conservation Advice for Calidris ferruginea (curlew sandpiper)* (Department of the Environment, 2015a).
Eastern curlew	*Conservation Advice for Numenius madagascariensis (far eastern curlew)* (Department of Climate Change, Energy, the Environment and Water, 2023d)
Fork-tailed swift	*Draft referral guideline for 14 birds listed as migratory species under the EPBC Act* (Department of the Environment, 2015b).
Greater glider (southern and central)	*Conservation Advice for Petauroides volans (greater glider (southern and central))* (Department of Climate Change, Energy, the Environment and Water, 2022b).
Grey-headed flying fox	*National Recovery Plan for the Grey-headed Flying-fox Pteropus poliocephalus* (Department of Environment and Water, 2021).
Koala	*Conservation Advice for Phascolarctos cinereus (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory* (Department of Agriculture, Water and the Environment, 2022b).
Latham's snipe	*Conservation Advice for Gallinago hardwickii (Latham's snipe)* (Department of Climate Change, Energy, the Environment and Water, 2024a).

Species	Source
Marine turtles	*Recovery Plan for Marine Turtles in Australia* (Department of the Environment and Energy, 2017b).
Northern quoll	*EPBC Act Referral Guidelines for the Endangered Northern Quoll Dasyurus hallucatus* (Department of the Environment, 2016).
Nunivak bar-tailed godwit	*Conservation Advice - Limosa lapponica baueri* (Threatened Species Scientific Committee, 2016d).
Painted honeyeater	*National Recovery Plan for the Painted Honeyeater (Grantiella picta)* (Department of Agriculture, Water and the Environment, 2021b).
Squatter pigeon	*Species SPRAT page and Conservation Advice for Geophaps scripta scripta (*squatter pigeon (southern)) (Threatened Species Scientific Committee, 2015c).
White-throated needletail	*Draft referral guideline for 14 birds listed as migratory species under the EPBC Act* (Department of the Environment, 2015b).
Yellow-bellied glider	*Conservation Advice for Petaurus australis australis (yellow-bellied glider (south-eastern)* (Department of Agriculture, Water, and the Environment, 2022a).

Significant impact assessments were prepared with consideration of the following objectives:

- Australia's obligations under the Biodiversity Convention, the Convention on Conservation of Nature in the South Pacific, the Convention on International Trade in Endangered Species of Wild Fauna and Flora
- Species specific recovery plan or threat abatement plan, where available
- The Bonn Convention
- China-Australia Migratory Bird Agreement
- Japan-Australia Migratory Bird Agreement
- International Agreement–Republic of Korea-Australia Migratory Bird Agreement
- Any international agreement approved under subsection 209(4) of the EPBC Act.

In conducting the significant impact assessments, the following was considered:

- the nature of disturbance (linear, non-linear)
- the scale of disturbance (extent)
- the duration of impact (temporary during construction, permanent)
- the configuration of Project
- the effectiveness of mitigation and management measures.

4.2 Water Resources Methodology

The assessment of hydrology, soils, topography, vegetation clearing, and water quality within and adjacent to the Project Area was based on a combination of baseline data reviews, mapping, and modelling.

Further details on the water resources methodology are provided in the Surface Water Impact Assessment and Water Quality Management Plan, attached as **Appendix D** and **Appendix G** respectively.

4.2.1 Desktop Assessment

A desktop assessment was undertaken including:

- a review of relevant Commonwealth and State legislation, policies, standards and plans relevant to surface water management
- a review of publicly available information relating to the existing surface water environment, climate, topography and drainage, flood history, soil types and characteristics.

4.2.2 Baseline Characterisation

Using information from the desktop assessment, the existing conditions for water resources and related matters were identified including:

- The hydrology of the Project Area was described in detail, including all watercourses, water bodies, and drainage features.
- Water resources were mapped using GIS, LiDAR, and aerial imagery to show their distribution relative to Project infrastructure.
- Soil types were mapped and classified, including erodibility and potential for sedimentation and run-off.
- Topography and drainage lines were mapped with clearly labelled contour intervals.

4.2.3 Water Quality Assessment

The water quality assessment undertook the following steps:

- Identification of relevant water quality objectives for the Calliope River and catchment.
- Identification of water quality indicators e.g. total suspended solids and turbidity, pH, dissolved oxygen, metal(loids), herbicides.
- Identification of end-of-catchment water quality targets in relation to Great Barrier Reef water quality target e.g. Reef 2050 Water Quality Improvement Plan 2017-2022.
- Baseline water quality monitoring approach was determined and site locations identified.

4.2.4 Flood Modelling

A TUFLOW hydrodynamic model was developed to simulate the flow behaviour arriving at the Project Area for the 10%, 1% and 0.2% annual exceedance probability (AEP) events under the current climate and the future climate 2090 projection, Shared Societal Pathway (SSP3) scenario.

Discharges within the Project Area were estimated by applying rainfall directly to the topographic surface in the hydraulic model. Design discharges were determined using the ensemble methodology described in Australian Rainfall Runoff v4.2 guidelines (AR&R v4.2) (Ball, et al., 2019). An ensemble of 10 temporal patterns is modelled for each storm duration to derive a range of estimated peak discharges for storms of different severity, represented by an AEP. The storm duration with the highest median peak discharge of the ensemble is selected, and the temporal pattern that produces the peak discharge just above the ensemble median is used for design event modelling.

The direct rainfall (also known as rain-on-grid) approach was adopted for the assessment. Design rainfall depth data, design losses, and storm pre-burst details were obtained from the ARR Data Hub.

Preliminary TUFLOW hydraulic model runs for a range of durations and temporal patterns were used to identify the critical storm durations for the Project Area and to determine the relevant design storm temporal patterns.

Design storm modelling results were post-processed to derive design flood characteristics (e.g., peak flood depths and extents) for each climate scenario for the existing catchment. The impacts of climate change for each AEP event were assessed by subtracting the current climate event results from the future climate event results. This difference map showed the location and magnitude of predicted climate impacts.

4.2.4.1 Design Rainfall Depths

Design rainfall depths were obtained using the following methodology:

- Design rainfalls based on historic climate, for the 10%, 1% and 0.2% AEP events were obtained from the Design Rainfall Data System based on a single point location at the centroid of the Project Area (BoM, 2016).
- Current climate rainfall estimates were increased in line with the AR&R v4.2 climate change guidance. The increase in rainfall depths increases, depending on duration, by 8% to 32% between historic 2016 IFD's to current climate and by 15% to 25% from 2030 SSP3 to 2090 SSP3.
- Areal reduction factors (ARF) derived for the Project Area's catchment (2,793 km^2) were applied to these design rainfalls. This includes the current and future climate's reduced design rainfall depths for the 10% (1 in 10), 1% (1 in 100) and 0.2% (1 in 500) AEP for durations from 15 minutes to 12 hours.

ARR Data Hub

Recommended design rainfall parameters were provided in the ARR Data Hub portal (ARR, 2024). Key design rainfall parameter values included:

- initial and continuous loss rates
- design storm pre-burst depths
- areal reduction factors
- design storm temporal patterns.

Design Rainfall Losses and Pre-burst Rainfall

The Storm initial loss (IL) and continuing loss (CL) method of accounting for rainfall losses was adopted in accordance with ARR Data Hub recommendations. An IL and a CL were adopted, with median pre-burst depths obtained from the ARR Data Hub used to adjust the initial loss with 1% AEP.

IL and CL were derived by extrapolating between rainfall losses adopted for infrequent events (up to 1% AEP) and the minimum rainfall loss, noting that:

- ILs for infrequent events were derived based on the Probability Neutral Burst ILs provided by ARR Data Hub. This approach results in a unique IL for each duration.
- CLs for infrequent events were derived based on the suggested ARR Data Hub and regional flood study CLs.
- Initial and continuing losses for the infrequent events used to interpolate the 0.5% and 0.2% AEP rainfall losses were identified.

Design Temporal Patterns

Design event hydrology was modelled using the ensemble of temporal patterns approach in accordance with AR&R v4.2 2019 (ARR, 2024). The design temporal patterns were adopted from the areal temporal patterns from AR&R v4.2 2019. Temporal patterns were obtained from the ARR Data Hub based on a point location at the centroid of the catchment. The Australian Rainfall and Runoff guidelines identify 10 temporal patterns, yielding 10 unique design storms for each critical duration and AEP. The model was run using representative temporal patterns for storm durations ranging from 15 minutes to 12 hours for the 10%, 2%, and 1% AEP events. The critical storm duration was identified as the duration that produced the highest median peak discharge among the 10 design storms.

4.2.4.2 Hydraulic Modelling

The 2023-03-AF version of the two-dimensional TUFLOW hydrodynamic model was used to simulate the existing catchment flow behaviour in the study area for the 10%, 1%, and 0.2% AEP events under the current and future (2090, SSP3) climates.

The direct rainfall approach was adopted for the assessment. The TUFLOW hydraulic model was run for durations and temporal patterns to identify the critical storm duration and median temporal pattern within the Project Area.

Topography and Grid Cell Size

Powerlink holds high-resolution LiDAR data along the transmission line corridor. This LiDAR also captured reflections from the existing power lines. Although the transmission corridor was surveyed using LiDAR, the coverage was insufficient for modelling purposes. The regional catchment model was derived from the best available elevation data.

In much of Section D and all of Section E, high-resolution LiDAR was available, which could be combined with the Powerlink LiDAR. To the west of Section D, the regional elevation coverage was often the much coarser Copernicus satellite topography (30 m grid cell).

Efforts were made to use these two very different scale datasets. When setting up the hydraulic model, the two datasets could not be loaded into available memory. Running the model with both datasets combined caused the regional elevation model to struggle to work with the LiDAR data. Various techniques were tried to fix this numerical issue.

A comparison was undertaken of the difference in the modelled results when using both LiDAR and Copernicus data, versus just using the Copernicus dataset only approach.

Ultimately, the modelling approach for the Sections where no regional LiDAR was available was to adopt the available Copernicus data. The Copernicus-only approach ensured that any elevation discrepancies remained relative, and no significant changes in absolute elevation were introduced. Where required, the Copernicus data values were edited to reflect LiDAR drainage paths. A 30 m grid resolution is adequate for basin-wide hydraulic modelling of catchment flows, but introduces limitations regarding elevations and velocities. Due to the usage of this coarse dataset, the modelled outputs for Sections A through C can only be considered as suitable for generating flows and flood extents. The modelled results are not appropriate for calculating peak flood velocities or absolute design elevations.

Boundary Conditions

A rainfall (2d_rf) polygon was applied over the hydraulic model extent, enabling a direct rainfall approach in the assessment.

A normal depth rating curve (HQ) type boundary condition was implemented as the downstream model boundaries. The model boundaries were set well downstream of the Project Area to minimise any influence on predicted flood behaviour near the Project Area. The downstream boundary conditions assumed a normal depth slope of 0.005 metres per metre (m/m) at the main ocean outlet; other areas were typically between 0.002 and 0.06 m/m, with a steeper northern boundary slope of 0.171 m/m. These depth slopes were calculated from the channel slopes extracted from topographic data. This normal depth slope is typical of water-surface slopes.

Hydraulic Structures

No surveyed hydraulic structures were available within the Project Area.

Hydraulic Resistance

The TUFLOW model represents hydraulic resistance using Manning's 'n' values. Analysis of available aerial imagery and land cover mapping identified seven general land-use classifications relevant to the study area. As this was a direct rainfall model, it adopted Manning's 'n' values for each land use classification. These values are typical for models constructed in Southern Queensland.

4.2.5 Impact Identification and Assessment

Potential changes in run-off and hydrology from vegetation clearing, earthworks, and altered drainage were analysed to identify impacts from the Project.

The assessment of impacts follows a systematic risk assessment methodology outlined in Australian Standard/New Zealand Standard (AS/NZS) ISO 31000:2018, *Risk Management—Principles and Guidelines (2009)*. For each GBR MNES, the following process was applied:

- Identify Impact Pathways: Describe the mechanism by which the project activity could affect the MNES. This identifies the vulnerable element and its consequence.
- Characterise the Impact: Define the nature, extent, timing, and likelihood of the impact.
- Assess Significance: Evaluate the impact against the issued PER guidelines. This will analyse the likelihood and consequence ratings.
- Identify Mitigation Measures: Propose specific, measurable actions to avoid, mitigate, or manage the impact; and
- Determine Residual Impact: Re-assess the significance of the impact after the application of mitigation measures.

4.2.6 Mitigation Measures

Based on the identification and assessment of potential impacts from the Project, mitigation measures were identified considering:

- Powerlink's environmental policies, procedures and plans
- industry standard management and mitigation approaches.

This included the development of approaches to:

- collect/monitor baseline water quality data
- manage erosion and run-off from construction sites
- monitor water quality during construction and respond to changes in water quality as a result of the Project.

4.2.7 Policy Alignment

The findings were evaluated against the requirements of the Reef 2050 Water Quality Improvement Plan, the Reef 2050 Long-Term Sustainability Plan, the Water Plan (Calliope River Basin) 2006, and the Fitzroy Region Calliope catchment water quality targets.

4.2.8 Significant Impact Assessment

SIAs for the Great Barrier Reef (GBR) World Heritage property, GBR National Heritage place and the environment of the GBR Marine Park were undertaken in accordance with the *Significant Impact Guidelines 1.1–MNES* (Department of the Environment, 2013a), and have utilised relevant information from the water quality and flooding assessments.

4.3 Cumulative Impact Assessment Methodology

This section presents the methodology undertaken to evaluate the potential for the Project to contribute to broader environmental effects when considered in conjunction with other existing or reasonably foreseeable projects and activities within the region.

Cumulative impacts arise when the incremental effect of a project adds to the effects of other actions, potentially resulting in environmental changes that may be significant, even if individual project impacts appear minor in isolation. The method includes assessment of relevant developments to provide a comprehensive understanding of the long-term and regional implications of the Project.

4.3.1 Projects

The cumulative impact assessment considered all project types and EPBC Act approval status occurring within 20 km of the Project Area, as identified using the PMST Interactive Map. Once projects were identified, the following information was obtained for each project using publicly available information on the EPBC Act referral portal:

- EPBC Act referral reference
- project title
- proximity to the Project Area
- approximate Disturbance Footprint.

4.3.2 Ecology

4.3.2.1 Assessment Grouping

To assess the cumulative impacts on threatened flora and fauna species and migratory species that are known or potentially occurring within the Project Area, a method was adopted that considered the lifecycle of species, spatial and temporal scales relative to the lifecycles of the species and impacts to ecological features relevant to the species.

Table 4.12 provides information on the lifecycle elements, geographic scale, temporal scale and project types considered in the cumulative impact assessment.

Table 4.12 Cumulative Impact Approach

Parameter	Terrestrial Species	Aerial Species
Species grouping rationale	Species with a lifecycle confined to the ground or near ground (including species that spend their lifecycle in trees), cumulative impacts were assessed based on geographic restrictions to their range of movement	Species with a lifecycle including aerial movement for foraging and dispersal, cumulative impacts were assessed based on the lack of geographic restrictions to their movement
Species include	TECs, plants, arboreal mammals, ground-dwelling mammals, reptiles, invertebrates, resident birds and bats	Birds, bats that migrate or undertake some movement as part of their lifecycle (i.e. movement to breeding areas)
Spatial scale	Habitat loss impacts: 20 km from the Project Area	Habitat loss impacts: 20 km from the Project Area Turbine collisions: within Queensland (not applicable to the Project)
Temporal scale	Focus on the construction phase when direct impacts to the species and species habitat is most likely to occur	Focus on the construction and operation phase for direct impacts to individuals
Project type	All projects that have been approved or are currently undergoing assessment through the EPBC Act	All projects that have been approved or are currently undergoing assessment through the EPBC Act

Projects that have not been referred under the EPBC Act have not been included in the assessment due to the absence of publicly available information.

To determine the nature and extent of cumulative impacts, projects were assessed to determine how much habitat clearing would be required, whether the habitat clearance was relevant to the MNES for the Project, the status of the project and the nature of overlap with the Project.

4.3.2.2 Data Acquisition

For terrestrial species, the cumulative impact assessment considered information on the EPBC Act referral portal including:

- details on MNES that overlap with those considered known or potentially occurring, as per **Section 4.1.3**
- area of MNES habitat within the Project's assessment area
- area of MNES habitat within the Project's footprint.

The total area of impact to each relevant MNES was added to the area of impact at this Project. To understand how this cumulative impact compares with the available habitat within the search area (i.e. 20 km for terrestrial species), potential suitable habitat was mapped.

Habitat was mapped via:

- Obtaining the DETSI habitat modelling for flora and fauna species that are known or potentially occurring. As this data has a confidence rating associated with the data, only areas with ≥50% confidence rating was utilised. It should be noted that this model uses pre-clearing data and therefore is likely to overestimate the habitat within the mapped extent.
- The layers were intersected with the SNES dataset (Department of Climate Change, Energy, the Environment and Water, 2024b), to identify the species distribution (noting that the DETSI habitat modelling does not take distribution into account of the modelling). These layers were intersected with a 20 km buffer applied to the Project Area.
- When DETSI habitat modelling was unavailable for some species (e.g. koala) State mapped remnant REs/broad vegetation groups were used as a suitable alternative.

4.3.3 Water Quality

Other projects in the surrounding area (i.e. within 20 km of the Project) were identified and reviewed in regard to the potential for cumulative water quality impacts on GBR MNES values. The outcomes of the Project's water quality impact assessment were considered to determine if the Project contributes to an increased cumulative impact.

5.0 Description of MNES Values

This chapter addresses section 5.1 of the PER Guidelines and identifies and describes the MNES relevant to the Project, including the controlling provisions for the PER:

- Listed threatened species and communities (sections 18 and 18A) [4]
- The world heritage values of a declared World Heritage property (sections 12 and 15A)
- The national heritage values of a National Heritage place (sections 15B and 15C)
- The environment in the Great Barrier Reef Marine Park (sections 24B and 24C).

5.1 MNES in the Project Area and Vicinity

A PMST search (dated July 2025) (**Appendix H**) identified six categories of MNES occurring within or a 10 km buffer of the Project Area (**Table 5.1**).

Table 5.1 PMST Results

MNES	Potential Presence
World Heritage Places	1
National Heritage Places	1
Great Barrier Reef Marine Park	1 (in buffer area only)
Listed Threatened Ecological Communities	11
Listed Threatened Species	91
Listed Migratory Species	66

A likelihood of occurrence assessment for each listed threatened ecological community (TEC), listed threatened species and listed migratory species, as per the criteria detailed in **Section 4.0,** was conducted. The results of this assessment are provided in **Section 5.3** to **Section 5.5**, with detail of the full likelihood of occurrence assessment provided in **Appendix E**.

Descriptions of MNES relating to World Heritage Places, National Heritage Places and the environment of the Great Barrier Reef Marine Park are provided in **Section 5.6** to **Section 5.8**.

5.2 Description of Ecological MNES Values

A description of ecological values that occur within the Project Area is provided to offer context to available habitat and values for the ecological MNES.

5.2.1 Vegetation Communities

Vegetation communities within the Field Survey Extent and Disturbance Footprint have been ground-truthed, while areas outside of the Field Survey Extent but within the Project Area have been based on State Mapped data.

[4] Section 8 provides further detail of the Ecological MNES species distribution, habitat and life history as well as detailed mapping of species' habitat, including areas. Section 4 details the scope, methodology, timing and effort of field surveys.

5.2.1.1 Vegetation Condition

The Project Area comprises a mix of remnant, regrowth and non-remnant vegetation communities, as well as areas of water and the intertidal zone (**Table 5.2**). Non-remnant vegetation dominated the Project Area, comprising approximately 63.4% of the Field Survey Extent.

Table 5.2 Condition of Vegetation Communities

Vegetation Conditions	Area within the Project Area (ha)	Area within the Disturbance Footprint (ha)[4]	Proportion of Vegetation Condition within the Disturbance Footprint (%)
Remnant[1]	4,615.2	106.2	25.5
Regrowth[2]	2,079.9	46.2	11.1
Non-remnant[3]	7,580.4	263.0	63.4
Water	41.2	-	-
Intertidal zone	4.0	-	-

[1]For areas utilising State Mapped data, remnant is synonymous with Category B vegetation.
[2]For areas utilising State Mapped data, regrowth is synonymous with Category C and Category R vegetation.
[3]For area utilising State Mapped data, non-remnant is synonymous with Category X vegetation.
[4]Excludes 2% buffer as further explained in **Section 8.0.**

Lower hills and valleys have been historically cleared for cattle grazing, resulting in non-remnant vegetation. These areas are often dominated by introduced pasture grasses, with scattered paddock trees (often *Eucalyptus crebra* or *Corymbia erythrophloia*).

Large extents of remnant woodland have been retained on steeps hills and rises within the Field Survey Extent. While many of these areas have not been historically cleared (Q Imagery, 2025), it is considered likely that the majority of areas have been subject to thinning at some point.

Regrowth communities throughout the Field Survey Extent varied in form and height. Some patches were 2–5 m in height, while others were up to 10 m tall.

5.2.1.2 Regional Ecosystems

Results of the field surveys confirmed the presence of 23 REs in remnant and regrowth condition within the Field Survey Extent, as well as areas of intertidal zone, non-remnant vegetation and water. Of these, three of the ground-truthed REs were not identified in the State REs mapping within the Project Area. The extent, condition and a description of the ground-truthed REs is provided in **Table 5.3**, along with representative images. The mapped extent of REs within the Disturbance Footprint is shown in **Figure 5.1.**

Despite a wide diversity of vegetation communities, RE 11.11.15 is the dominant community across the Disturbance Footprint, particularly in Sections A to D, occupying approximately 26 % of remnant and regrowth vegetation within the Project Area. This community is dominated by *Eucalypts crebra*, occasionally with *Corymbia erythrophloia*, on metamorphosed sediments and interbedded volcanics. Section E is dominated by two REs:

- RE 12.1.3 comprising mangrove shrubland of *Rhizophora stylosa* (spotted mangrove) and *Ceriops australis* on estuaries.

- RE 12.3.3 composed of remnant or regrowth *Eucalyptus tereticornis* (Queensland blue gum) over native and exotic grasses.

In addition, Section E comprises large areas of cleared, non-remnant vegetation, primarily exotic grasses.

The Vegetation Management Regional Ecosystem Map (Version 13) was reviewed as part of the desktop assessment and was used to map REs outside of the Field Survey Extent but within the Project Area to provide further context to the Project Area. Homogenous and heterogeneous polygons were identified, comprising 46 REs, as well as areas mapped as estuary, non-remnant and water. These REs are also detailed in **Table 5.3**.

Table 5.3 Ground-truthed and State Mapped Vegetation Communities

*Denotes exotic species

RE ID	Vegetation Description		
11.1.3	This RE is described as a sedgeland on marine clay plains.		
VM Act Status	Of Concern		This RE is State mapped only and was not ground-truthed within the Field Survey Extent.
Synonymous TEC	Subtropical and Temperate Coastal Saltmarsh (**Section 5.3.1.2**)		
Extent within Disturbance Footprint (ha)	**Remnant** -	**Regrowth** -	
11.3.2	This RE is described as *Eucalyptus populnea* woodland on alluvial plains.		
VM Act Status	**Of Concern**		This RE is State mapped only and was not ground-truthed within the Field Survey Extent.
Synonymous TEC	Poplar Box Woodland on Alluvial Soils (**Section 5.3**)		
Extent within Disturbance Footprint (ha)	**Remnant** -	**Regrowth** -	

RE ID	Vegetation Description
11.3.4	This RE is described as *Eucalyptus tereticornis* and/or E. spp. woodland on alluvial plains. Within the Field Survey Extent, remnant RE 11.3.4 was dominated by *Blakella tessellaris* across the T1, T2 and T3. *Casuarina cunninghamiana* and *Melaleuca quinquenervia* were prevalent in the T3. The T1, T2 and T3 layer were sparse. The S1 layer was very sparse and was dominated by introduced species, specifically, *Lantana camara**. The ground layer was dominated by *Hyparrhenia rufa** with *Lantana montevidensis** as a co-dominant species. Native species were sparse, including *Lomandra confertifolia*. Regrowth patches of RE 11.3.4 also occurred within the Field Survey Extent. They were typically dominated by *B. tessellaris* and had a sparse canopy to approximately 15 m tall.

VM Act Status	Of Concern	
Synonymous TEC	-	
BioCondition Score	48.0–57.5 / 80.0	
Extent within Disturbance Footprint (ha)	**Remnant** 1.5	**Regrowth** 2.5
Structure–average height (m)	**Remnant** T1–23 T2–15 T3–8 S1–1.5 G–0.5	**Regrowth** T1–15



RE ID	Vegetation Description		
11.3.6	This RE is described as *Eucalypts melanophloia* woodland on alluvial plains.		
VM Act Status	**Least Concern**		This RE is State mapped only and was not ground-truthed within the Field Survey Extent.
Synonymous TEC	**-**		
Extent within Disturbance Footprint (ha)	**Remnant** -	**Regrowth** -	
11.3.11	This RE is described as semi-evergreen vine thicket on alluvial plains.		
VM Act Status	Endangered		This RE is State mapped only and was not ground-truthed within the Field Survey Extent.
Synonymous TEC	Semi-evergreen vine thicket TEC (**Section 5.3.1.1**)		
Extent within Disturbance Footprint (ha)	**Remnant** -	**Regrowth** -	

RE ID	Vegetation Description
11.3.25	This RE is described as *Eucalyptus tereticornis* and/or *E. camaldulensis* woodland fringing drainage lines. Within the Field Survey Extent, remnant RE 11.3.25 occurred in association with streams and was typically dominated by *E. tereticornis*, to 29 m tall at times. Other trees that occurred occasionally in the T2 layer included *Blakella tessellaris* and *Casuarina cunninghamiana*. Regrowth patches of RE 11.3.25 also occurred within the Field Survey Extent. These areas were typically dominated by *E. tereticornis*, with occasional *E. moluccana*, *E. crebra* and *Lophostemon suaveolens*. The canopy was often sparse to very sparse.

VM Act Status	Least Concern	
Synonymous TEC	-	
BioCondition Score	39.0–46.8 / 80.0	
Extent within Disturbance Footprint (ha)	**Remnant** 2.1	**Regrowth** 0.6
Structure–average height (m)	**Remnant** T1–22	**Regrowth** T1–14



RE ID	Vegetation Description		
11.3.25b	This RE is described as *Melaleuca leucadendra* and/or *M. fluviatilis, Nauclea orientalis* open forest. Within the Field Survey Extent, remnant RE 11.3.25b was dominated by *Melaleuca leucadendra*. Subdominant canopy species included *Casuarina cunninghamiana, Eucalyptus tereticornis*, *Lophostemon suaveolens*. The canopy was typically mid-dense. Regrowth patches of 11.3.25b were also present within the Field Survey Extent, also dominated by *Melaleuca leucadendra*.		
VM Act Status	Least Concern		
Synonymous TEC	-		
BioCondition Score	Not available.		
Extent within Disturbance Footprint (ha)	**Remnant** 0.4	**Regrowth** 0.1	
Structure–average height (m)	**Remnant** T1–19	**Regrowth** T1–16	



RE ID	Vegetation Description
11.3.26	This RE is described as *Eucalyptus moluccana* or *E. microcarpa* woodland to open forest on margins of alluvial plains. Within the Field Survey Extent, RE 11.3.26 occurred adjacent streams and drainage lines and was dominated by *E. moluccana*. Sparse *E. crebra*, *E. tereticornis* and *Blakella tessellaris* occurred throughout patches but were not dominant. The canopy varied across patches between sparse and mid-dense. Regrowth patches of RE 11.3.26 also occurred within the Field Survey Extent. The dominant canopy species was *E. moluccana* and the canopy was mid-dense.

VM Act Status	Least Concern	
Synonymous TEC	-	
BioCondition Score	36.5 / 80.0	
Extent within Disturbance Footprint (ha)	**Remnant** 0.8	**Regrowth** -
Structure–average height (m)	**Remnant** T1–20	**Regrowth** T1–11



RE ID	Vegetation Description	
11.3.27f	This RE is described as *Eucalyptus coolabah* and/or *E. tereticornis* open woodland to woodland fringing swamps.	
VM Act Status	Least Concern	This RE is State mapped only and was not ground-truthed within the Field Survey Extent.
Synonymous TEC	Coolibah–Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions (**Section 5.3**)	
Extent within Disturbance Footprint (ha)	**Remnant** - **Regrowth** -	
11.3.29	This RE is described as a *Eucalyptus crebra, E. exserta, Melaleuca* spp. woodland on alluvial plains.	
VM Act Status	Least Concern	This RE is State mapped only and was not ground-truthed within the Field Survey Extent.
Synonymous TEC	-	
Extent within Disturbance Footprint (ha)	**Remnant** - **Regrowth** -	
11.4.3	This RE is described as an *Acacia harpophylla* and/or *Casuarina cristata* shrubby open forest on Cainozoic clay plains.	
VM Act Status	Endangered	This RE is State mapped only and was not ground-truthed within the Field Survey Extent.
Synonymous TEC	Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC (**Section 5.3**)	
Extent within Disturbance Footprint (ha)	**Remnant** - **Regrowth** -	
11.5.2	This RE is described as a *Eucalyptus crebra, Corymbia* spp., with *E. moluccana* woodland on lower slopes of Cainozoic sand plains and/or remnant surfaces.	
VM Act Status	Least Concern	This RE is State mapped only and was not ground-truthed within the Field Survey Extent.
Synonymous TEC	-	
Extent within Disturbance Footprint (ha)	**Remnant** - **Regrowth** -	

RE ID	Vegetation Description		
11.8.3	This RE is described as a semi-evergreen vine thicket on Cainozoic igneous rocks.		
VM Act Status	Of Concern	This RE is State mapped only and was not ground-truthed within the Field Survey Extent.	
Synonymous TEC	Semi-evergreen vine thicket TEC (**Section 5.3.1.1**)		
Extent within Disturbance Footprint (ha)	**Remnant** -	**Regrowth** -	

RE ID	Vegetation Description		
11.8.4	This RE is described as *Eucalyptus melanophloia* woodland to open woodland on Cainozoic igneous rocks. Within the Field Survey Extent, remnant RE 11.8.4 was typically dominated by *E. melanophloia* or occasionally *E. crebra*. *Corymbia erythrophloia* occurred sparsely throughout patches in the T2 and T3. The canopy was mid-dense. *Hibiscus divaricatus* was scattered throughout the understorey. Regrowth patches of RE 11.8.4 also occurred within the Field Survey Extent. Regrowth patches were dominated by a low, sparse canopy of *E. melanophloia* or *C. erythrophloia*. *Cycas megacarpa* is present within this RE.		
VM Act Status	Least Concern		
Synonymous TEC	n/a		
BioCondition Score	50.5–56.0 / 80.0		
Extent within Disturbance Footprint (ha)	**Remnant** 1.3	**Regrowth** 5.5	
Structure–average height (m)	**Remnant** T1–13	**Regrowth** T1–10	
11.9.5	This RE is described as an *Acacia harpophylla* and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks.		
VM Act Status	Endangered		This RE is State mapped only and was not ground-truthed within the Field Survey Extent.
Synonymous TEC	-		
Extent within Disturbance Footprint (ha)	**Remnant** -	**Regrowth** -	



RE ID	Vegetation Description		
11.10.1	This RE is described as a *Blakella citriodora* woodland on coarse-grained sedimentary rocks.		
VM Act Status	Endangered		This RE is State mapped only and was not ground-truthed within the Field Survey Extent.
Synonymous TEC	-		
Extent within Disturbance Footprint (ha)	**Remnant** -	**Regrowth** -	
11.10.3	This RE is described as *Acacia shirleyi* or *A. catenulata* open forest on coarse-grained sedimentary rocks. It occurs on crests and scarps. Within the Field Survey Extent, this RE is dominated by *Acacia rhodoxylon* to 15 m tall. T2 and T3 species include *Hibiscus heterophyllus, Alectryon diversifolius, Acalypha eremorum* and *Cyclophyllum coprosmoides*. Regrowth RE 11.10.3 occurred within the Field Survey Extent and was dominated by *Acacia rhodoxylon* to 11 m tall with a mid-dense canopy.		
VM Act Status	Least Concern		
Synonymous TEC	-		
BioCondition Score	35.0 / 80		
Extent within Disturbance Footprint (ha)	**Remnant** <0.01	**Regrowth** 0.5	
Structure–average height (m)	**Remnant** T1–15	**Regrowth** T1–10	



RE ID	Vegetation Description
11.10.4	This RE is described as *Eucalyptus decorticans*, *Lysicarpus angustifolius* +/- *Eucalyptus* spp., *Corymbia* spp., *Acacia* spp. woodland on coarse-grained sedimentary rocks. Remnant RE 11.10.4 within the Field Survey Extent is dominated by *Eucalyptus decorticans*, over a mid-dense shrubby understorey of vine-thicket and *Acacia* spp.. The groundcover was sparse and comprised native and exotic grasses. Within the Field Survey Extent, regrowth RE 11.10.4 comprised a variety of species. It is often dominated by *Acacia rhodoxylon*, *A. shirleyi* or rarely *A. harpophylla*. *Eucalyptus decorticans* is also present. The shrub layer was typically sparse and lacking diversity. Shrub species present included *Dodonaea triangularis*, *Alectryon diversifolius*, *Cassia brewsteri* and *Carissa ovata*. The ground layer is dominated by exotic grasses specifically *Megathyrsus maximus** and *Cenchrus ciliaris**. Native grasses and forbs are rare and very sparse. *Cossinia australiana* is present in the ecotone within RE 11.10.4.

VM Act Status	Least Concern	
Synonymous TEC	-	
BioCondition Score	41.5 / 80.0	
Extent within Disturbance Footprint (ha)	**Remnant** 0.6	**Regrowth** 0.2
Structure–average height (m)	**Remnant** T1–14	**Regrowth** E–16 T1–9 T2–5 S1–1.5 G–0.3



RE ID	Vegetation Description		
11.10.7	This RE is described as a *Eucalyptus crebra* woodland on coarse-grained sedimentary rocks.		
VM Act Status	Least Concern	This RE is State mapped only and was not ground-truthed within the Field Survey Extent.	
Synonymous TEC	-		
Extent within Disturbance Footprint (ha)	**Remnant** -	**Regrowth** -	
11.10.8	This RE is described as semi-evergreen vine-thicket in sheltered habitats on medium to coarse-grained sedimentary rocks. Within the Field Survey Extent, remnant RE 11.10.8 comprised a variety of species. It was often dominated by *Acacia rhodoxylon*, with emergent *Brachychiton australis*. The shrub layer was typically dense and diverse. Some of the species present included *Apowollastonia spilanthoides*, *Jasminum didymum*, *Erythroxylum* sp. (Splityard Creek) and *Clematicissus opaca*. Regrowth RE 11.10.8 was also recorded within the Field Survey Extent. This patch was dominated by *Acacia fasciculifera, Diospyros humilis* and *Alectryon diversifolius*. *Cycas megacarpa* was recorded within this RE.		
VM Act Status	Of Concern		
Synonymous TEC	-		
BioCondition Score	Not available.		
Extent within Disturbance Footprint (ha)	**Remnant** 0.1	**Regrowth** 0.1	
Structure–average height (m)	**Remnant** T1–15 T2–8 T3–4 S1–1.5 G–0.2	**Regrowth** Not available.	

RE ID	Vegetation Description
11.10.13	This RE is described as a *Eucalyptus* spp. and/or *Corymbia* spp. open forest on scarps and sandstones tablelands. Within the Field Survey Extent, remnant RE 11.10.13 was typically dominated by *E. cloeziana* or *Corymbia trachyphloia*. Other eucalypts occurred occasionally as canopy species, including *E. melanoleuca* and *Blakella citriodora*. *Acacia leptostachya* and *A. pedleyi* were prominent within the T2 layer. The shrub layer was typically sparse, approximately 10-30% cover. The ground layer ranged from sparse to dense, often comprising *Themeda triandra*. Evidence of past fire that in turn produced abundant understorey acacia regrowth. Regrowth patches of RE 11.10.13 also occurred within the Field Survey Extent. These areas typically comprised a sparse canopy of *E. melanoleuca* and *E. cloeziana*, however, some areas were dominated by *A. leptostachya*. *Cycas megacarpa* and *Samadera bidwillii* are present in remnant RE 11.10.3.

VM Act Status	Least Concern	
Synonymous TEC	-	
BioCondition Score	38.5–47.0 / 80	
Extent within Disturbance Footprint (ha)	**Remnant** 9.9	**Regrowth** 2.3
Structure–average height (m)	**Remnant** T1–17 T2–11 S1–1 G–0.2	**Regrowth** T1–12



RE ID	Vegetation Description		
11.11.3	This RE is a *Blakella citriodora*, *Eucalyptus crebra*, *E. acmenoides* open forest on old sedimentary rocks with varying degrees of metamorphism and folding. It occurs on coastal ranges. Within the Field Survey Extent, remnant RE 11.11.3 was dominated by *E. crebra* or *B. citriodora* and had a sparse cover. *C. erythrophloia* occurred occasionally throughout patches. Regrowth patches of RE 11.11.3 also occurred within the Field Survey Extent, which typically comprised a very sparse canopy of *B. citriodora* and *E. crebra*. *Cycas megacarpa* was recorded within this RE.		
VM Act Status	Least Concern		
Synonymous TEC	-		
BioCondition Score	54.5–55.0 / 80.0		
Extent within Disturbance Footprint (ha)	**Remnant** 15.7	**Regrowth** 4.2	
Structure–average height (m)	**Remnant** T1–19	**Regrowth** T1–13	



RE ID	Vegetation Description	
11.11.3c	This RE is described as a *Eucalyptus moluccana* woodland on lower slopes in association with *E. crebra* +/- *Blakella citriodora* +/- *Eucalyptus* spp. Usually on lower slopes or low rises of Devonian-Carboniferous metasediments, on clay soils. Within the Field Survey Extent, remnant RE 11.11.3c was dominated by *E. moluccana* and *B. citriodora*. Occasionally, *E. crebra* also occurred in the canopy.	
VM Act Status	Least Concern	
Synonymous TEC	-	
BioCondition Score	Not available.	
Extent within Disturbance Footprint (ha)	**Remnant** 1.1	**Regrowth** -
Structure–average height (m)	**Remnant** T1–20	**Regrowth** -



RE ID	Vegetation Description		
11.11.4	This RE is described as a *Eucalypts crebra* woodland on old sedimentary rocks with varying degrees of metamorphism and folding. Within the Field Survey Extent, RE 11.11.4 was dominated by *Blakella citriodora* with frequent *E. crebra* and rare *E. tereticornis*. The T1 layers was dense and the T2, T3 and S1 layers were sparse. The S1 layer was very sparse. The T3 and shrub layers were dominated by *Acacia disparrima*, *A. leiocalyx* and *Planchonia careya*. The S2 layer typically comprised *A. fasciculifera*. The ground layer comprised *Lomandra longifolia*, *Flemingia parviflora*, *Desmodium rhytidophyllum* and *Praxelis clematidea**. Regrowth patches of RE 11.11.4 also occurred within the Field Survey Extent, which typically comprised a sparse canopy of *B. citriodora* and *C. intermedia*. Occasional patches of low, mid-dense (2-4 m) *Acacia disparrima* regrowth were present.		
VM Act Status	Least Concern		
Synonymous TEC	-		
BioCondition Score	45.5–57.0 / 80.0		
Extent within Disturbance Footprint (ha)	**Remnant** 8.0	**Regrowth** 2.1	
Structure–average height (m)	**Remnant** T1–20 T2–13 T3–5 S1–2 S2–0.8 G–0.3	**Regrowth** T1–12	
11.11.4a	This RE is described as a *Eucalyptus tereticornis* dominated woodland.		
VM Act Status	Least Concern		This RE is State mapped only and was not ground-truthed within the Field Survey Extent.
Synonymous TEC	-		
Extent within Disturbance Footprint (ha)	**Remnant** -	**Regrowth** -	

RE ID	Vegetation Description
11.11.4c	This RE is described as a *Eucalyptus moluccana* dominated woodland, occurring on undulating rises and low hills, on moderately to strongly deformed and metamorphised sediments and interbedded volcanics and Permian sediments. Within the Field Survey Extent, remnant RE 11.11.4c was dominated by a sparse canopy of *Eucalyptus moluccana*, with occasional *Eucalyptus crebra* and *Blakella citriodora*. The shrubs layer comprised *Atalaya hemiglauca, Acacia* sp., *Elaeodendron australe* and *Carissa ovata*. *Lantana camara** was sparse throughout the shrub layer. The ground layer typically comprised *Cenchrus ciliaris**. Regrowth RE 11.11.4c was also present within the Field Survey Extent. The canopy was dominated by *E. moluccana*, and the T1 and T2 layers comprised *Lophostemon suaveolens, Corymbia intermedia* and *E. crebra*. The shrub layer comprised *Pittosporum spinescens* and *Acacia disparrima*. The ground layer was dominated by *Heteropogon contortus* and *Aristida calycina*.

VM Act Status	Least Concern	
Synonymous TEC	-	
BioCondition Score	47.0–52.5 / 80.0	
Extent within Disturbance Footprint (ha)	**Remnant** 1.6	**Regrowth** 0.8
Structure–average height (m)	**Remnant** T1–18	**Regrowth** E–21 T1–15 T2 - 11



RE ID	Vegetation Description		
11.11.5	This RE is described as a microphyll vine forest +/- *Araucaria cunninghamii* on old sedimentary rocks with carrying degrees of metamorphism and folding.		
VM Act Status	Least Concern		This RE is State mapped only and was not ground-truthed within the Field Survey Extent.
Synonymous TEC	-		
Extent within Disturbance Footprint (ha)	**Remnant** -	**Regrowth** -	
11.11.10	This RE is described as a *Eucalyptus melanophloia* woodland on deformed and metamorphised sediments and interbedded volcanics. Within the Field Survey Extent, this RE occurred as regrowth vegetation. It was typically dominated by *Corymbia erythrophloia* and *Eucalyptus melanophloia*. A shrub layer was occasionally present, comprising *Brachychiton populnea*, *Denhamia oleaster* and *Petalostigma pubescens*. The ground layer comprised native grasses.		
VM Act Status	Of Concern		
Synonymous TEC	-		
BioCondition Score	45.0 / 80.0		
Extent within Disturbance Footprint (ha)	**Remnant** -	**Regrowth** 4.5	
Structure–average height (m)	**Remnant** -	**Regrowth** T1–11	



RE ID	Vegetation Description		
11.11.14	This RE is described as an *Acacia harpophylla* open forest on deformed and metamorphosed sediments and interbedded volcanics.		
VM Act Status	Endangered		This RE is State mapped only and was not ground-truthed within the Field Survey Extent.
Synonymous TEC	Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC (**Section 5.3**)		
Extent within Disturbance Footprint (ha)	**Remnant** -	**Regrowth** -	

RE ID	Vegetation Description
11.11.15	This RE is described as a *Eucalyptus crebra* woodland to open woodland on deformed and metamorphised sediments and interbedded volcanics. Within the Field Survey Extent, remnant RE 11.11.15 was dominated by *E. crebra* across the T1, T2 and T3 layers. The T1 layer was typically sparse and the T2 and S1 layers were very sparse. The shrub layer comprised *Acacia decora* and *Lantana camara** with occasional *Opuntia tomentosa**. The ground layer was diverse and comprised a variety of native and introduced herbs and graminoids, including *Heteropogon contortus*, *Themeda triandra*, *Melinis repens** and *Pterocaulon sphacelatum*. Regrowth patches of this RE also occurred within the Field Survey Extent, which were dominated by a sparse to very sparse canopy of *E. crebra* and *C. erythrophloia*. The T2, T3 and S1 layers were also very sparse. The ground layer comprised *Cymbopogon refractus*, *Stylosanthes scabra**, *Melinis repens** and *Bidens pilosa**. *Cycas megacarpa* was recorded within this RE.

VM Act Status	Least Concern	
Synonymous TEC	-	
BioCondition Score	48.0–59.0 / 80	
Extent within Disturbance Footprint (ha)	**Remnant** 27.1	**Regrowth** 12.6
Structure–average height (m)	**Remnant** T1–14 T2–9 S1–1.5 S2–0.8 G–0.3	**Regrowth** T1–11 T2–6 T3–3 S1–1



RE ID	Vegetation Description
11.11.18	This RE is described as semi-evergreen vine thicket. It occurs on undulating plains, rises and gentle slopes of ranges formed on moderately to strongly deformed and metamorphised sediments and inter bedded volcanics. Within the Field Survey Extent, remnant RE 11.11.18 occurred as a low vine-ticket, with very sparse, emergent *Eucalyptus crebra*. The T1 and T2 were diverse, comprising *Terminalia porphyrocarpa*, *Secamone elliptica, Alectryon tomentosus* and *Alphitonia excelsa*. The T1 layer was dense, the T2 layer was mid-dense and the S1 layer was sparse. The S1 and S2 layers comprised *Carissa lanceolata, Alyxia ruscifolia, Cassytha filiformis* and *Pittosporum spinescens*. The ground layer was sparse and comprised *Gahnia aspera, Ancistrachne uncinata* and *Lantana montevidensis**. Regrowth RE 11.11.18 also occurred within the Field Survey Extent. It comprised a mid-dense canopy of *Alphitonia excelsa* and *Secamone elliptica*. *Cycas megacarpa* was recorded within this RE.

VM Act Status	Endangered	
Synonymous TEC	Semi-evergreen Vine Thicket (**Section 5.3.1.1**)	
BioCondition Score	37.3–40.3 / 80.0	
Extent within Disturbance Footprint (ha)	**Remnant** 1.5	**Regrowth** 0.6
Structure–average height (m)	**Remnant** E–13 T1–8 T2–4 S1–1.5 S2–0.6 G–0.2	**Regrowth** T1–6



RE ID	Vegetation Description		
11.12.1	This RE is described as a *Eucalyptus crebra* woodland on igneous rocks. Within the Field Survey Extent, remnant RE 11.12.1 was dominated by *E. crebra*, with occasional *Corymbia erythrophloia*. Rarely, Blakella *tessellaris* or *B. citriodora* was present in patches. Regrowth RE 11.12.1 also occurred within the Field Survey Extent. It comprised a very sparse canopy of *C. erythrophloia* and *E. crebra*. *Cycas megacarpa* was recorded within this RE.		
VM Act Status	Least Concern		
Synonymous TEC	-		
BioCondition Score	34.0–47.0 / 80.0		
Extent within Disturbance Footprint (ha)	**Remnant** 0.9	**Regrowth** 6.7	
Structure–average height (m)	**Remnant** T1–11	**Regrowth** T1–8	
11.12.2	This RE is described as a *Eucalyptus melanophloia* woodland on igneous rocks.		
VM Act Status	Least Concern		This RE is State mapped only and was not ground-truthed within the Field Survey Extent.
Synonymous TEC	-		
Extent within Disturbance Footprint (ha)	**Remnant** -	**Regrowth** -	



RE ID	Vegetation Description		
11.12.3	This RE is described as a *Eucalyptus crebra, E. tereticornis* and *Angophora leiocarpa* woodland on igneous rocks especially granite.		
VM Act Status	Least Concern		This RE is State mapped only and was not ground-truthed within the Field Survey Extent.
Synonymous TEC	-		
Extent within Disturbance Footprint (ha)	**Remnant** -	**Regrowth** -	
11.12.6	This RE is described as a *Blakella citriodora* open forest on igneous rocks (granite). Within the Field Survey Extent, remnant RE 11.12.6 was dominated by *B. citriodora* and *Eucalyptus crebra*, with *Angophora leiocarpa* occurring occasionally as a co-dominant. *C. erythrophloia* also occurred occasionally. *Cycas megacarpa, Sida hackettiana* and *Psydrax odorata* occurred frequently in the shrub layer. The ground layer comprised *Heteropogon contortus*, *Cymbopogon refractus* and *Lomandra confertifolia*. Regrowth patches of RE 11.12.6 were also present within the Field Survey Extent, which were also dominated by *B. citriodora*. *Cycas megacarpa* was recorded within this RE.		
VM Act Status	Least Concern		
Synonymous TEC	-		
BioCondition Score	59.5 / 80.0		
Extent within Disturbance Footprint (ha)	**Remnant** 8.8	**Regrowth** 0.3	
Structure–average height (m)	**Remnant** T1–20	**Regrowth** T1–22	



RE ID	Vegetation Description		
11.12.17	This RE is described as a *Eucalyptus populnea* woodland on igneous rocks, colluvial lower slopes. Regrowth patches of RE 11.12.17 occurred within the Field Survey Extent. The T1 layer of the regrowth patches was typically sparse. One regrowth patch was dominated by *E. populnea* with occasional *E. tereticornis*. Other patches were dominated by *E. crebra*. The T2, T3 and S1 layers were very sparse. The shrub layer comprised *Lantana camara**.		
VM Act Status	Endangered		No image available.
Synonymous TEC	-		
BioCondition Score	Not available.		
Extent within Disturbance Footprint (ha)	**Remnant** -	**Regrowth** 1.9	
Structure–average height (m)	**Remnant** -	**Regrowth** T1–17 T2–11 T3–6 S1–1 G–0.3	

RE ID	Vegetation Description		
12.1.2	This RE is described as saltpan vegetation including grassland, herbland and sedgeland on marine clay plans. RE 12.1.2 occurred in Section E of the Field Survey Extent. It occurred as a samphire grassland, dominated by *Sporobolus virginicus*, with occasional *Fimbristylis ferruginea*. Exotic grasses and forbs were sparse but prevalent throughout this vegetation community.		
VM Act Status	Least Concern		
Synonymous TEC	Subtropical and Temperate Coastal Saltmarsh (**Section 5.3.1.2**)		
BioCondition Score	25.0–47.0 / 30.0		
Extent within Disturbance Footprint (ha)	**Remnant** 0.1	**Regrowth** 0.2	
Structure–average height (m)	**Remnant** G–0.3	**Regrowth** G–0.3	



RE ID	Vegetation Description
12.1.3	This RE is described as a mangrove shrubland to low closed forest on marine clay plains and estuaries. Remnant RE 12.1.3 occurred within the Field Survey Extent as a low, open woodland, typically with >70% cover. A variety of mangrove species were present. *Avicennia marina, Rhizophora stylosa* and *Ceriops australis* were typically dominant. There were also occasional occurrences of *Lumnitzera racemosa*.

VM Act Status	Least Concern	
Synonymous TEC	-	
BioCondition Score	52.0–58.5 / 65.0	
Extent within Disturbance Footprint (ha)	**Remnant** -	**Regrowth** 0.2
Structure–average height (m)	**Remnant** T1–5	**Regrowth** n/a



RE ID	Vegetation Description		
12.3.3	This RE is described as a *Eucalyptus tereticornis* woodland on Quaternary alluvium. Within the Field Survey Extent, remnant areas of RE 12.3.3 was dominated by *E. tereticornis* with occasional *E. crebra*. The T1 layer was mid-dense and the T2, T3 and S1 layers were very sparse. *Melaleuca quinquenervia* occurred in the T3 and shrub layer, alongside *Acacia disparrima*. The ground layer was typically dominated by introduced species, including *Melinis repens**, *Megathyrsus maximus** and *Macroptilium atropurpureum**, however native species were also present, including *Capillipedium spicigerum* and *Breynia oblongifolia*. The Field Survey Extent also contained patches of regrowth RE 12.3.3. These patches were typically dominated by *E. tereticornis*, with *E. crebra* as a co-dominant canopy species. The canopy cover was sparse.		
VM Act Status	Endangered		
Synonymous TEC	Subtropical eucalypt floodplain forest and woodland (**Section 5.3.1.3**)		
BioCondition Score	31.5–57.0 / 80.8		
Extent within Disturbance Footprint (ha)	**Remnant** 13.1	**Regrowth** 0.4	
Structure–average height (m)	**Remnant** T1–16 T2–12 T3–5 S1–1.5 G–0.4	**Regrowth** T1–14	



RE ID	Vegetation Description	
12.3.7	This RE is described as a *Eucalyptus tereticornis, Casuarina cunninghamiana* subsp. *cunninghamiana* +/- *Melaleuca* spp. fringing woodland.	
VM Act Status	Least Concern	This RE is State mapped only and was not ground-truthed within the Field Survey Extent.
Synonymous TEC	Subtropical eucalypt floodplain forest and woodland (**Section 5.3.1.3**)	
Extent within Disturbance Footprint (ha)	**Remnant** - **Regrowth** -	
12.3.8	This RE is described as swamps with *Cyperus* spp., *Schoenoplectus* spp. and *Eleocharis* spp.	
VM Act Status	Of Concern	This RE is State mapped only and was not ground-truthed within the Field Survey Extent.
Synonymous TEC	-	
Extent within Disturbance Footprint (ha)	**Remnant** - **Regrowth** -	
12.3.12	This RE is described as *Eucalyptus latisinensis* or *E. exserta, Melaleuca viridiflora* var. *viridiflora* woodland on alluvial plains.	
VM Act Status	Least Concern	This RE is State mapped only and was not ground-truthed within the Field Survey Extent.
Synonymous TEC	-	
Extent within Disturbance Footprint (ha)	**Remnant** - **Regrowth** -	
12.5.1	This RE is described as an open forest complex with *Blakella citriodo*ra subsp. *variegata* on subcoastal remnant Tertiary surfaces. Usually occurs on deep red soils.	
VM Act Status	Least Concern	This RE is State mapped only and was not ground-truthed within the Field Survey Extent.
Synonymous TEC	-	
Extent within Disturbance Footprint (ha)	**Remnant** - **Regrowth** -	

RE ID	Vegetation Description
12.11.6	This RE is described as a *Blakella citriodora* subsp. *variegata*, *Eucalyptus crebra* woodland on metamorphics +/- interbedded volcanics. Within the Field Survey Extent, RE 12.11.6 occurred in remnant patches, dominated by *B. citriodora* and *E. crebra*. Occasionally, *E. acmenoides* was present. The T1 and T2 layers were mid-dense and the T3 and S1 layers were very sparse. The shrub layers comprised *Jasminum simplicifolium* subsp. *simplicifolium, Alphitonia excelsa* and *Acacia fasciculifera*. The ground layer comprised native and introduced herbs and graminoids, including *Arundinella nepalensis, Melinis repens**, *Passiflora suberosa** and *Cyanthillium cinereum*.
VM Act Status	Least Concern
Synonymous TEC	-
BioCondition Score	60.0–66.5 / 80.0
Extent within Disturbance Footprint (ha)	**Remnant** 11.6 **Regrowth** -
Structure–average height (m)	**Remnant** T1–20 T2–11 T3–5 S1–2 S2–0.8 G–0.3 **Regrowth** -



12.11.7	This RE is described as *Eucalyptus crebra* woodland on metamorphics +/- interbedded volcanics.
VM Act Status	Least Concern
Synonymous TEC	-
Extent within Disturbance Footprint (ha)	**Remnant** - **Regrowth** -

This RE is State mapped only and was not ground-truthed within the Field Survey Extent.

RE ID	Vegetation Description		
12.11.14	This RE is described as a *Eucalyptus crebra, E. tereticornis, Corymbia intermedia* woodland on metamorphics +/- interbedded volcanics.		
VM Act Status	Of Concern		This RE is State mapped only and was not ground-truthed within the Field Survey Extent.
Synonymous TEC	-		
Extent within Disturbance Footprint (ha)	**Remnant** -	**Regrowth** -	
12.11.17	This RE is described as a *Eucalyptus acmenoides* or *E. portuensis* open forest on metamorphics +/- interbedded volcanics.		
VM Act Status	Of Concern		This RE is State mapped only and was not ground-truthed within the Field Survey Extent.
Synonymous TEC	-		
Extent within Disturbance Footprint (ha)	**Remnant** -	**Regrowth** -	
12.11.18	This RE is described as a *Eucalyptus moluccana* woodland on metamorphics +/- interbedded volcanics.		
VM Act Status	Least Concern		This RE is State mapped only and was not ground-truthed within the Field Survey Extent.
Synonymous TEC	-		
Extent within Disturbance Footprint (ha)	**Remnant** -	**Regrowth** -	

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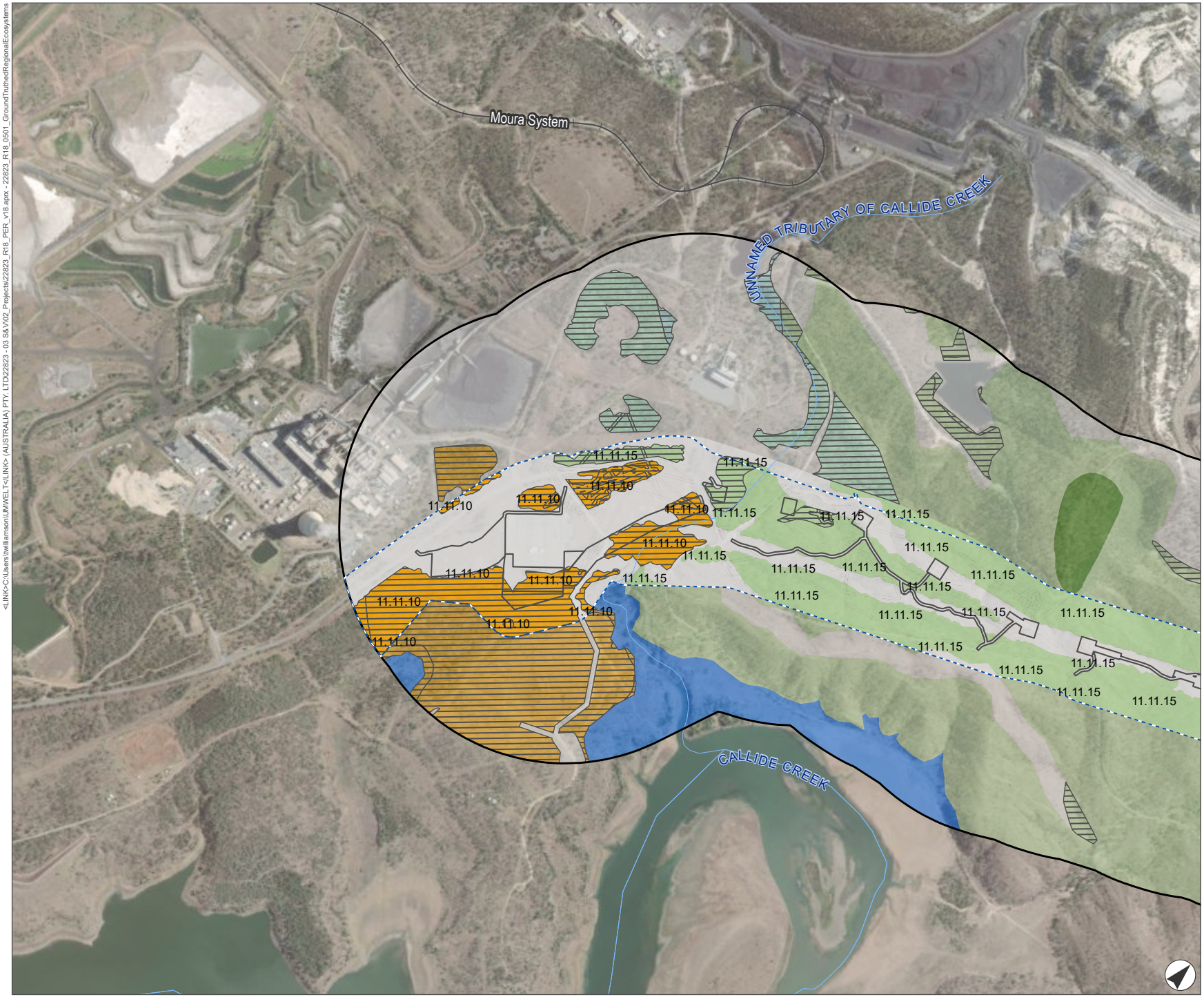


FIGURE 5.1-1

Ground-truthed Regional Ecosystems

Legend

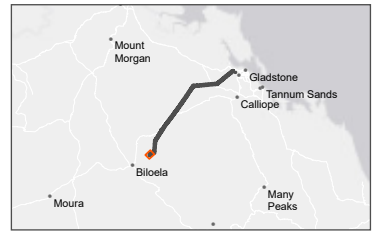
- Railway
- Watercourse
- Field Survey Extent
- Project Area
- Disturbance Footprint
- Regrowth

Ground-truthed Regional Ecosystems

- 11.11.10
- 11.11.15
- Non-remnant

State Mapped Regional Ecosystems

- 11.8.4
- 11.9.5
- 11.10.7
- 11.10.13
- 11.11.10
- 11.11.15
- Non-remnant
- Water



0 0.5 1

Kilometres

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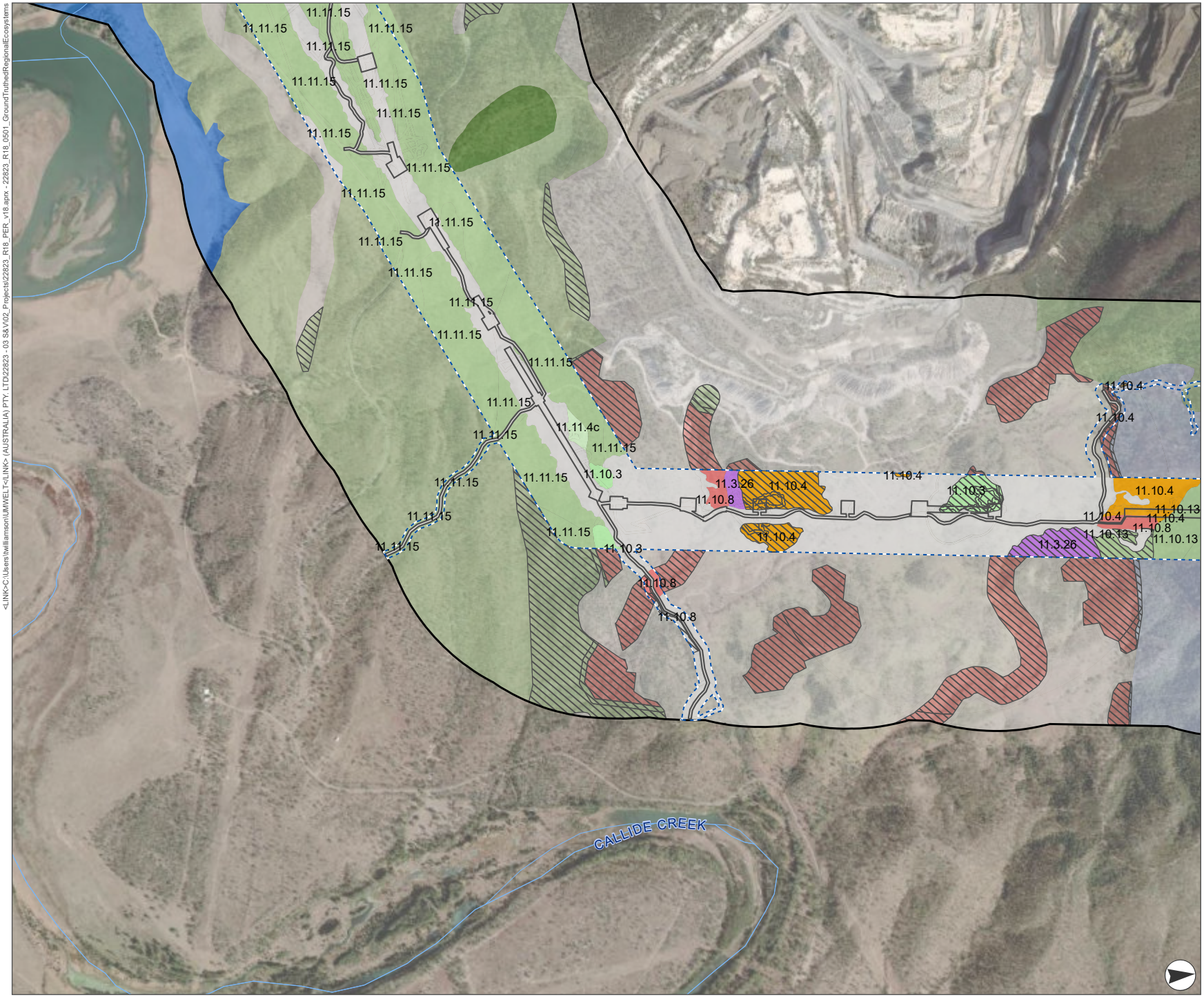


FIGURE 5.1-2

Ground-truthed Regional Ecosystems

Legend

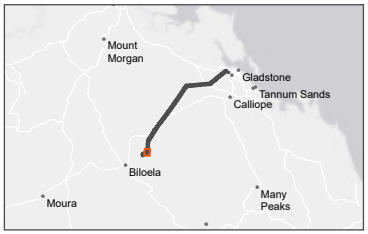
- Watercourse
- Field Survey Extent
- Project Area
- Disturbance Footprint
- Regrowth

Ground-truthed Regional Ecosystems

- 11.10.3
- 11.3.26
- 11.10.4
- 11.10.8
- 11.10.13
- 11.11.4c
- 11.11.15
- Non-remnant

State Mapped Regional Ecosystems

- 11.8.3
- 11.8.4
- 11.10.8
- 11.10.13
- 11.11.15
- Non-remnant
- Water



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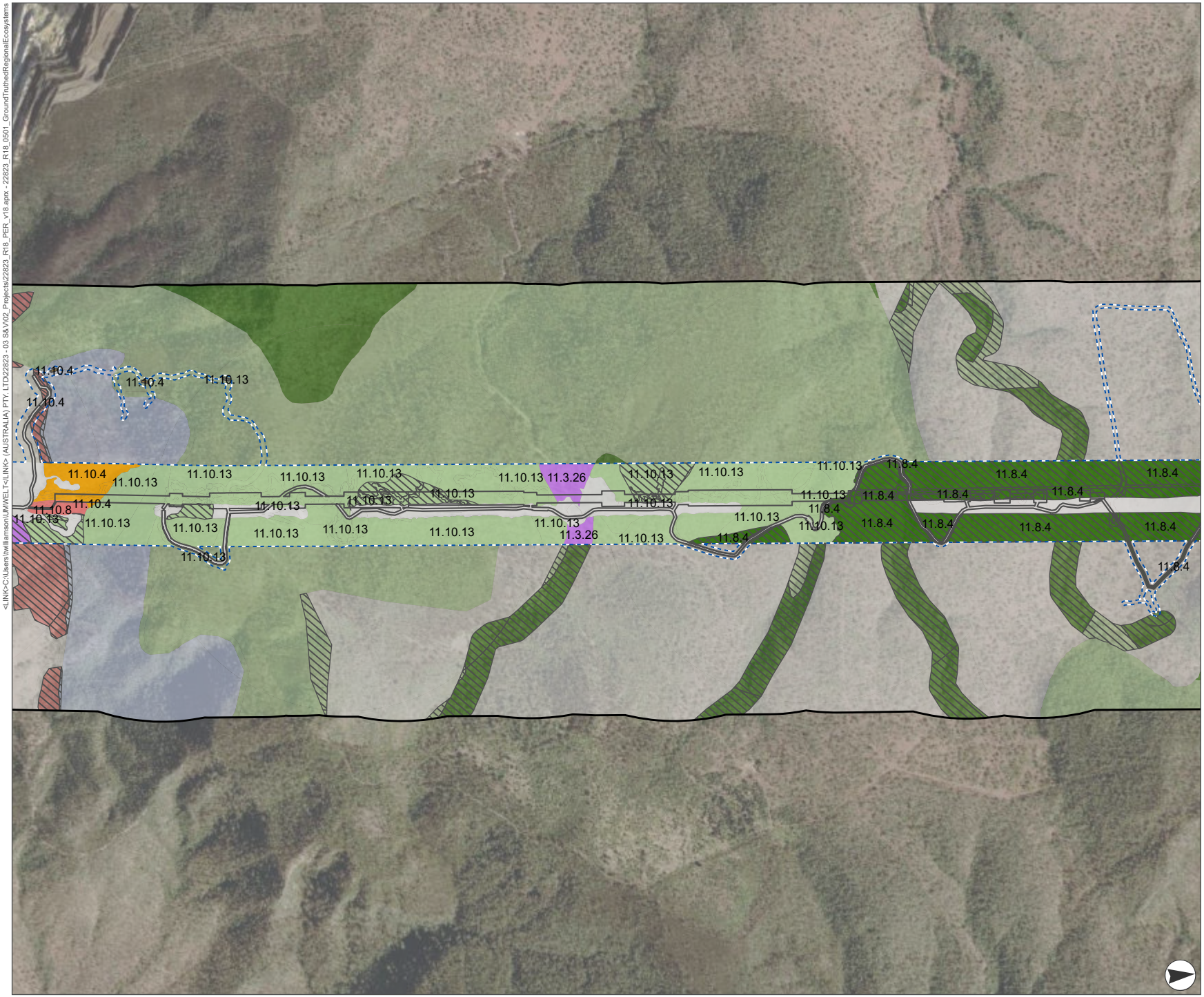


FIGURE 5.1-3

Ground-truthed Regional Ecosystems

Legend

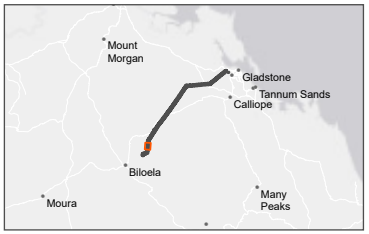
- Field Survey Extent
- Project Area
- Disturbance Footprint
- Regrowth

Ground-truthed Regional Ecosystems

- 11.3.26
- 11.8.4
- 11.10.4
- 11.10.8
- 11.10.13
- Non-remnant

State Mapped Regional Ecosystems

- 11.8.3
- 11.8.4
- 11.10.8
- 11.10.13
- Non-remnant



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Kilometres

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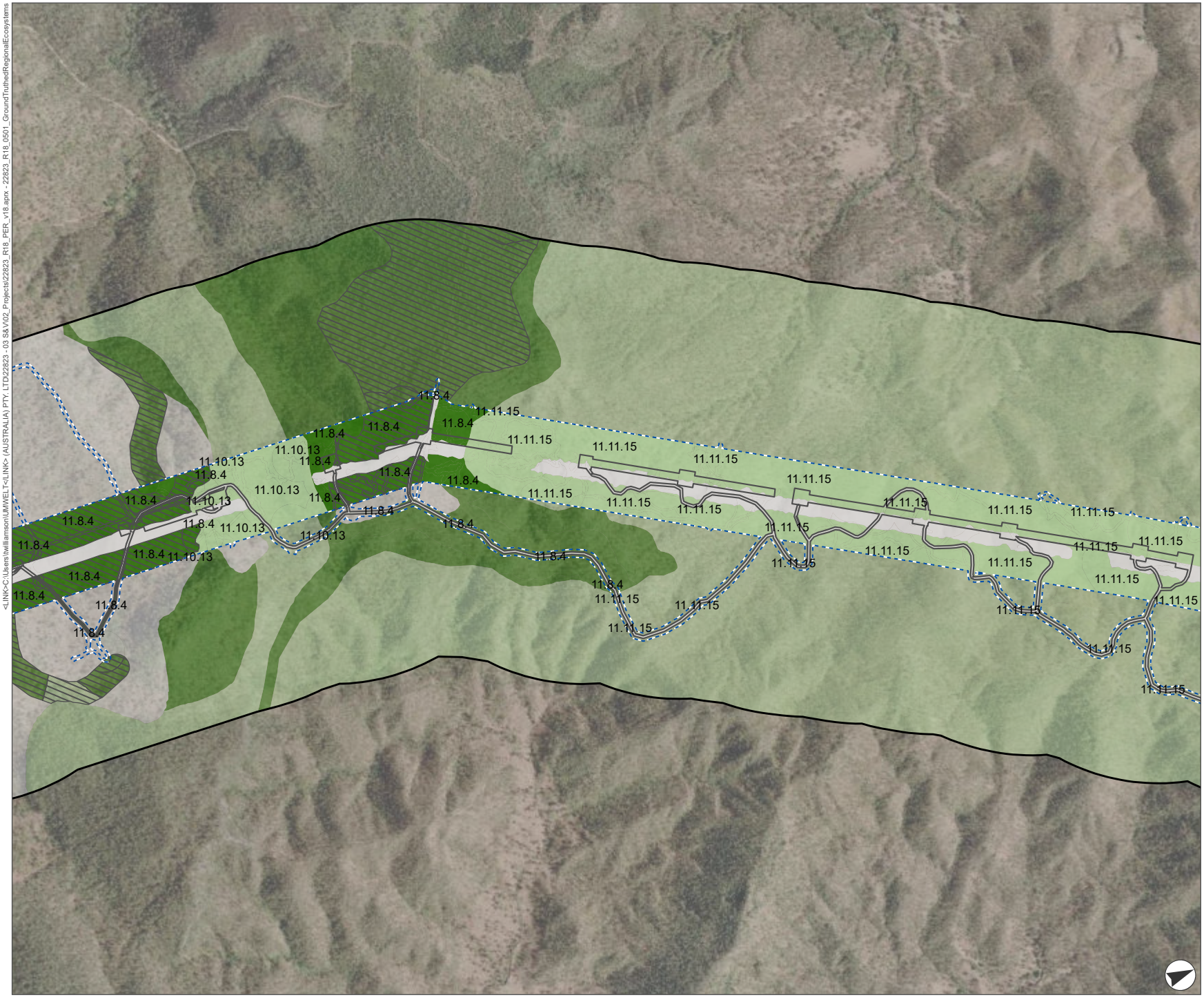


FIGURE 5.1-4

Ground-truthed Regional Ecosystems

Legend

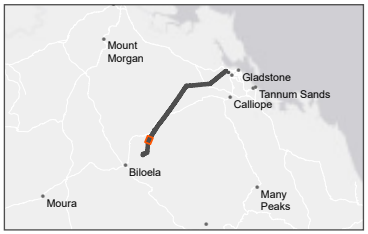
- Field Survey Extent
- Project Area
- Disturbance Footprint
- Regrowth

Ground-truthed Regional Ecosystems

- 11.8.4
- 11.10.13
- 11.11.15
- Non-remnant

State Mapped Regional Ecosystems

- 11.8.4
- 11.10.13
- 11.11.15
- Non-remnant



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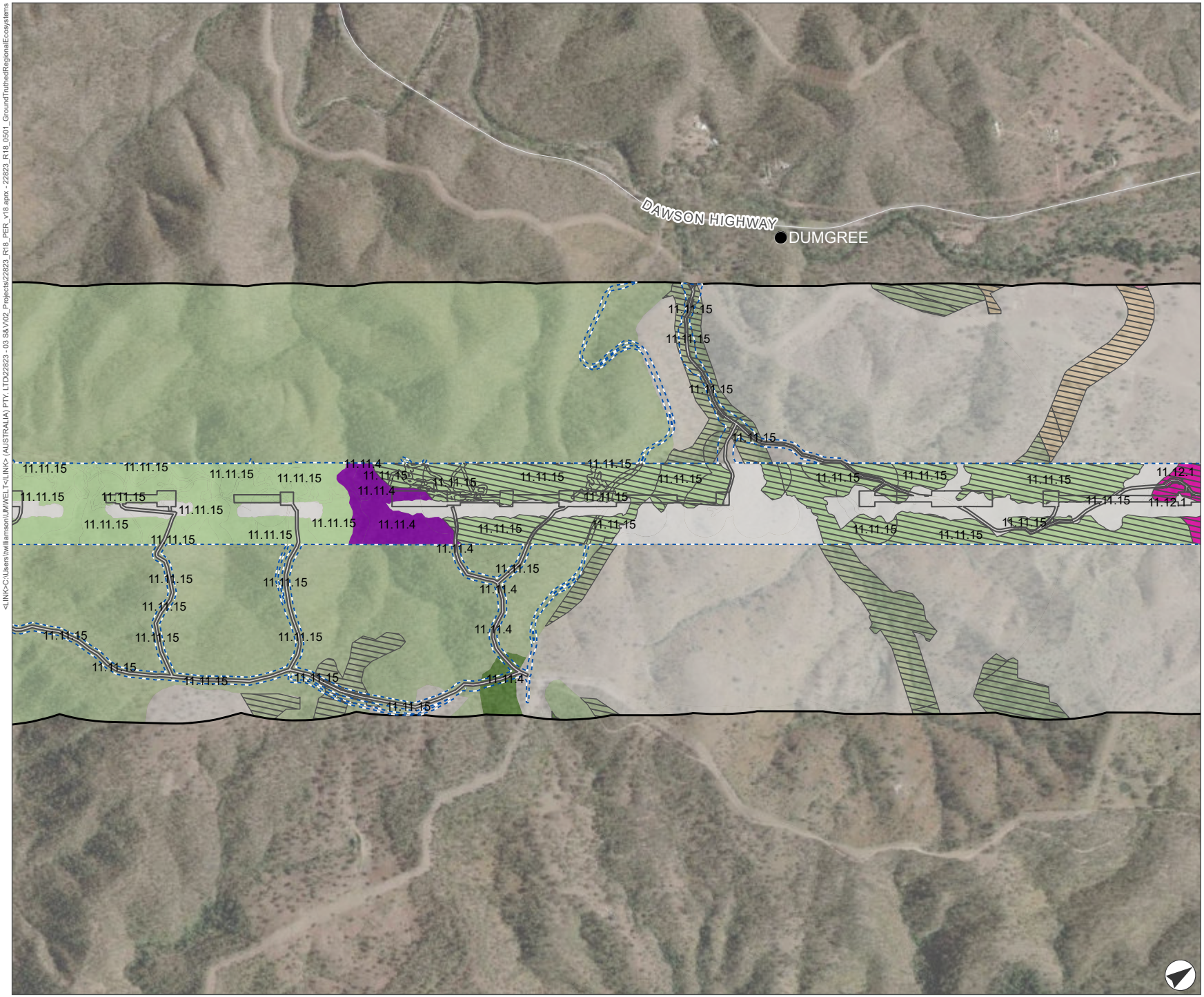


FIGURE 5.1-5

Ground-truthed Regional Ecosystems

Legend

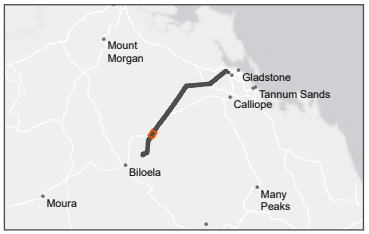
- Roads
- Field Survey Extent
- Project Area
- Disturbance Footprint
- Regrowth

Ground-truthed Regional Ecosystems

- 11.11.4
- 11.11.15
- 11.12.1
- Non-remnant

State Mapped Regional Ecosystems

- 11.3.4
- 11.8.4
- 11.11.15
- 11.12.3
- Non-remnant



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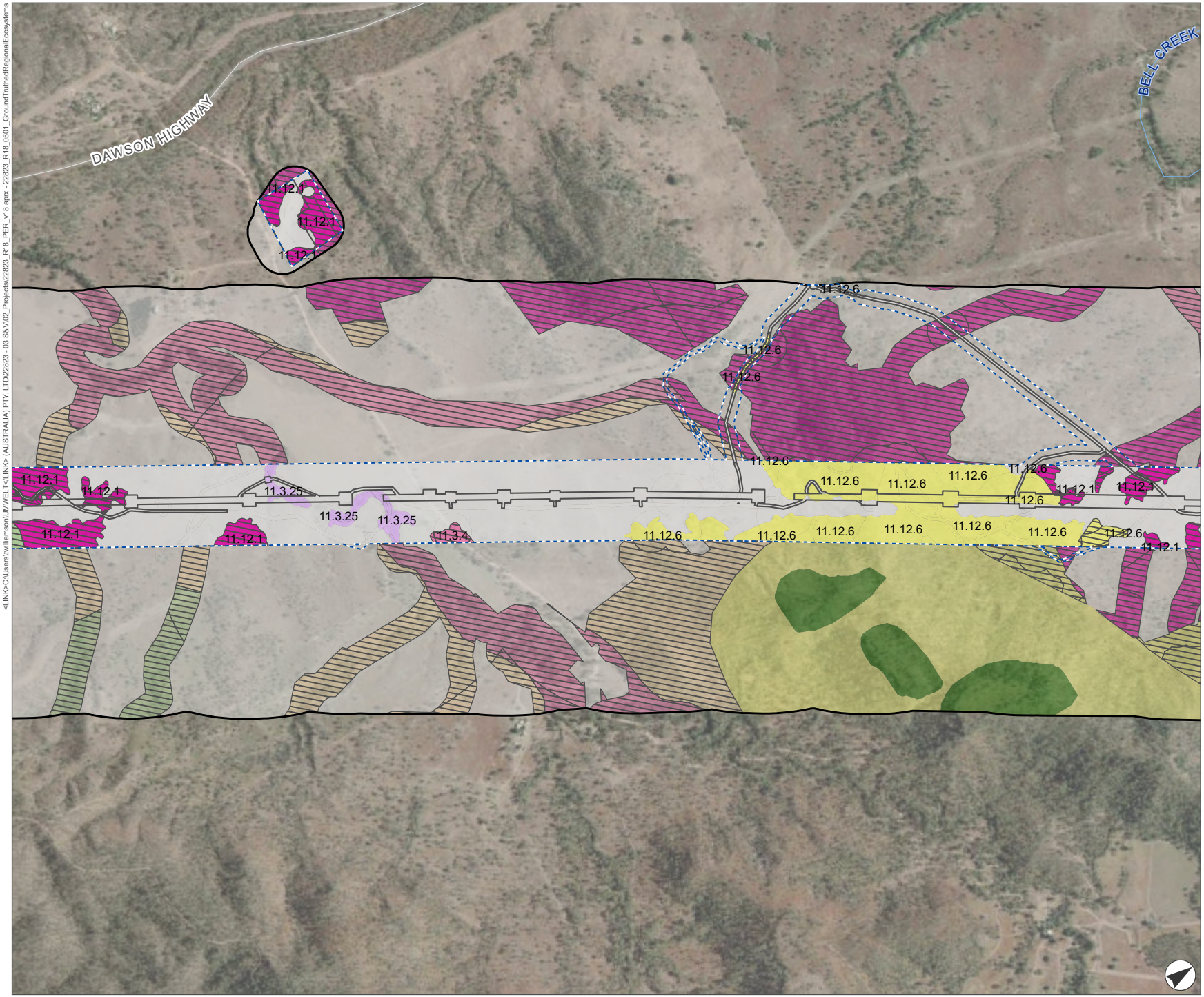


FIGURE 5.1-6

Ground-truthed Regional Ecosystems

Legend

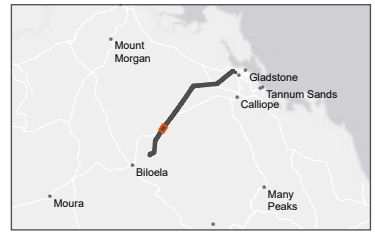
- Roads
- Watercourse
- Field Survey Extent
- Project Area
- Disturbance Footprint
- Regrowth

Ground-truthed Regional Ecosystems

- 11.3.4
- 11.3.25
- 11.11.15
- 11.12.1
- 11.12.6
- Non-remnant
- <all other values>

State Mapped Regional Ecosystems

- 11.3.4
- 11.8.4
- 11.11.15
- 11.12.1
- 11.12.3
- 11.12.6
- Non-remnant



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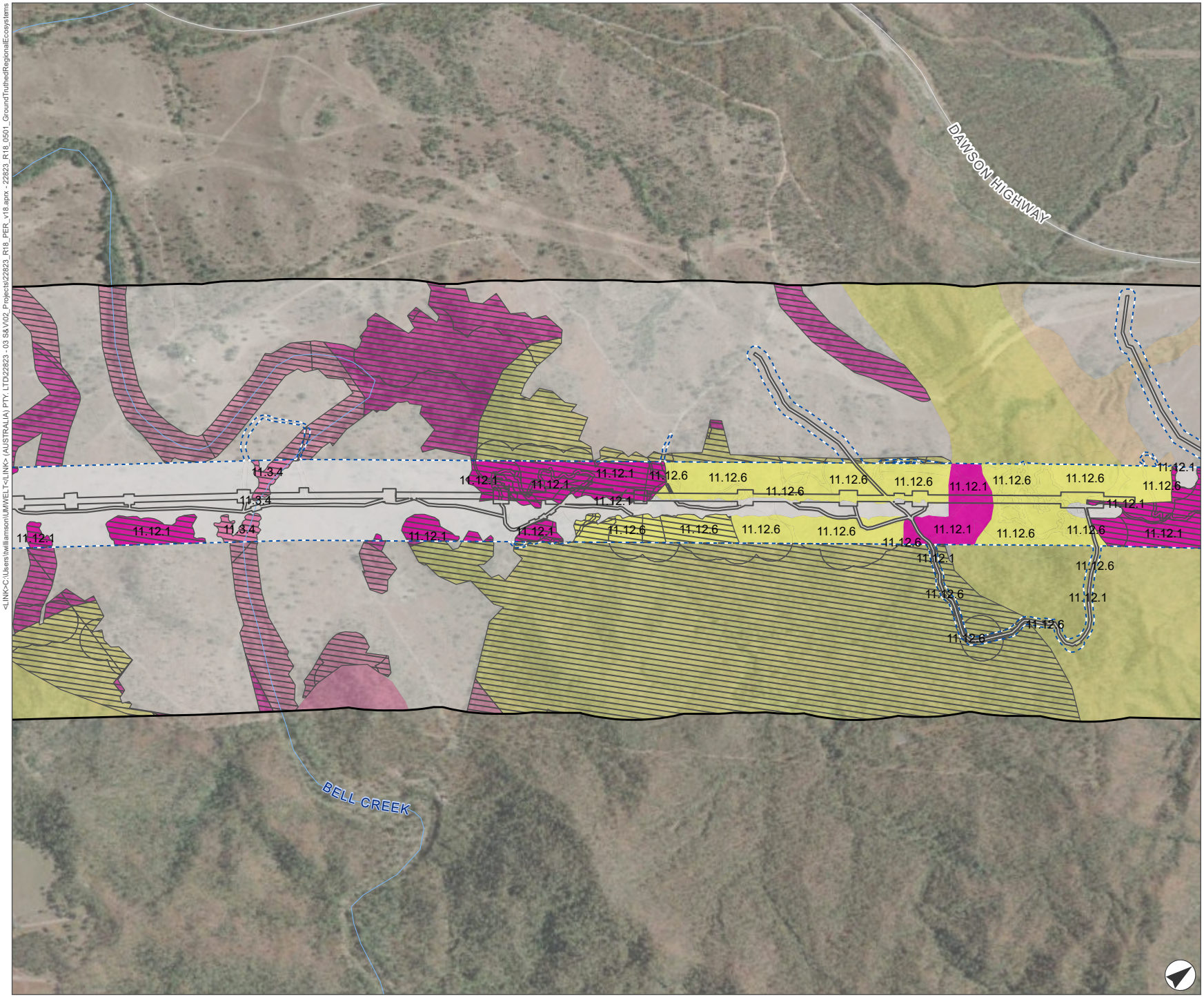


FIGURE 5.1-7

Ground-truthed Regional Ecosystems

Legend

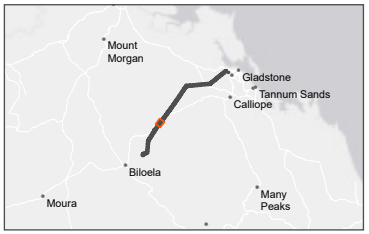
- Roads
- Watercourse
- Field Survey Extent
- Project Area
- Disturbance Footprint
- Regrowth

Ground-truthed Regional Ecosystems

- 11.3.4
- 11.12.1
- 11.12.6
- Non-remnant
- <all other values>

State Mapped Regional Ecosystems

- 11.3.4
- 11.12.1
- 11.12.3
- 11.12.6
- Non-remnant



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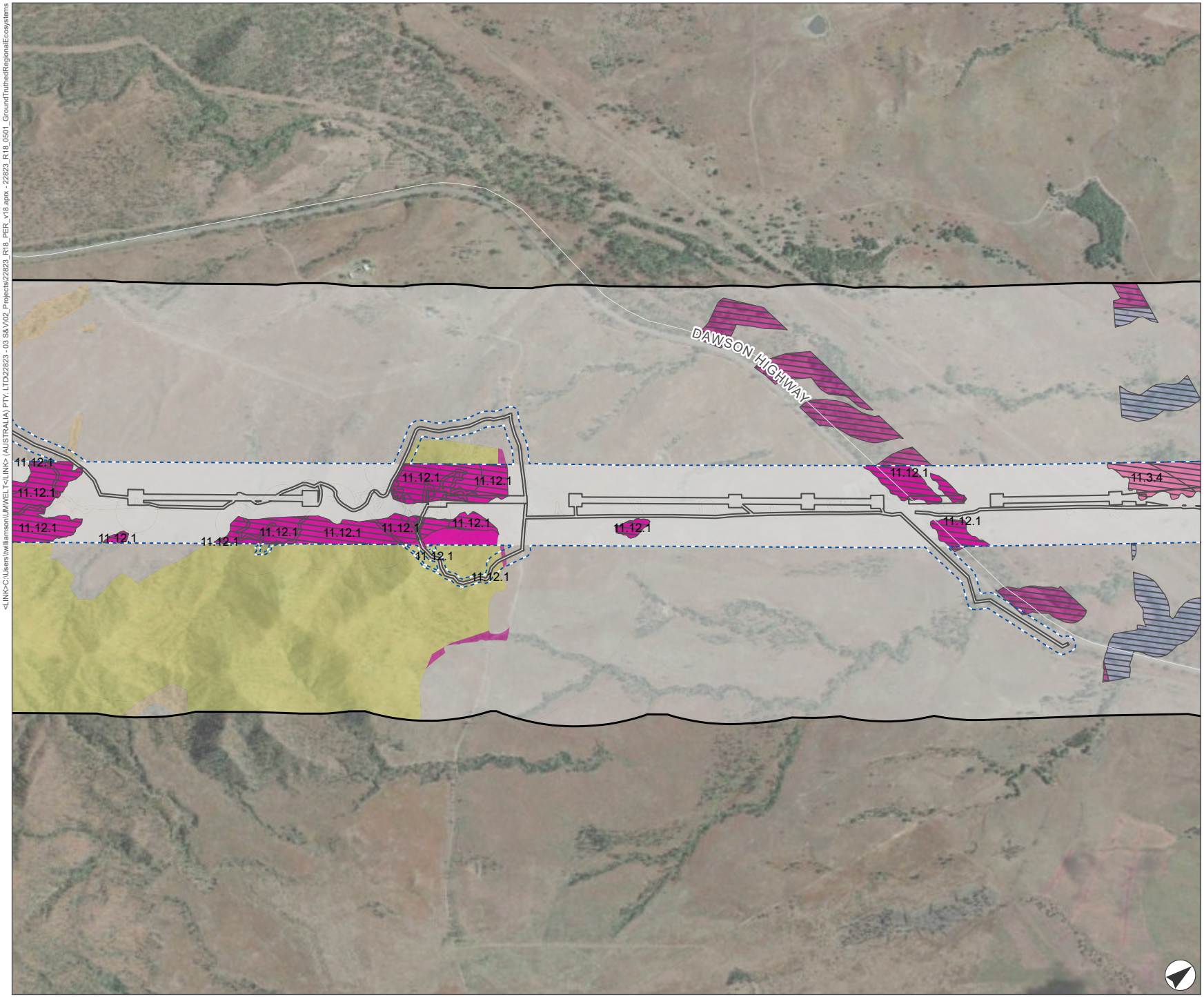


FIGURE 5.1-8

Ground-truthed Regional Ecosystems

Legend

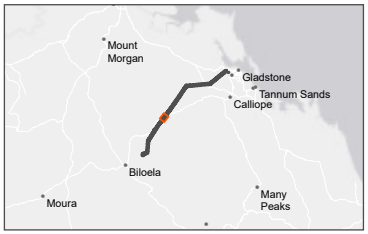
- Roads
- Field Survey Extent
- Project Area
- Disturbance Footprint
- Regrowth

Ground-truthed Regional Ecosystems

- 11.3.4
- 11.12.1
- Non-remnant
- <all other values>

State Mapped Regional Ecosystems

- 11.12.1
- 11.12.3
- 11.12.6
- 11.12.17
- Non-remnant



0 0.5 1

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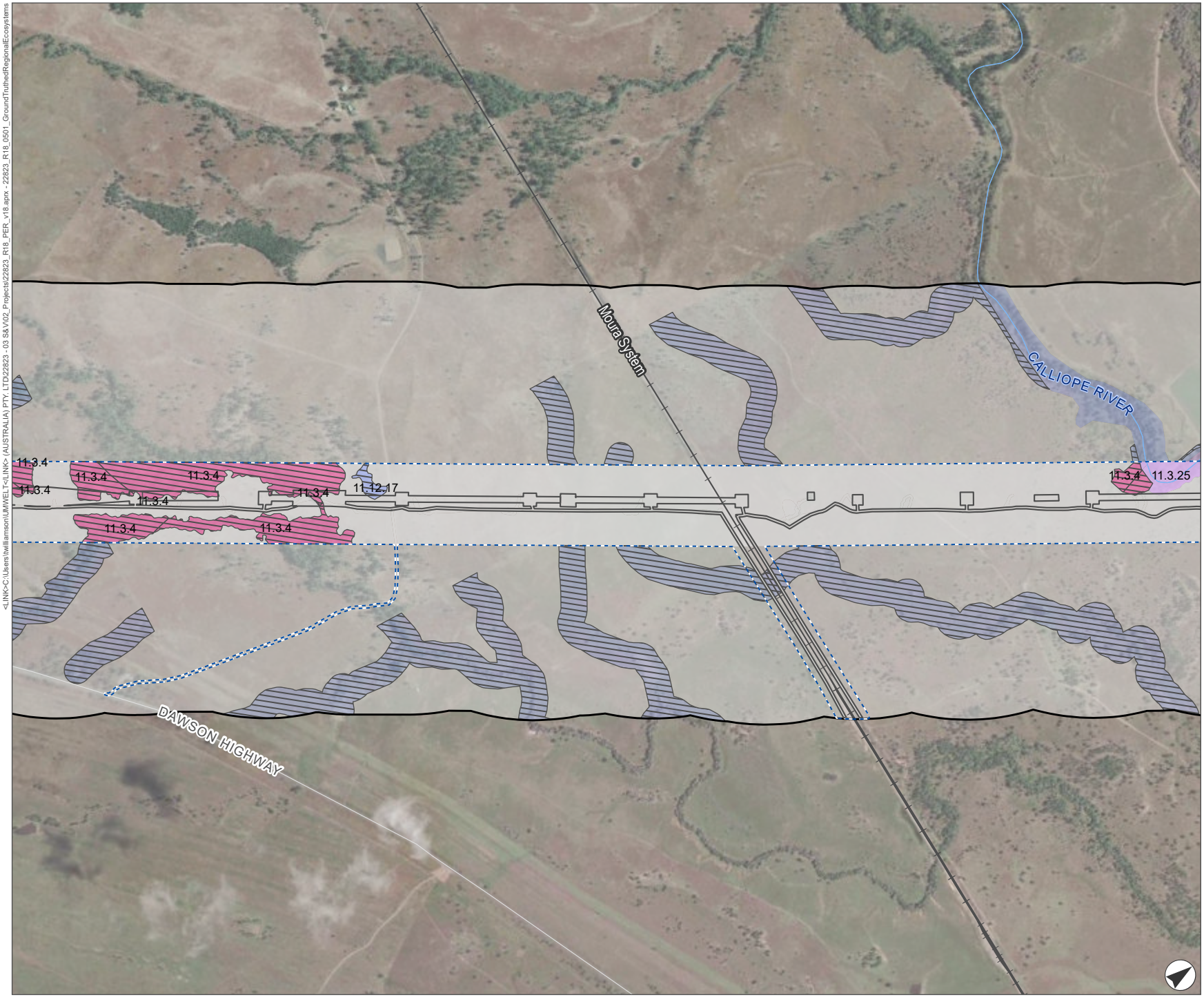


FIGURE 5.1-9

Ground-truthed Regional Ecosystems

Legend

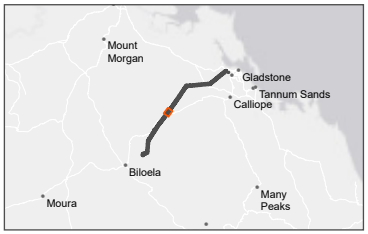
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area
- Disturbance Footprint
- Regrowth

Ground-truthed Regional Ecosystems

- 11.3.4
- 11.3.25
- 11.12.17
- Non-remnant

State Mapped Regional Ecosystems

- 11.3.25
- 11.12.17
- Non-remnant



0 0.5 1

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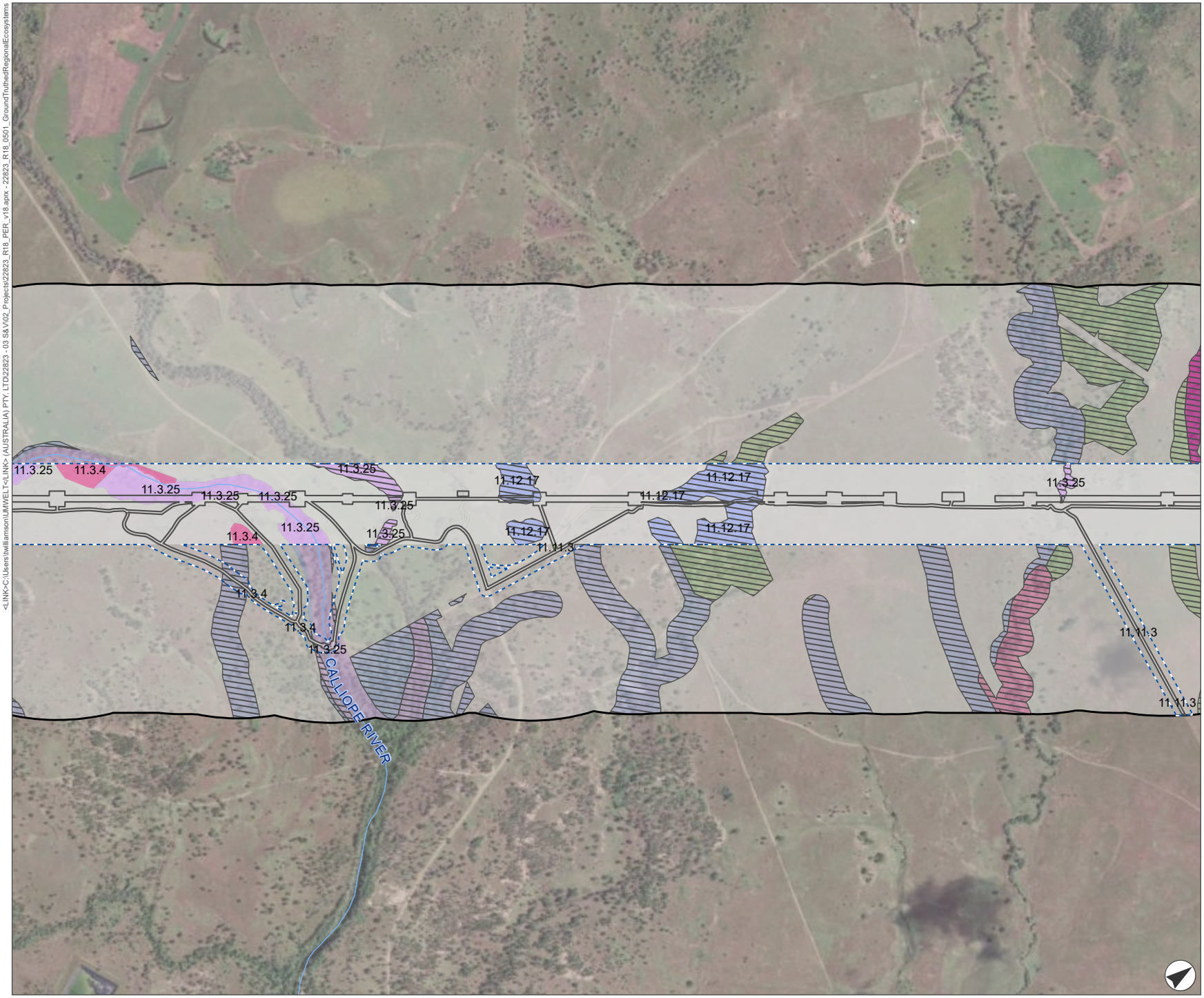


FIGURE 5.1-10

Ground-truthed Regional Ecosystems

Legend

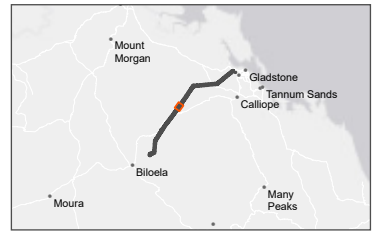
- Watercourse
- Field Survey Extent
- Project Area
- Disturbance Footprint
- Regrowth

Ground-truthed Regional Ecosystems

- 11.3.4
- 11.3.25
- 11.11.3
- 11.12.17
- Non-remnant

State Mapped Regional Ecosystems

- 11.3.4
- 11.3.25
- 11.11.15
- 11.12.1
- 11.12.17
- Non-remnant



0 0.5 1

Kilometres

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FIGURE 5.1-11

Ground-truthed Regional Ecosystems

Legend

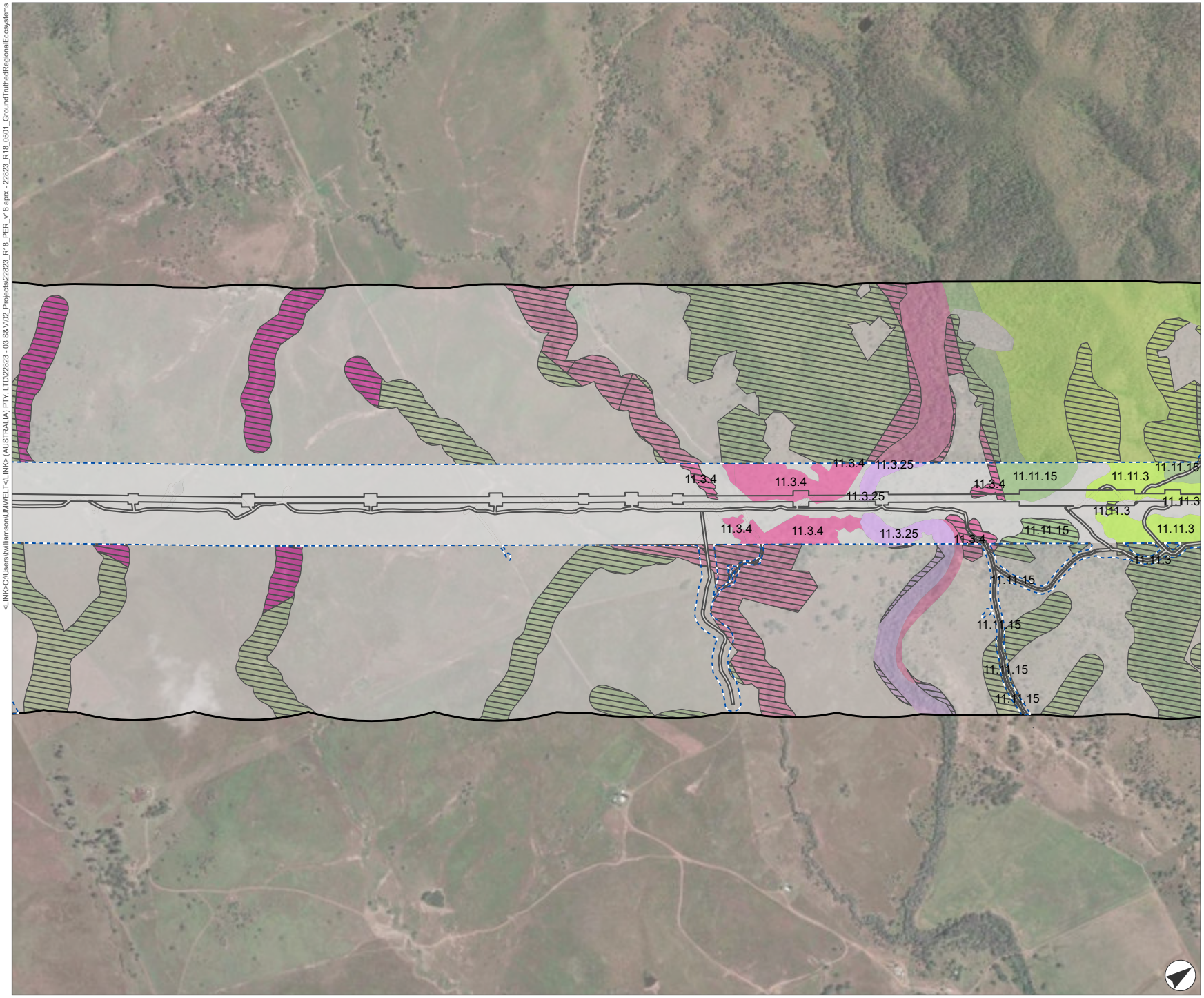
- Field Survey Extent
- Project Area
- Disturbance Footprint
- Regrowth

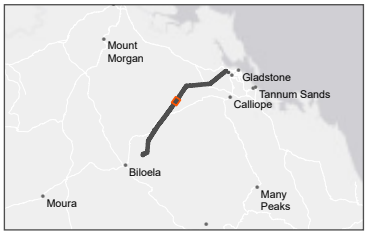
Ground-truthed Regional Ecosystems

- 11.3.4
- 11.3.25
- 11.11.3
- 11.11.15
- Non-remnant

State Mapped Regional Ecosystems

- 11.3.4
- 11.3.25
- 11.11.3
- 11.11.15
- 11.12.1
- Non-remnant





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FIGURE 5.1-12

Ground-truthed Regional Ecosystems

Legend

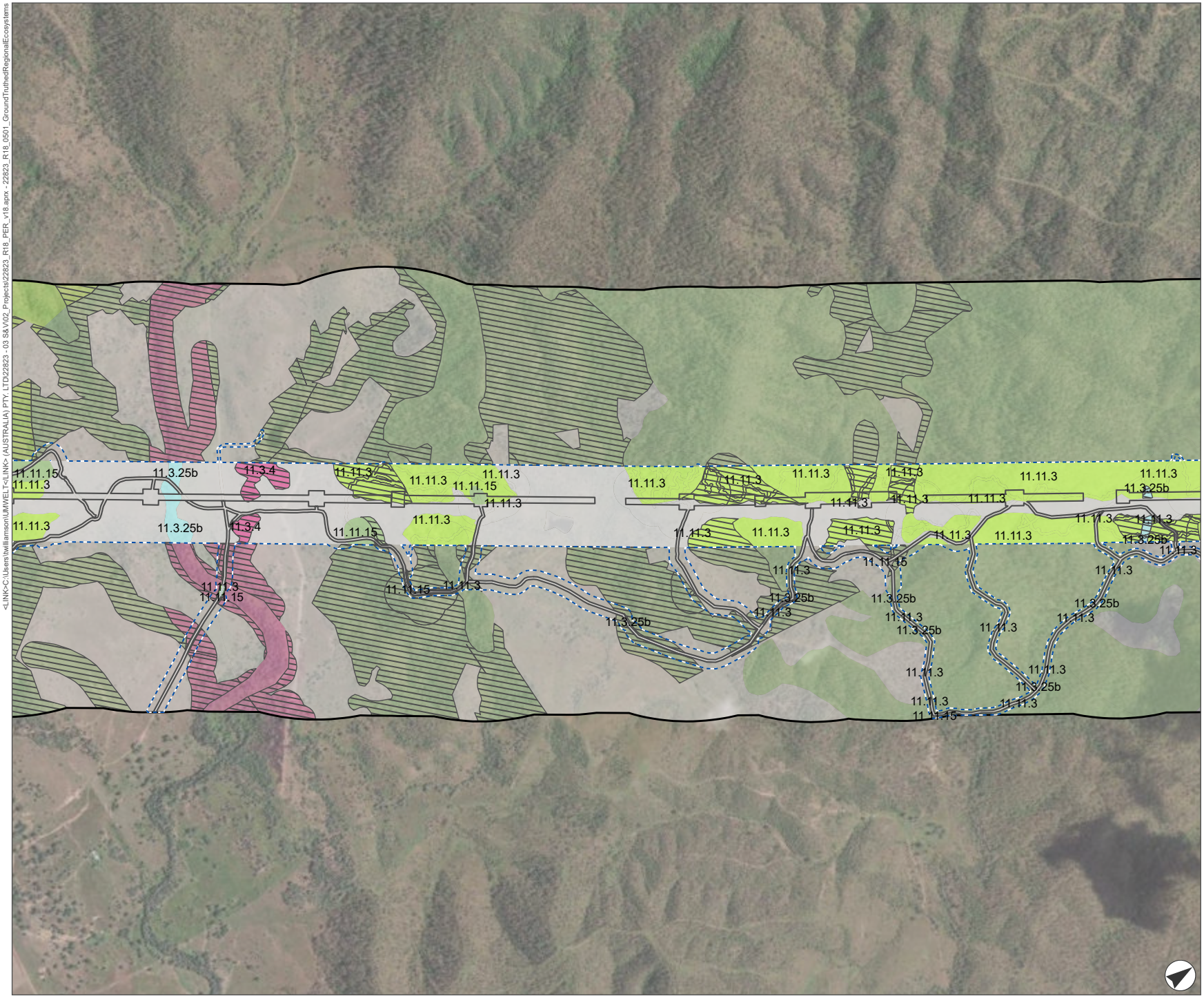
- Field Survey Extent
- Project Area
- Disturbance Footprint
- Regrowth

Ground-truthed Regional Ecosystems

- 11.3.4
- 11.3.25b
- 11.11.3
- 11.11.15
- Non-remnant

State Mapped Regional Ecosystems

- 11.3.4
- 11.11.3
- 11.11.15
- Non-remnant


11.11.15
11.11.3
11.3.25b
11.3.4
11.11.3
11.11.3
11.11.3
11.11.15
11.11.3
11.11.3
11.11.3

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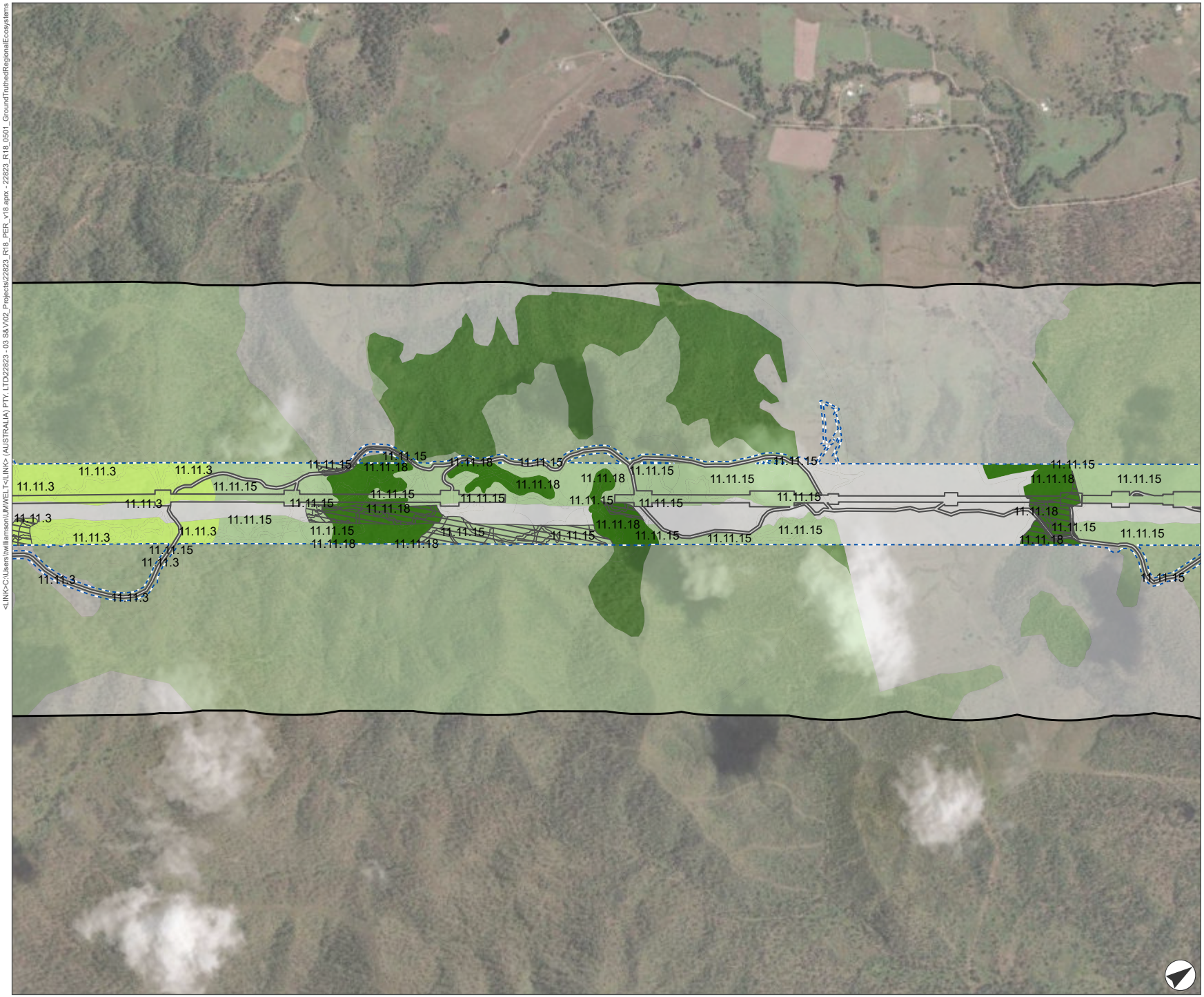


FIGURE 5.1-13

Ground-truthed Regional Ecosystems

Legend

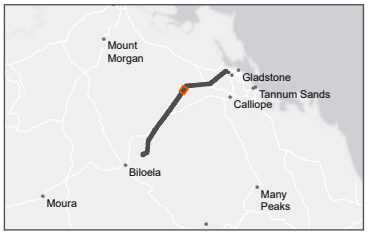
- Field Survey Extent
- Project Area
- Disturbance Footprint
- Regrowth

Ground-truthed Regional Ecosystems

- 11.11.3
- 11.11.18
- 11.11.15
- Non-remnant

State Mapped Regional Ecosystems

- 11.11.18
- 11.11.15
- Non-remnant



0 0.5 1

Kilometres

Scale 1:20,000 at A4
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FIGURE 5.1-14

Ground-truthed Regional Ecosystems

Legend

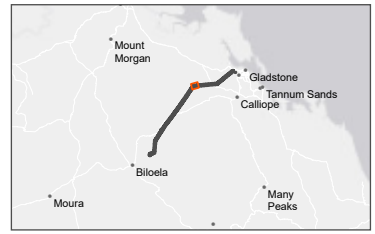
- Field Survey Extent
- Project Area
- Disturbance Footprint
- Regrowth

Ground-truthed Regional Ecosystems

- 11.3.25
- 11.11.3
- 11.11.18
- 11.11.15
- Non-remnant

State Mapped Regional Ecosystems

- 11.3.4
- 11.3.25
- 11.11.15
- Non-remnant



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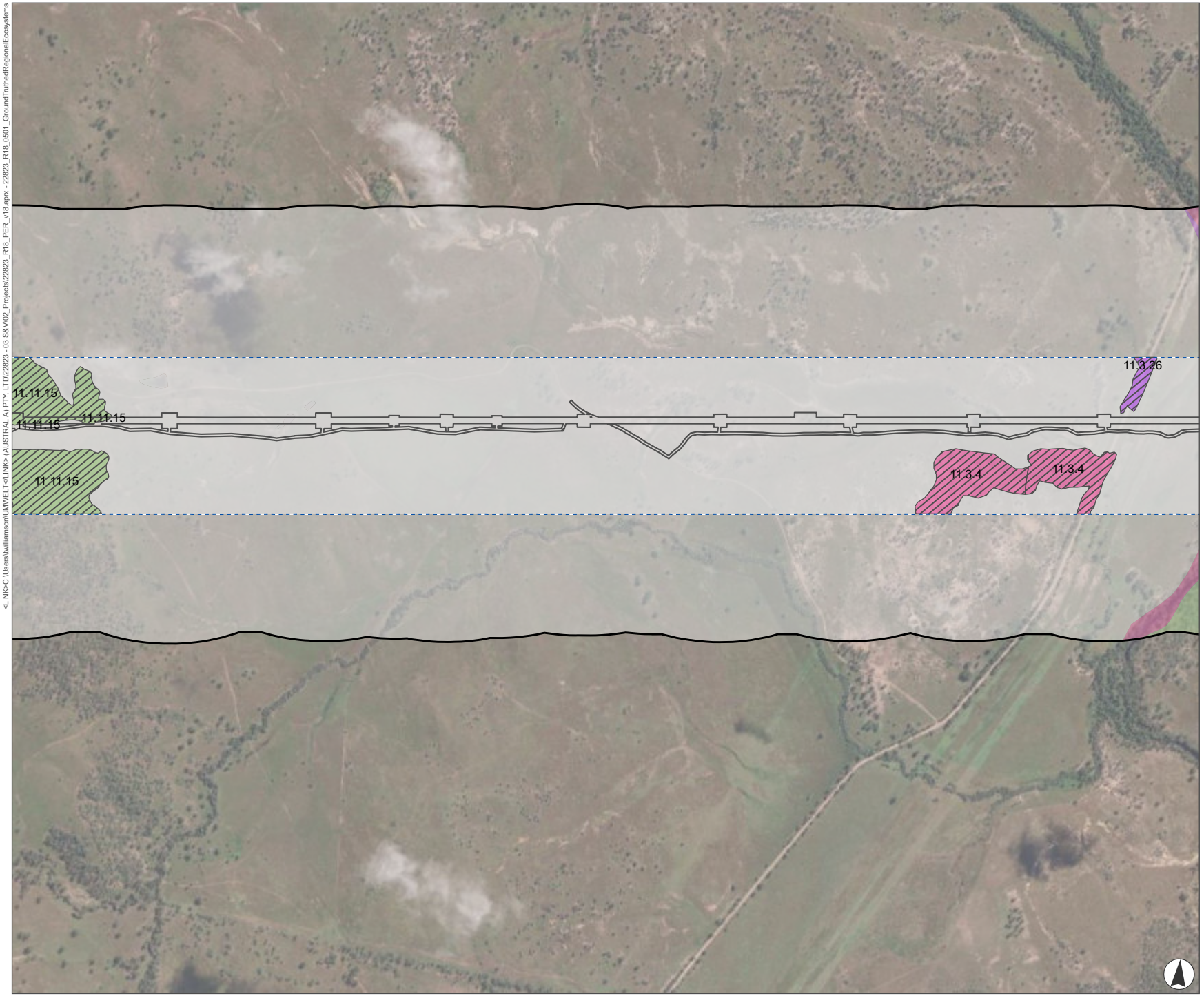


FIGURE 5.1-15

Ground-truthed Regional Ecosystems

Legend

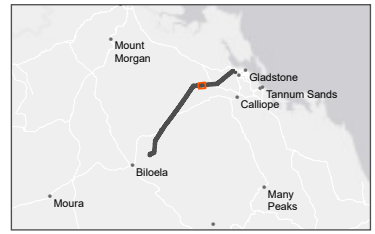
- Field Survey Extent
- Project Area
- Disturbance Footprint
- Regrowth

Ground-truthed Regional Ecosystems

- 11.3.4
- 11.3.26
- 11.11.15
- Non-remnant

State Mapped Regional Ecosystems

- 11.3.4
- 11.3.26
- 11.11.15
- Non-remnant



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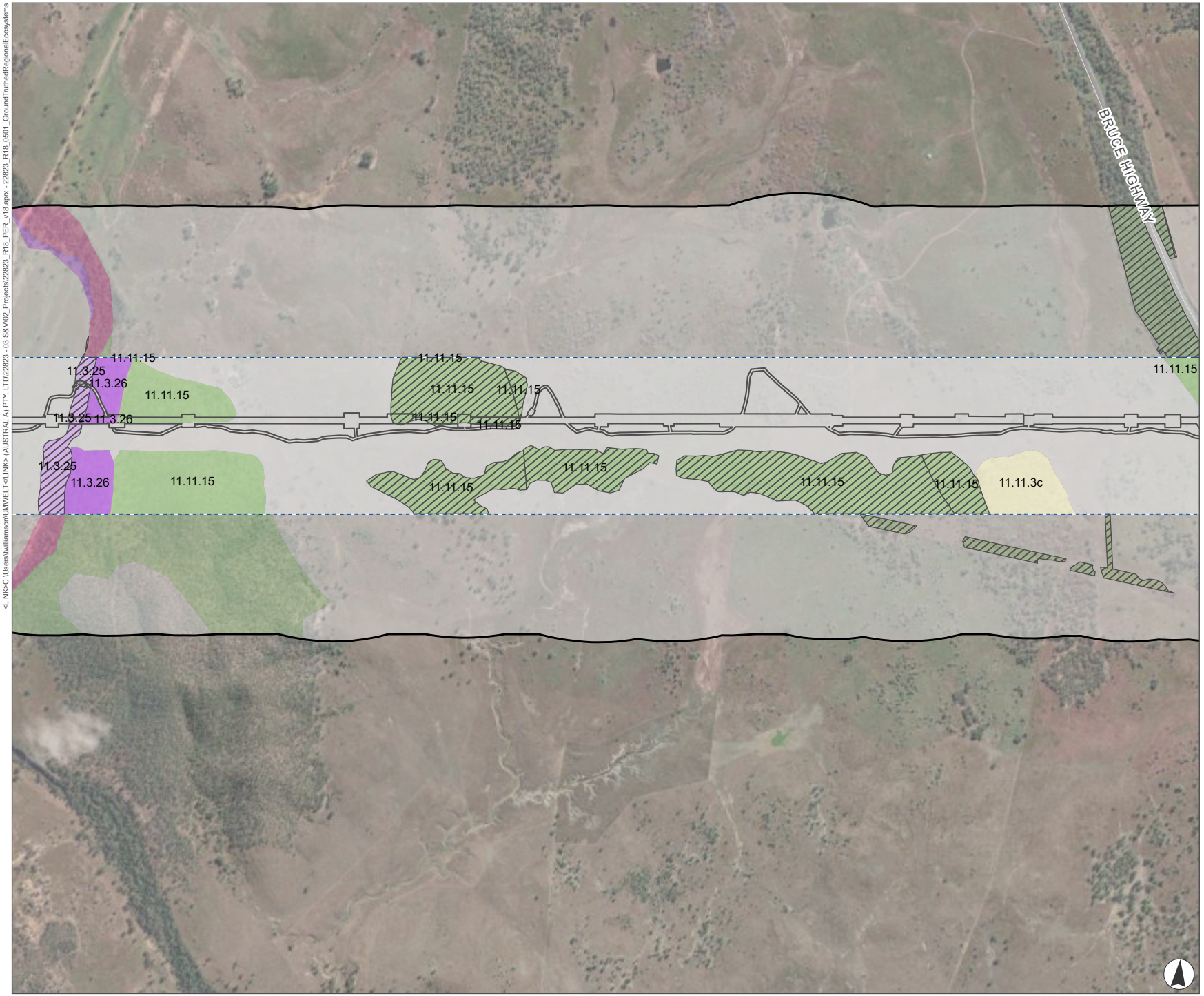


FIGURE 5.1-16

Ground-truthed Regional Ecosystems

Legend

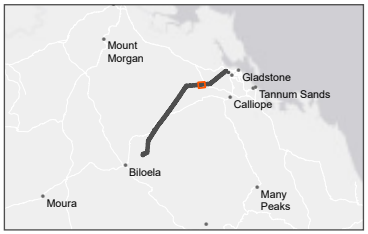
- Roads
- Field Survey Extent
- Project Area
- Disturbance Footprint
- Regrowth

Ground-truthed Regional Ecosystems

- 11.3.25
- 11.3.26
- 11.11.3c
- 11.11.15
- Non-remnant

State Mapped Regional Ecosystems

- 11.3.4
- 11.3.26
- 11.11.15
- Non-remnant



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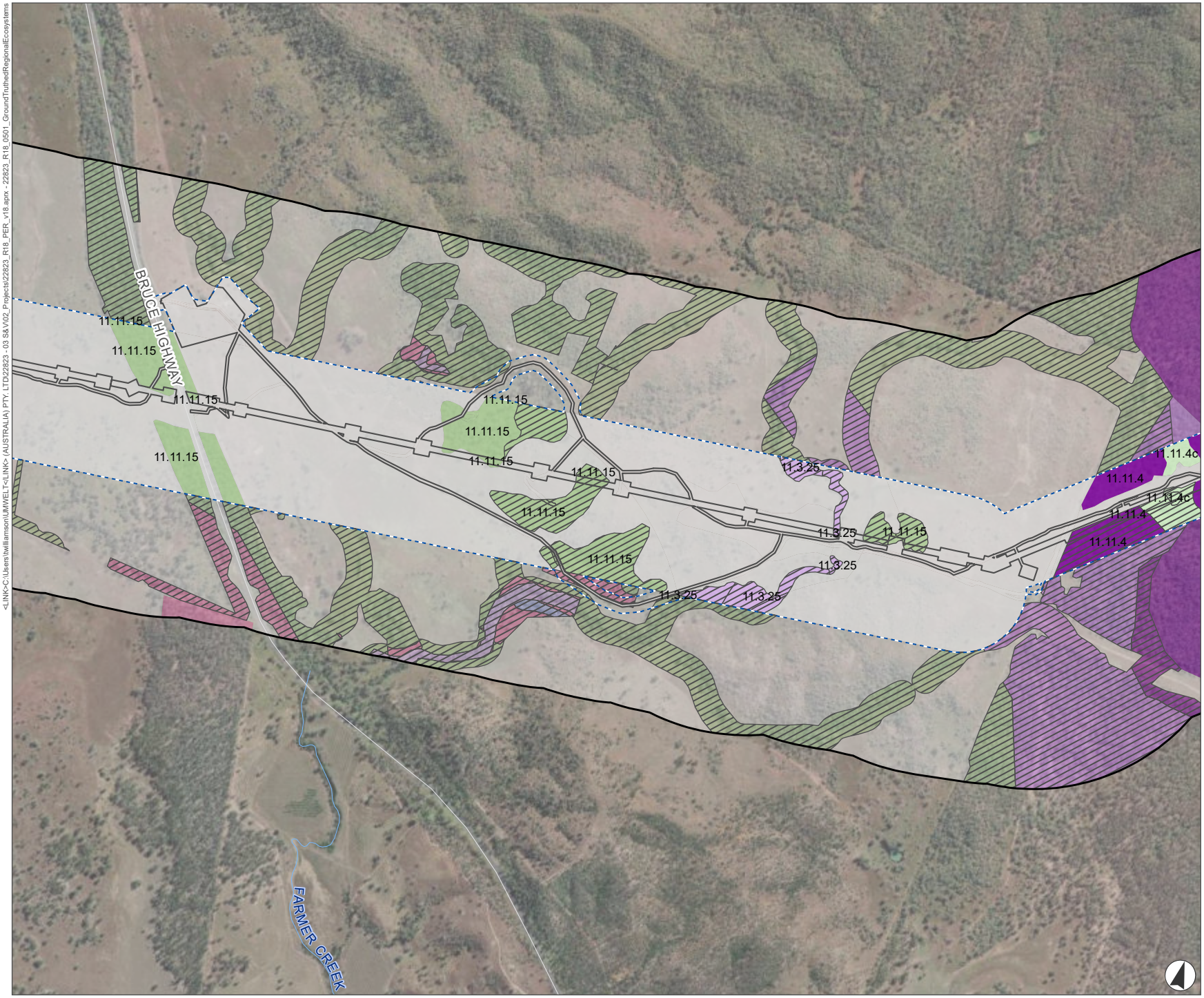


FIGURE 5.1-17

Ground-truthed Regional Ecosystems

Legend

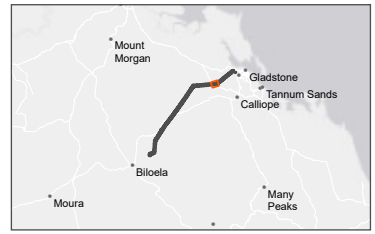
- Roads
- Field Survey Extent
- Project Area
- Disturbance Footprint
- Regrowth

Ground-truthed Regional Ecosystems

- 11.3.25
- 11.11.4
- 11.11.4c
- 11.11.15
- Non-remnant

State Mapped Regional Ecosystems

- 11.3.4
- 11.3.25
- 11.3.26
- 11.3.27f
- 11.11.4
- 11.11.15
- Non-remnant



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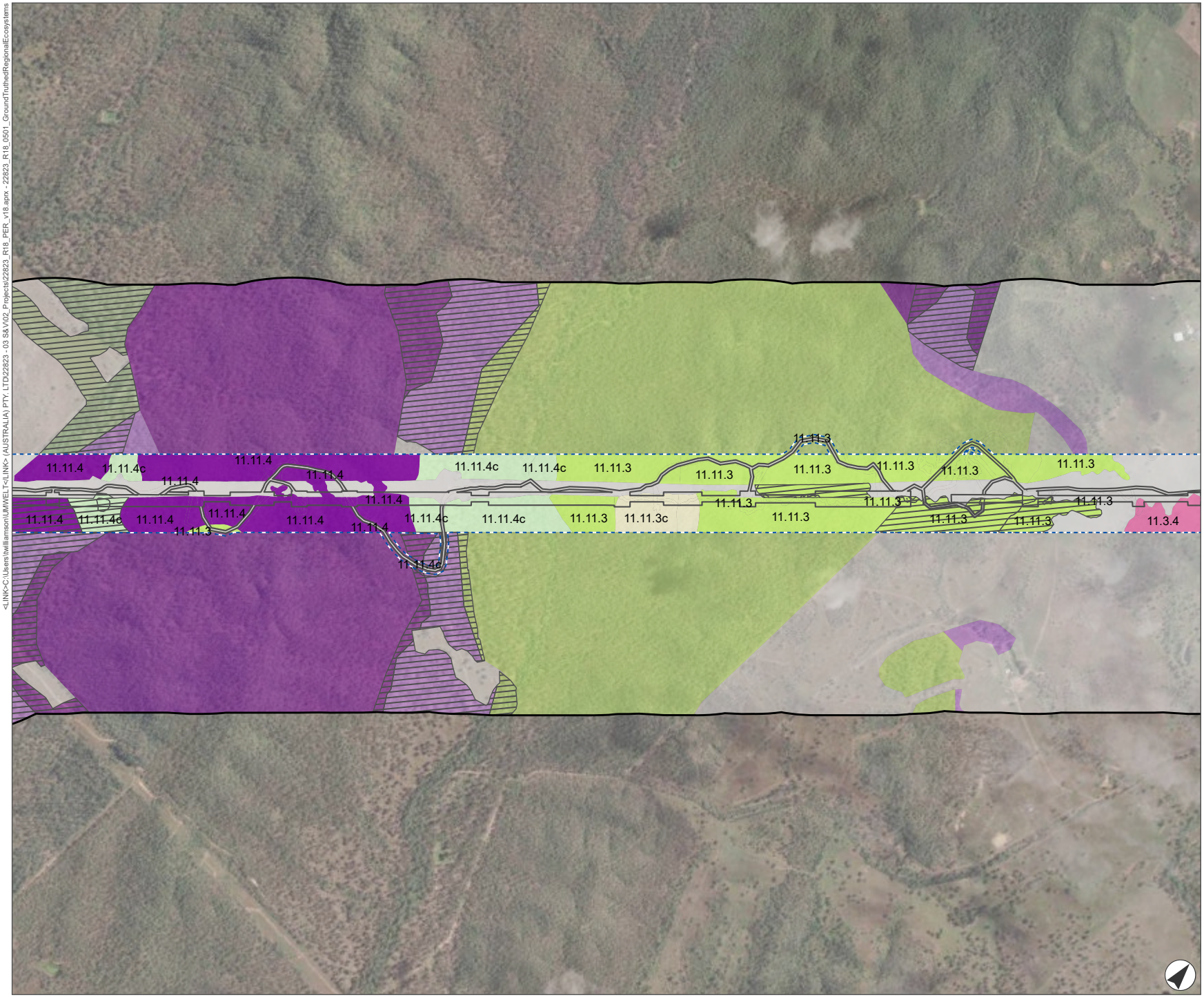


FIGURE 5.1-18

Ground-truthed Regional Ecosystems

Legend

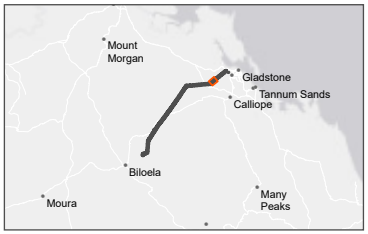
- Field Survey Extent
- Project Area
- Disturbance Footprint
- Regrowth

Ground-truthed Regional Ecosystems

- 11.3.4
- 11.11.3
- 11.11.3c
- 11.11.4
- 11.11.4c
- Non-remnant

State Mapped Regional Ecosystems

- 11.3.26
- 11.11.3
- 11.11.4
- 11.11.15
- Non-remnant



0 0.5 1

Kilometres

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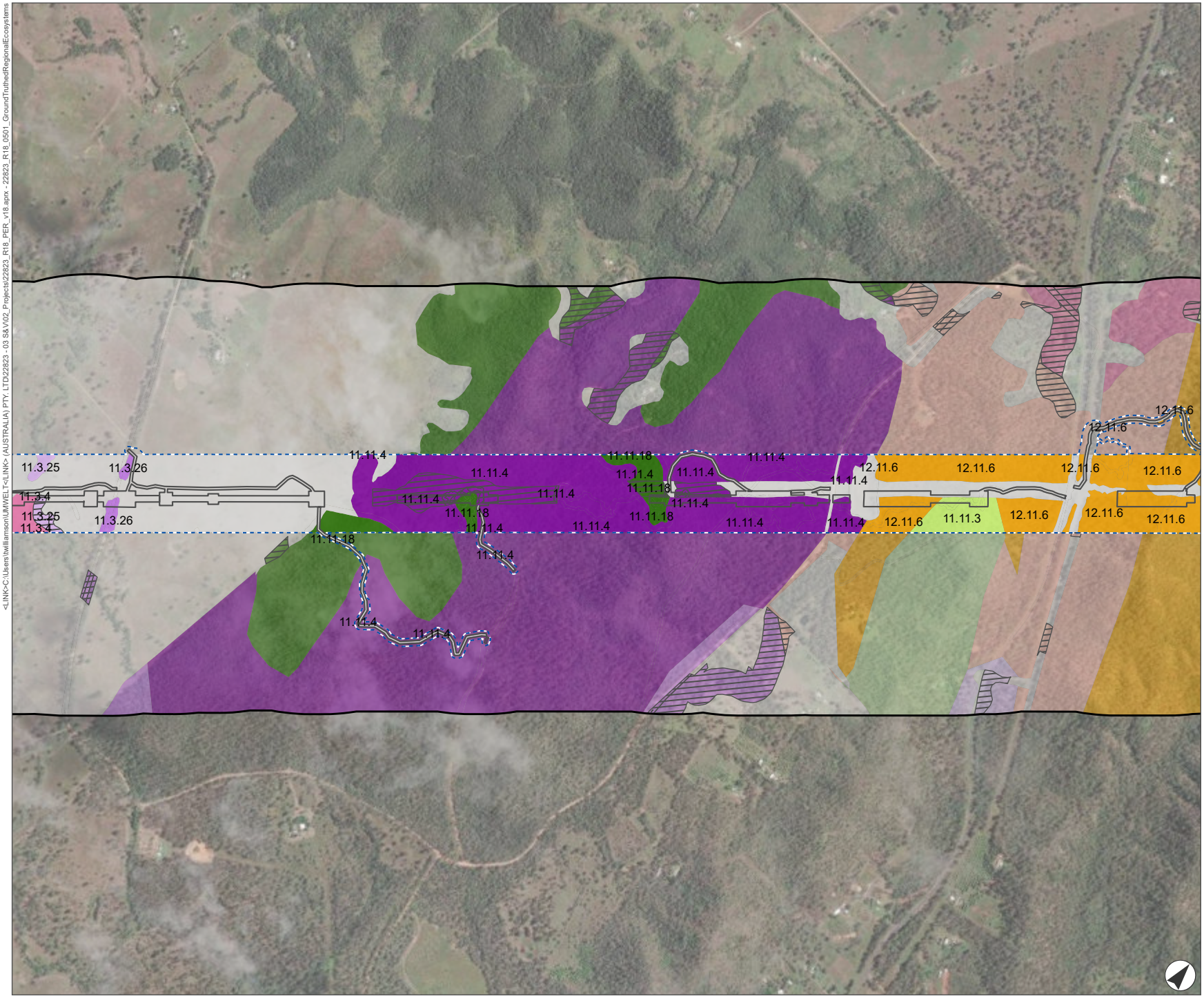
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11.3.25
11.3.26
11.3.4
11.3.25
11.3.26
11.3.4
11.11.4
11.11.4
11.11.4
11.11.4
11.11.18
11.11.4
11.11.4
11.11.4
11.11.18
11.11.4
11.11.18
11.11.4
11.11.4
11.11.4
11.11.4
11.11.4
11.11.4
12.11.6
12.11.6
12.11.6
12.11.6
12.11.6
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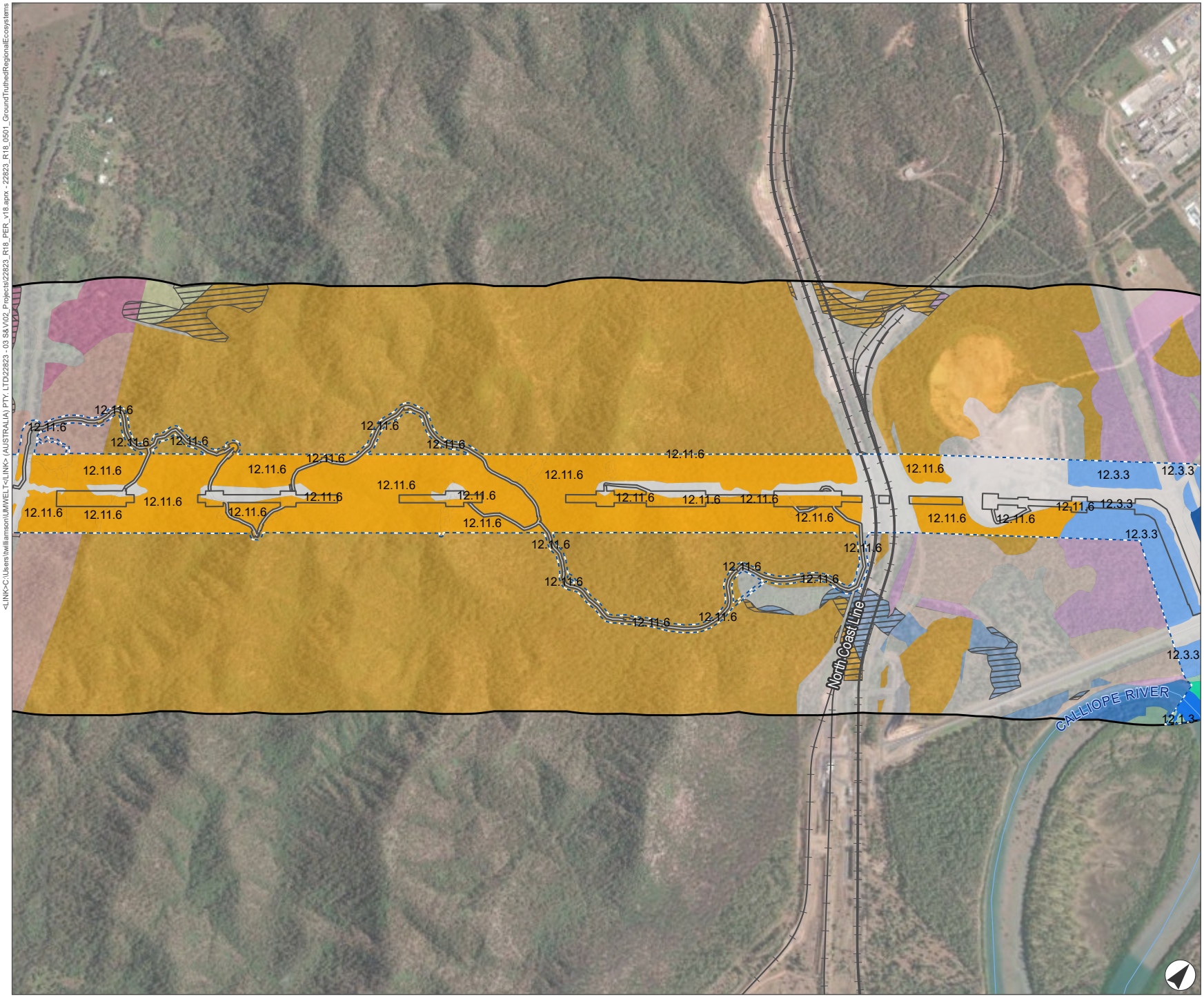


FIGURE 5.1-20

Ground-truthed Regional Ecosystems

Legend

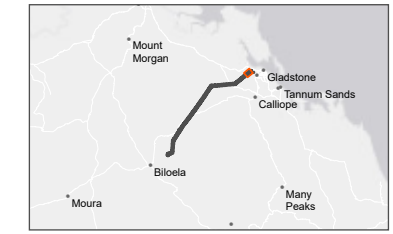
- Railway
- Watercourse
- Field Survey Extent
- Project Area
- Disturbance Footprint
- Regrowth

Ground-truthed Regional Ecosystems

- 12.1.2
- 12.1.3
- 12.3.3
- 12.11.6
- Intertidal Zone
- Non-remnant
- Water

State Mapped Regional Ecosystems

- 11.3.4
- 11.3.29
- 12.1.3
- 12.3.3
- 12.11.6
- 12.11.7
- 12.11.14
- 12.11.17
- Non-remnant
- Water



0 0.5 1

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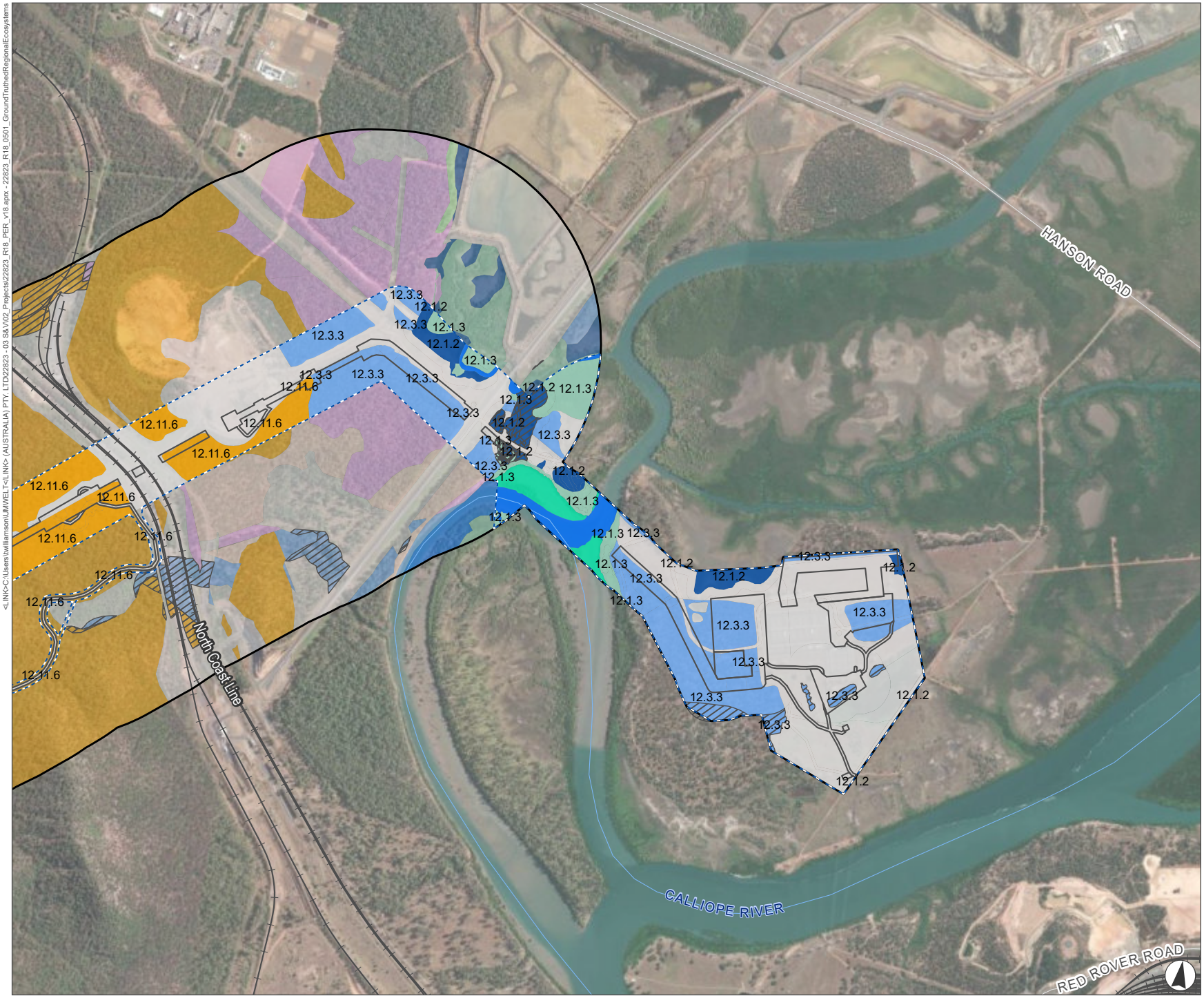


FIGURE 5.1-21

Ground-truthed Regional Ecosystems

Legend

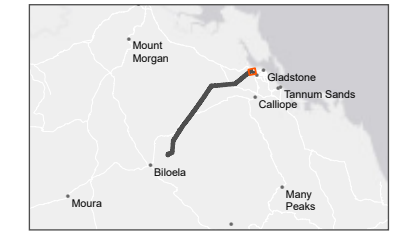
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area
- Disturbance Footprint
- Regrowth

Ground-truthed Regional Ecosystems

- 12.1.2
- 12.1.3
- 12.3.3
- 12.11.6
- Intertidal Zone
- Non-remnant
- Water
- <all other values>

State Mapped Regional Ecosystems

- 11.1.3
- 11.3.29
- 12.1.2
- 12.1.3
- 12.3.3
- 12.11.6
- 12.11.7
- Non-remnant
- Water



0 0.5 1

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5.2.2 Habitat Types

A total of nine fauna habitat types have been identified within the Field Survey Extent and have been applied across the Disturbance Footprint and Project Area. Fauna habitat types are shown in **Table 5.4**. These habitat types are described in the following sections and shown in **Figure 5.2**.

Table 5.4 Summary of Habitat Types

Fauna Habitat Type	Ground-truthed RE(s)	Area (ha) within the Project Area	Area (ha) within Disturbance Footprint
Blakella citriodora open forest to woodlands	11.11.3, 11.12.6, 12.5.1*and 12.11.6	1457.6	40.7
Eucalypt dominated open forests to woodlands on hills and ranges	11.8.4, 11.11.3c, 11.11.4c, 11.12.17*, 12.11.14* and 11.12.17	103.8	12.1
Ironbark woodland to open woodland on hills and ranges	11.8.4*, 11.10.7*, 11.10.13, 11.11.4, 11.11.10, 11.11.15,11.12.1 and 11.12.3*	3,995.0	74.1
Eucalypt or melaleuca dominated open forest to woodland fringing drainage lines or floodplains	11.3.4, 11.3.25, 11.3.25b, 11.3.26, 11.3.27f*, 11.3.29* and 12.3.3	823.9	21.4
Acacia dominated open forest to woodland with emergent Eucalyptus and Blakella	11.10.3 and 11.10.4	14.2	1.3
Tidal flats dominated by mangroves, sedges and grasses	11.1.3*, 12.1.2 and 12.1.3	103.1	0.5
Semi-evergreen vine thicket	11.8.3*, 11.10.8 and 11.11.18	250.6	2.3
Acacia dominated open forest to woodland[#]	11.9.5*	18.6	-
Modified landscapes, artificial waterbodies and wetlands	Non remnant paddocks, farm dams, cleared areas	7,616.9	263.0
Intertidal zone and estuaries	Intertidal zone and the estuary section of the Calliope River	9.0	-

* RE mapped within Vegetation Management Act mapping within the Project Area but not observed within the Disturbance Footprint.

[#]This habitat types dominated by *Acacia harpophylla* was not observed and reflects applicable Vegetation Management Act mapping and is not discussed further

5.2.2.1 *Blakella citriodora* Open Forest to Woodlands

Habitat Description

This habitat type is scattered in large and small patches across Section B, D and E, analogous with REs 11.11.3. 11.12.6 and 12.11.6 (remnant and regrowth) and dominated by *B. citriodora*. It typically occurs on sub-coastal hills and ranges formed on moderately to strongly deformed and metamorphosed sediments and interbedded volcanics (RE 11.11.3), as well as on gently undulating lower slopes of hills formed from Mesozoic to Proterozoic granite (RE 11.12.6). Soils vary from shallow sandy or loamy skeletal profiles to deep texture contrast soils with thin sandy or loamy surface horizons over acid mottled subsoils, particularly where granite is deeply weathered. It was observed that *B. citriodora* often formed pure stands on south facing slopes whilst elsewhere it often co-dominated the canopy with *Eucalyptus crebra*.

Habitat Features and Potential MNES

This fauna habitat type is defined by a canopy comprised of *Blakella citriodora* as the dominant species with scattered *Eucalyptus crebra* and *Eucalyptus acmenoides*. Medium and small sized hollows are occasionally present in dead branches of *Blakella citriodora* trees and in stags. The shrub layer is sparse and consisted of *Alphitonia excelsa*, *Jasminum simplicifolium*, *Acacia disparrima* and *Macrozamia miquelii*. The ground layer is comprised of exotic grasses, weeds and areas with scattered leaf litter up to 40 mm in depth. Ground timber of less than 30 cm diameter was also scattered in areas with the occasional large, hollow logs.

Trees with the presence of occasional small and medium sized hollows may provide refuge for arboreal mammals, nocturnal bird species and microbats. The presence of *Blakella* and *Eucalyptus* trees provide suitable breeding (**Photo 5.1**), foraging and dispersal habitat for koala and foraging for species including yellow-bellied glider and painted honeyeater. The presence of native and exotic grasses, leaf litter, woody debris and scattered small rocks can provide habitat opportunities for collared delma.

Observed Threats

Several ongoing threats to this habitat type were noted during field surveys which present ongoing impact for MNES species. Weed species are prevalent throughout this habitat type and are associated with the shrub and ground layer. Higher densities of exotic grasses and forbs reduce suitable habitat for squatter pigeon to disperse as well as reducing the availability of native grass species used as a foraging resource.

Weed incursion changes the ground cover native/exotic dynamic reducing suitable microhabitat for collared delma by altering ground cover density and composition of leaf litter. In addition, stands of lantana were noted and in conjunction with prevalent exotic ground cover these exotic species likely outcompete native canopy seedlings affecting the long-term construct and diversity of the canopy. This canopy alteration changes the suitability of this community for yellow bellied glider over longer time periods.

Cattle grazing is an observed threated in this habitat type. Grazing alters the composition of the ground cover, promotes exotic weed incursion and thereby promotes the potential increase in fire intensity impacting those species which shelter, forage or disperse throughout the ground layer.



Photo 5.1 ***Blakella citriodora*** **Open Forest to Woodlands**

5.2.2.2 Eucalypt Dominated Open Forests to Woodlands on Hills and Ranges

Habitat Description

This habitat type was recorded in several patches in Sections B and D, analogous with REs 11.8.4, 11.11.3c, 11.11.4c, and 11.12.17 (remnant and regrowth). The canopy is dominated by a diversity of species including *Eucalyptus populnea*, *Eucalyptus tereticornis, Eucalyptus moluccana*, *Corymbia erythrophloia* and occasional scattered *Eucalyptus crebra*. *Blakella citriodora* occasionally intergrades from adjacent vegetation community providing additional diversity in the canopy. Tree size is highly variable including patches of very tall, thin tree canopy and without hollows to larger individuals containing occasional hollows. A few dead stags are present with small hollows suitable for small mammals and reptiles. A mid canopy layer is occasionally present consisting of regrowth eucalyptus species. Typically, the ground layer has scattered native/ exotics grasses, weed and leaf litter (both course and fine).

This habitat type typically occur on hills and ranges formed from a variety of geological substrates including Cainozoic igneous rocks (RE 11.8.4), moderately to strongly deformed and metamorphosed sediments and interbedded volcanics (REs 11.11.3c, 11.11.4c), and Proterozoic to Mesozoic granites (RE 11.12.17). Associated landforms include steep slopes, ridgelines, and undulating terrain, with soils ranging from shallow stony profiles to texture contrast soils with sandy or loamy surface horizons over mottled subsoils.

Habitat Features and Potential MNES

Habitat features present within this habitat type differed depending on patch size, existing land use history, dominance of tree species and underlying geology.

The canopy trees vary in age with some *Eucalyptus tereticornis* forming the occasional small to large hollows providing suitable denning habitat for arboreal mammals, like the greater glider (southern and central). Elsewhere the canopy is younger with taller individuals but lacking tree girth suggesting older regrowth at remnant height. Tall–thin canopies lack the hollows needed by greater gliders for breeding.

The shrub layer is absent apart from patches of *Lantana camara** which can provide connectivity and refuge for small woodland birds. The ground layer is highly variable and typically has limited microhabitat features and is dominated by native and exotic grasses. Tops of ridges usually scattered stones and exposed rock, however, are covered with creeping lantana (*Lantana montevidensis**) limiting the suitability for microhabitat specific ground dwelling species like the collared delma.

Habitat occurring on skeletal soils tended to have lower height and diversity of vegetation, typically due to the soil retaining limited nutrients and moisture associated with the position in the landscape. As such this vegetation can lack suitable microhabitat features such as hollows, which are associated with tall woodlands that occur at lower elevations on relatively moist, nutrient rich soil.

As this habitat type is dominated by Eucalypt and Corymbia species (**Photo 5.2**), it provides suitable habitat (to varying degrees) for foliage eating threatened arboreal mammal's greater glider and koala. Locally important koala food trees present within the Project Area associated with this habitat type include *E. populnea, E. tereticornis, E. moluccana and E. crebra*. Ancillary habitat trees used by koala include *C. erythrophloia*.

Observed Threats

This habitat type typically showed signed of historical clearing and is heavily impacted by cattle grazing in areas which present ongoing impact for MNES species. Cattle grazing was observed throughout this habitat type, present through observed herds, cattle tracks and scats as well as greatly reduced ground cover density. In addition, grazing alters the composition of the ground cover, promotes exotic weed incursion and thereby promotes the potential increase in fire intensity impacting those species which shelter, forage or disperse throughout the ground layer.

Similarly, weed species incursion alters ground layer composition and diversity. Dense patches of *L. montevidensis* alter the microhabitat requirements of ground dwelling threatened species like the collared delma. Higher densities of exotic grasses and forbs reduce suitable habitat for squatter pigeon to disperse as well as reducing the availability of native grass species used as a foraging resource. Examination of historical imagery suggest clearing for grazing occurred.



Photo 5.2 Eucalypt Dominated Open Forests to Woodlands on Hills and Ranges

5.2.2.3 Ironbark Woodland to Open Woodland on Hills and Ranges

Habitat Description

The majority of the native vegetation communities within the Project Area were represented by this habitat type, which was analogous with seven REs including 11.10.13, 11.11.4, 11.11.10, 11.11.15 and 11.12.1 (remnant and regrowth). These regional ecosystems occur across a range of landforms including low hills, ridges, and undulating terrain. Soils vary from shallow stony profiles on ridge tops to texture contrast soils with sandy or loamy surface horizons on mid and lower slopes.

This fauna habitat type is defined by a canopy dominated by *Eucalyptus crebra* or *Eucalyptus melanophloia* with *Corymbia erythrophloia* but also comprised of a variety of other canopy species intergrading from other adjacent vegetation including *Blakella citriodora, Blakella tessellaris* and rarely *Eucalyptus tereticornis*. The shrub layer was very sparse to largely absent except for some recruiting canopy species and *Lantana camara**. The ground layer was comprised of both native and exotic grasses and ground timber of various sizes, with ridge lines often with loose surface stones or rocky areas. Ridge tops also saw expanse areas of *L. montevidensis** smothering native grasses and forbs. Other habitat values included occasional hollows (occasional medium and small) in mature *Eucalyptus crebra* and *Corymbia erythrophloia* trees and stags.

Habitat Features and Potential MNES

A combination of native grasses, leaf litter, loose surface stones and woody debris may provide habitat opportunities for collared delma. It was noted during field surveys that on side slopes in this habitat type, rocks and stones were present, but often with full contact with the soils surface limiting shelter potential for ground dwelling species.

Trees with occasional small to medium hollows may provide suitable denning habitat for small arboreal mammals but are unlikely to be large enough for greater glider denning. The presence of *Eucalyptus* species and *Corymbia* species (**Photo 5.3**) may provide breeding, foraging and dispersal habitat for the koala. Locally important koala food trees present within the Project Area associated with this habitat type include *E. crebra* and *E. melanophloia,* with ancillary habitat trees also present including *C. erythrophloia* and *B. tessellaris*.

Habitat occurring on skeletal soils tended to have lower height and diversity of vegetation, typically due to the soil retaining limited nutrients and moisture associated with the position in the landscape. As such this vegetation can lack suitable microhabitat features such as hollows, which are associated with tall woodlands that occur at lower elevations on relatively moist, nutrient rich soil.

Observed Threats

Historical clearing with the presence of timber piles as well as evidence of thinning are present in this habitat type; wherein selective logging practices will remove individual mature trees. Although thinning will often amount to less cumulative impact, it does modify the landscape and removes crucial habitat features such as hollows, canopy coverage and mistletoe, whilst also encouraging the incursion of weeds.

Cattle grazing was observed throughout this habitat type, present through observed herds, cattle tracks and scats as well as greatly reduced ground cover density. In addition, grazing alters the composition of the ground cover, promotes exotic weed incursion and thereby promotes the potential increase in fire intensity impacting those species which shelter, forage or disperse throughout the ground layer.

Uncontrolled bushfires and their effects were observed in October 2023 along the existing alignment south of the Calliope Range State Forest, as well as south of Coal Road in the southern end of Section B. Fire intensity was of a scale to remove the canopy in this habitat type to which the landscape is still recovering. Leaf litter after 2 years is on average only 10 mm deep and leaf mat size and position in the landscape is very sparse likely limiting habitat for collared delma.



Photo 5.3 Ironbark Woodland to Open Woodland on Hills and Ranges

5.2.2.4 Eucalypt or Melaleuca Dominated Open Forest to Woodland Fringing Drainage Lines or Floodplains

Habitat Description

This habitat type is comprised of alluvial riparian forests or woodlands, analogous with RE 11.3.4, 11.3.25, 11.3.25b, 11.3.26 and 12.3.3 (remnant and regrowth) generally associated with watercourses or alluvial flats.

The canopy is typically composed as an open forest to open woodland dominated by either *Eucalyptus sp*. (including *E. tereticornis, E. crebra*), *Blakella tessellaris, Melaleuca sp*. or *Casuarina cunninghamii* often associated with semi-ephemeral or ephemeral water courses or floodplains. Within the Project Area, smaller tributaries and gullies canopy vegetation is often characterised by the dominance of *Melaleuca sp*. with rare emergent eucalypts. Shrubs are rare to occasional with the ground layer heavily infested by exotic species including *L. camara* and *Megathyrsus maximus* (Guinea grass).

These regional ecosystems typically occur on Quaternary alluvial plains and drainage lines, formed from recent unconsolidated sediments deposited by fluvial processes. Landforms include floodplains, stream banks, and riparian corridors, with soils ranging from deep, fertile loams and clays to sandy alluvium, often subject to seasonal inundation or waterlogging.

Habitat Features and Potential MNES

Watercourses associated with this habitat type were commonly found to be dry, have ponding water or a slow flowing stream. This community is defined by a canopy of *Eucalyptus tereticornis*, *Eucalyptus moluccana*, *Blakella tessellaris* and/or *Casuarina cunninghamiana* (**Photo 5.4**). Occasional large, medium and small hollows were present in areas with large old growth trees providing refuge sites for greater glider (southern and central). This habitat type is also suitable foraging and dispersal habitat for koalas and given the close proximity to water, koalas may utilise this habitat as refuge when water in the landscape is low during dry periods.

The shrub layer was absent with the exception of some recruiting canopy species and *Lantana camara**. In most areas the ground layer was covered in dense exotic grass species, and their presence limits the suitability of this habitat type for the persistence of collared delma. Stream beds that were dry were often infested with *Megathyrsus maximus* var *maximus** or lined with small rocks. Where exotic grasses were absent, microhabitat features with the presence of water create ideal habitat for species like the squatter pigeon (southern). Although disturbance from weeds, cattle grazing and some bank erosion is present, this habitat is likely to provide corridors for fauna movements across the landscape.

Observed Threats

Lantana camara was commonly observed throughout the Project Area with some areas forming impenetrable thickets. The presence of this species in some areas would inhibit koala movement. To a lesser extent exotic vines, including *Cryptostegia grandiflora* (rubber vine) and *Dolichandra unguis-cati* (cat's claw creeper) are also identified as a threatening process for a number of species given their ability to envelope and eventually cause mortality for mature eucalypt trees over a period of time.

Cattle grazing was observed throughout this habitat type, present through observed herds, cattle tracks and scats as well as greatly reduced ground cover density. In addition, grazing alters the composition of the ground cover, promotes exotic weed incursion and thereby promotes the potential increase in fire intensity impacting those species which shelter, forage or disperse throughout the ground layer.



Photo 5.4 Eucalypt Dominated Open Forest to Woodland Fringing Drainage Lines and Floodplains

5.2.2.5 Acacia Dominated Regrowth with Emergent Eucalyptus and Corymbia

Habitat Description

This habitat type is present at several location along the western corner of the Project Area in Sections A and B, analogous with remnant RE 11.10.3 and remnant/regrowth RE 11.10.4. This habitat type typically occurs on undulating terrain and low hills formed derived from sandstone.

This habitat type is defined by a mixture of Acacia species particularly *Acacia shirleyi*, *Acacia rhodoxylon* and in two small areas, *Acacia harpophylla* (**Photo 5.5**). Amidst the acacia the following species were also noted; *Eucalyptus decorticans*, *Corymbia erythrophloia* and *Atalaya hemiglauca*.

In this habitat type the shrub layer is sparse consisting of scattered *Carissa ovata* and *Geijera parviflora*. The ground layer consists largely of exotic grasses with the occasional woody debris scattered where a canopy layer is present.

Habitat Features and Potential MNES

This habitat types supports a variety of features including coarse woody debris and coarse leaf litter, which may provide suitable habitat for black-breasted button quail, however surface stones and rock are rare limiting the suitability of this habitat type for collared delma. In some areas, a sparse emergent layer of eucalypts is also present. Several patches fauna habitat type is in regrowth condition only and therefore is not at the stage of senescence where hollows or decorticating bark is present.

Emergent eucalypts may provide shelter opportunities for koala; however, locally important koala tree species are absent. Ancillary koala trees, *A. harpophylla* and *E. decorticans* are present in this habitat type.

Cattle grazing is the dominant land use within the Project Area and has facilitated the development of permanent water sources (farm dams) within areas in close proximity to this habitat type. Despite the presence of several weed species throughout this habitat type, small patches of native tussock grass species persist potentially supporting the dispersal requirements of squatter pigeon (southern).

Observed Threats

Threats to this habitat type were observed during field surveys which may present ongoing impact for MNES species. These include:

- Habitat degradation from cattle grazing including an increased susceptibility to erosion of particularly where drainage lines or permanent waterbodies occur. Cattle grazing also has the potential to exacerbate the spread of weed species throughout the habitat from nearby infestations.
- Weed incursion reducing the availability of native grass species used as a foraging resource for native species.



Photo 5.5 *Acacia* Dominated Regrowth Vegetation with Emergent Eucalyptus and Corymbia

5.2.2.6 Tidal Flats Dominated by Mangroves, Sedges and Grasses

Habitat Description

This habitat type occurs on the eastern end of the Project Area within Section E, analogous with remnant and regrowth REs 12.1.3 and 12.1.2. These regional ecosystems are associated with coastal tidal flats and estuarine environments, formed on Quaternary marine sediments. The landform is typically low-lying, flat and poorly drained, subject to regular tidal inundation. Soils are generally saline, clayey or silty, and may include areas of bare saltpan or muddy intertidal zones.

This fauna habitat type occurs on saltwater tidal flats and is a combination of mangrove shrubland to low closed forests and saltpan vegetation including grassland, herbland and sedges (**Photo 5.6**). The mangrove shrubland consists of *Avicennia marina*, *Rhizophora stylosa* and *Ceriops australis* and the grassland is dominated by *Sporobolus virginicus*, with occasional *Fimbristylis ferruginea*.

Habitat Features and Potential MNES

Areas where mangroves and saltpan vegetation were present, the banks had slight descending slopes onto intertidal muddy areas where terrestrial and aquatic fauna can forage or shelter in amongst the dense grass or mangrove roots and foliage. This fauna habitat may provide potential breeding and foraging habitat for the water mouse (*Xeromys myoides*) and migratory shorebirds birds including curlew sandpiper (*Calidris ferruginea*) and eastern curlew (*Numenius madagascariensis*).

Observed Threats

Exotic grasses and forbs were observed encroaching into saltmarsh derived habitat, particularly *Megathyrsus maximus* (Guinea grass) often in conjunction with existing anthropogenic disturbance. The presence of exotic grasses can outcompete native salt tolerant species and form dense monocultures reducing structural diversity. This eliminates microhabitats used by native fauna including invertebrates and fish which provide a food source of the water mouse and threatened migratory bird species. Dense patches of exotic grasses have the potential to increase fuel loads raising fire risk in habitat not adapted to frequent burning. Fire frequency and intensity can further degrade saltmarsh habitat and facilitate post-fire invasion by exotic flora species.

Dumping of waste as well as tidal deposition of rubbish was noted during field surveys in Section E of the Project Area. Debris can smother vegetation, alter hydrology, and introduce invasive species which can directly affect the habitat of the water mouse and threatened migratory shorebirds. The presence of waste/rubbish reduces the suitability of this habitat type as a nursery for fish species or foraging opportunities for crustaceans. This leads to a reduced food availability for the water mouse and threatened migratory shorebirds.



Photo 5.6 Tidal Flats Dominated by Mangroves, Sedges and Grasses

5.2.2.7 Semi-evergreen Vine Thicket

Habitat Description

This habitat type (**Photo 5.7**) is often confined to the steep slopes, hills and gullies of the Project Area that are well shaded or associated with south facing slopes. It is analogous with remnant and regrowth RE 11.11.18 and comprises a dense vine thicket assemblage of species occasional with rocky patches or boulders. Although the flora species complex present generally varies between each of the synonymous REs, there is consistency in that a high diversity of flora species is often present. Within the Project Area, species in the canopy layer can include *Terminalia porphyrocarpa*, *Secamone elliptica*, *Ficus rubiginosa*, *Alectryon tomentosus* and *Alphitonia excelsa*. The shrub layers can include *Psydrax odorata, Jasminum simplicifolium, Alphitonia excelsa and Alyxia ruscifolia, Cupaniopsis anacardioides, Drypetes deplanchei, Grewia latifolia, Psydrax oleifolia, Breynia oblongifolia, Lantana camara** and *Vachellia bidwillii*. Ground cover is often sparse; however, it can include *Aristida gracilipes, Enneapogon lindleyanus, Cyperus gracilis, Melhania oblongifolia* and *Panicum effusum*.

Habitat Features and Potential MNES

Vine thicket habitat can provide microclimate refugia in the form of denning and shelter opportunities through presence of cracks, crevices and small overhangs, suitable for northern quoll. Similarly, dense leaf litter and rock scree may also provide a variety of microhabitat features for small reptiles, mammals and amphibians which may be prey source for this species.

Grey-headed flying-fox may forage on fruiting canopy species within this habitat type. This habitat has a high degree of complexity and diversity of flora species, making it suitable for a range of ground-dwelling mammals, small reptiles and birds. Habitat may be suitable for the threatened, black-breasted button quail when suitably thick leaf litter and open understorey is present.

Threatened plants such as *Cycas megacarpa*, *Cossinia australiana* and *Samadera bidwillii* may occur within this habitat type as well as in ecotones shared with open eucalypt woodlands.

Observed Threats

*Lantana camara** was commonly observed throughout the Project Area with some areas forming impenetrable thickets. The presence of this species may significantly alter the regularity and intensity of fires in this habitat type. Alteration of the structure of this habitat type by *Lantana camara** may also encourage the incursion of pest species such as pigs and cats as well as domestic cattle, which can further impact the structure of the vegetation and its suitability for MNES. Incursion of pest species also encourages the infiltration of exotic weed species altering and degrading ground cover composition thereby reducing or changing the leaf litter thickness reducing foraging habitat for the black-breasted button quail.

Grazing was noted in this habitat type with domestic stock degrading ground cover, compacting soil, and hindering regeneration, facilitating weed invasion and increasing fire vulnerability. As described above this may impact the suitability of this habitat for northern quoll and black-breasted button quail.



Photo 5.7 Semi-evergreen Vine Thicket

5.2.2.8 Modified Landscapes, Artificial Water Bodies and Wetlands

Habitat Description

This habitat type incorporates modified landscapes, inclusive of artificial water bodies and modified wetlands, as well as non-remnant areas cleared for agricultural purposes.

Artificial water bodies and wetlands are scattered throughout the Project Area in the form of dams and ephemeral wetlands that contain water during periods of increased rainfall, however, have been modified for landholder use. As the primary land use of the Project Area is for cattle grazing, the water sources are predominately artificial farm dams designs to provide a reliable water source for cattle.

Non-remnant scattered vegetation previously cleared for agricultural purposes, contains high levels of exotic pastures and scattered access tracks or other infrastructure. Cleared pasture is common in Section B and C of the Project Area. Examples of highly modified areas consisting of non-remnant vegetation observed within the Project Area (**Photo 5.8**).

Habitat Features and Potential MNES

Exotic grasses are prominent, and mature trees and tree canopies have been removed through broadscale clearing and ongoing grazing pressure, making it largely unsuitable for the majority of MNES. Due to historical clearing, non-remnant vegetation within the Project Area typically did not contain hollow-bearing trees or suitably sized large trees for threatened arboreal mammals such as the greater glider (southern and central). This fauna habitat type supports scattered shrubs, grass (native and non-native), farm dams and other water sources (troughs, ephemeral drainage lines). It is usually intersected by small, marginal vegetated creek lines which offer some shelter to fauna (mostly birds) using the open spaces to forage or disperse. Large portions of this habitat type are dominated by exotic grass species, with some locations designated for growing fodder for cattle.

Observed Threats

Grazing impacts are generally high, with occasional areas of bare exposed ground. Although the ground cover is often dense and dominated by exotics, available water resources exist, and squatter pigeon (southern) was typically observed within this habitat type utilising access tracks and cattle yards. The presence of water within this habitat provides a reliable water source for a range of native birds, mammals and amphibians as well as exotic cane toads (*Rhinella marina*). Within the farm dams and modified wetlands, this habitat may provide marginally suitable habitat for wetland birds as well as threatened MNES such as squatter pigeon (southern), particularly during periods of high rainfall.

Due to the ongoing utilisation by cattle, these dams are often highly turbid due to intermittent access by cattle. They also harbour cane toads, known to be toxic to many native fauna species, when ingested, including northern quoll.

Feral species such as pigs and cats are likely to occur commonly within this habitat type given its modified nature and ease of dispersibility.



Photo 5.8 Non-remnant Paddocks and Pasture

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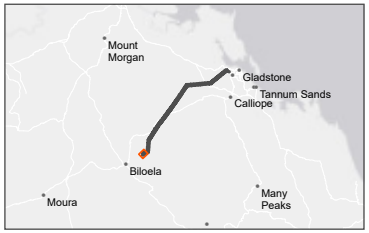
FIGURE 5.2-1
Fauna Habitat Types

Legend

- Watercourse
- Railway
- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Habitat Types

- Ironbark woodland to open woodland on hills and ranges
- Modified landscapes, artifical waterbodies and wetlands



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Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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FIGURE 5.2-2

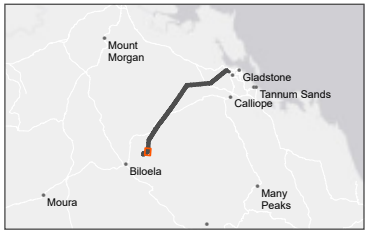
Fauna Habitat Types

Legend

- Watercourse
- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Habitat Types

- Acacia dominated open forest to woodland with emergent Eucalypts or Blakella on sandstone derived soils
- Eucalypt dominated open forests to woodlands on hills and ranges
- Eucalypt or Melaleuca dominated open forest to woodlands fringing drainage lines or floodplains
- Ironbark woodland to open woodland on hills and ranges
- Modified landscapes, artifical waterbodies and wetlands
- Semi-evergreen vine thicket



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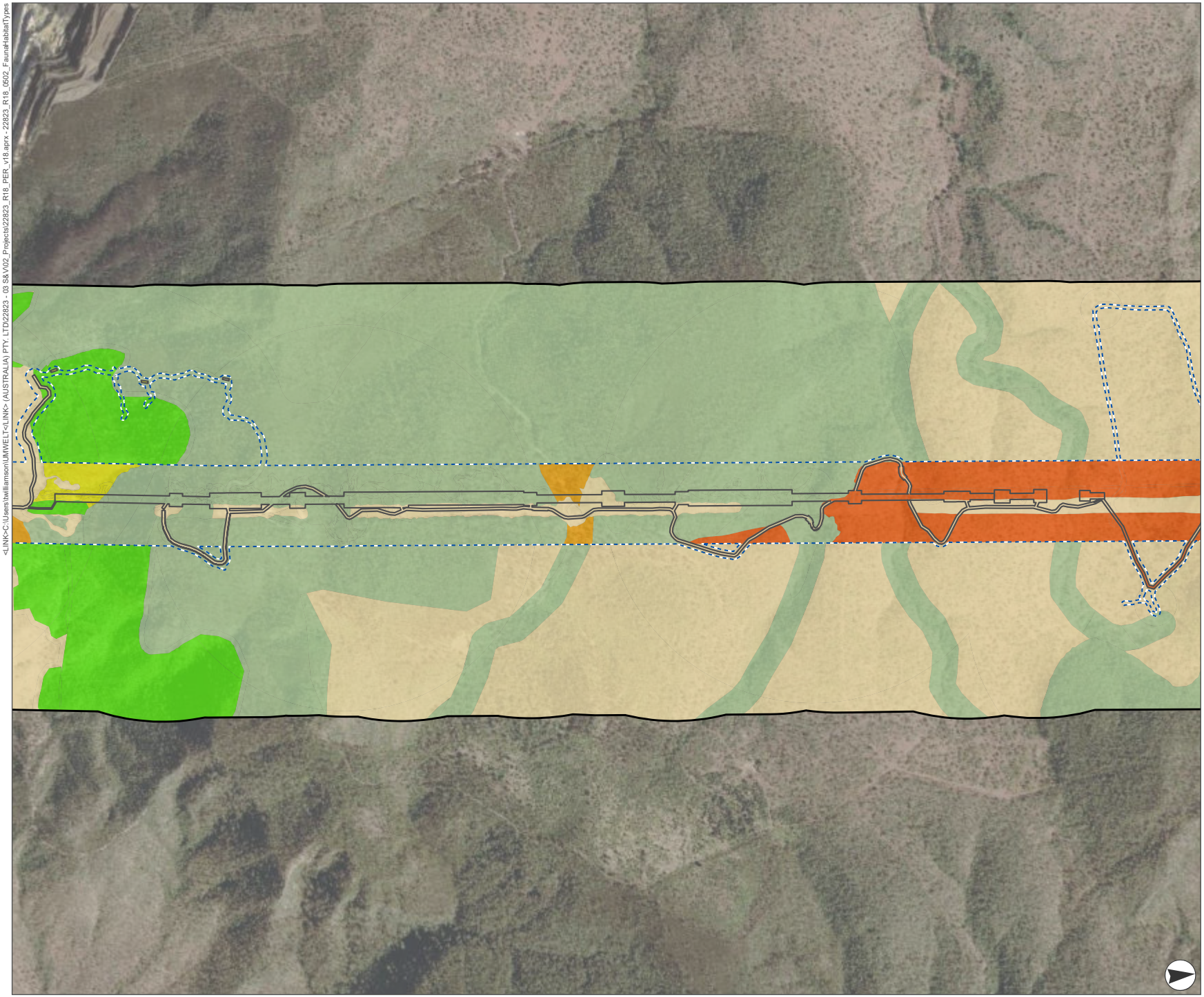


FIGURE 5.2-3

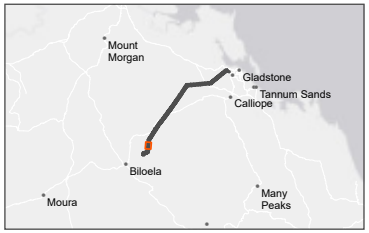
Fauna Habitat Types

Legend

- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Habitat Types

- Acacia dominated open forest to woodland with emergent Eucalypts or Blakella on sandstone derived soils
- Eucalypt dominated open forests to woodlands on hills and ranges
- Eucalypt or Melaleuca dominated open forest to woodlands fringing drainage lines or floodplains
- Ironbark woodland to open woodland on hills and ranges
- Modified landscapes, artifical waterbodies and wetlands
- Semi-evergreen vine thicket



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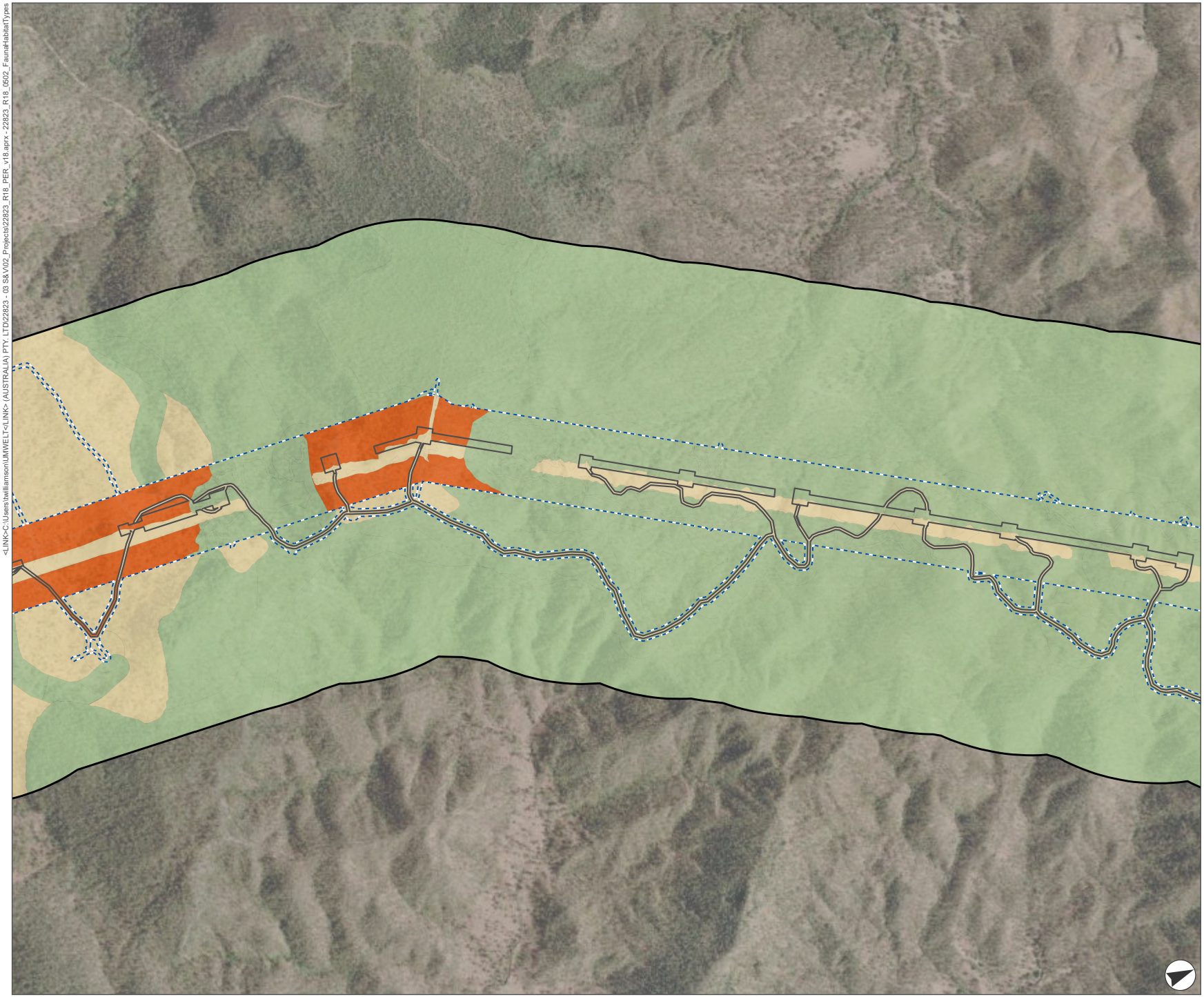


FIGURE 5.2-4

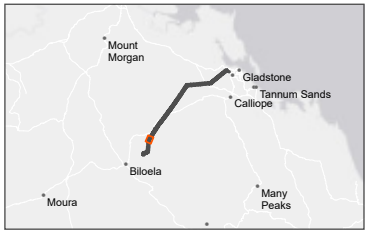
Fauna Habitat Types

Legend

- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Habitat Types

- Eucalypt dominated open forests to woodlands on hills and ranges
- Ironbark woodland to open woodland on hills and ranges
- Modified landscapes, artifical waterbodies and wetlands



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Kilometres

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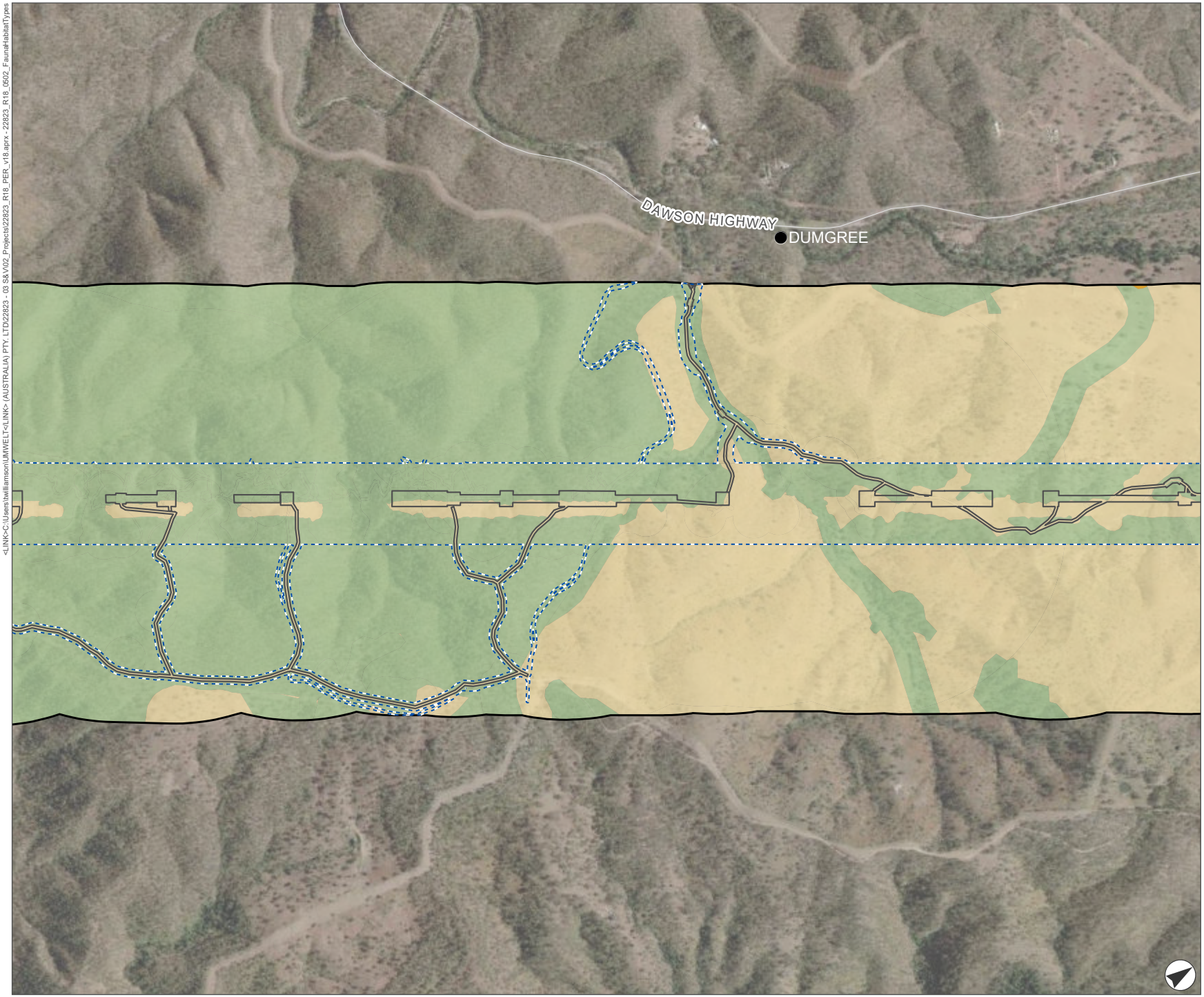


FIGURE 5.2-5

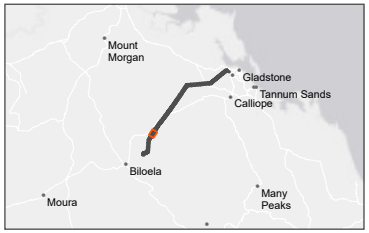
Fauna Habitat Types

Legend

- Roads
- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Habitat Types

- Eucalypt or Melaleuca dominated open forest to woodlands fringing drainage lines or floodplains
- Ironbark woodland to open woodland on hills and ranges
- Modified landscapes, artifical waterbodies and wetlands



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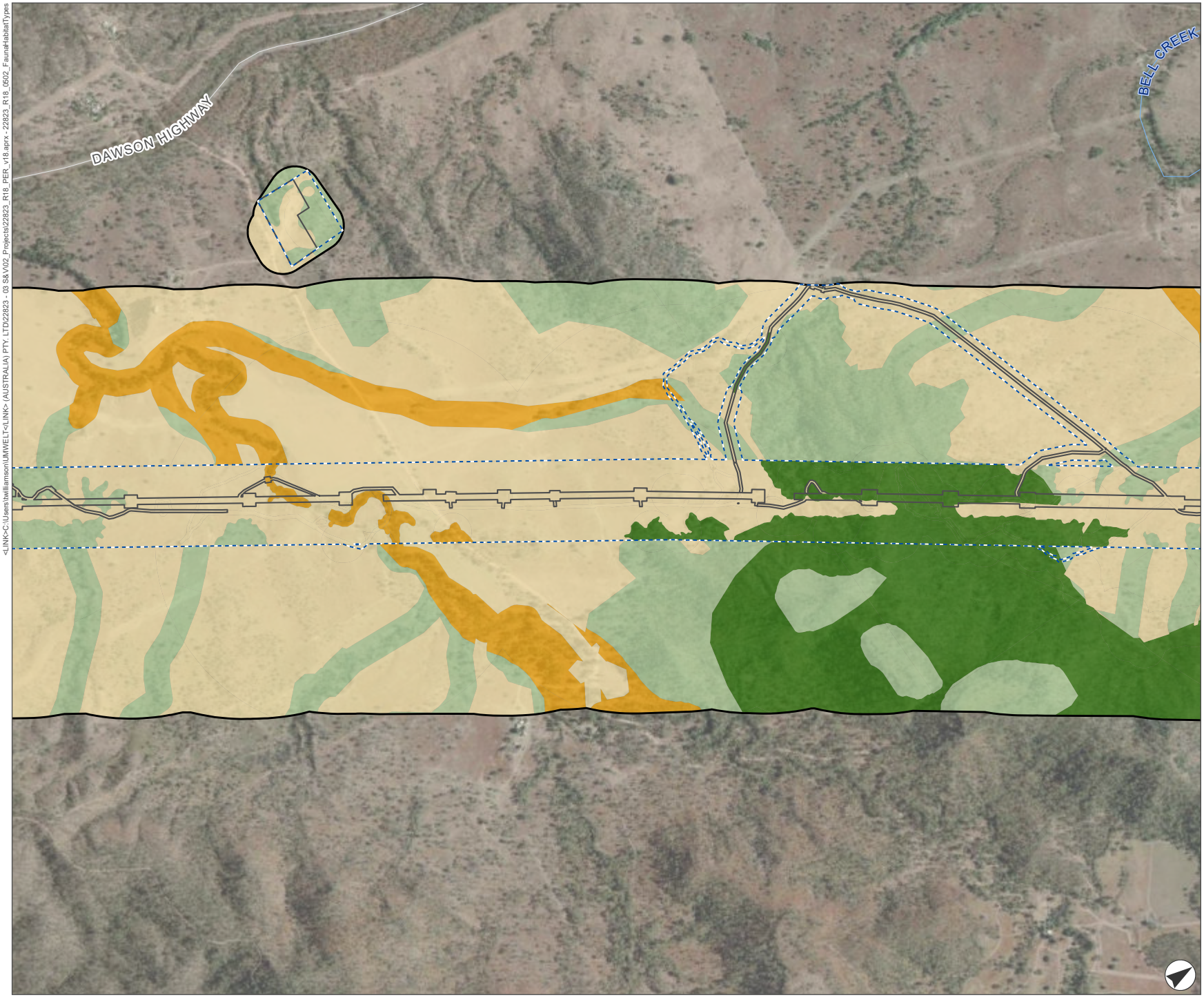


FIGURE 5.2-6

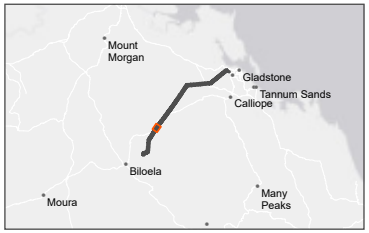
Fauna Habitat Types

Legend

- Roads
- Watercourse
- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Habitat Types

- Blakella citriodora open forest to woodlands
- Eucalypt or Melaleuca dominated open forest to woodlands fringing drainage lines or floodplains
- Ironbark woodland to open woodland on hills and ranges
- Modified landscapes, artifical waterbodies and wetlands



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Kilometres

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FIGURE 5.2-7

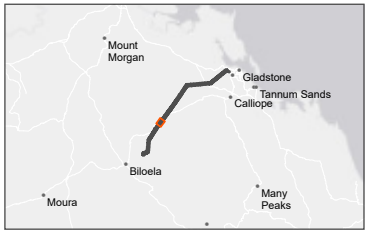
Fauna Habitat Types

Legend

- Roads
- Watercourse
- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Habitat Types

- Blakella citriodora open forest to woodlands
- Eucalypt or Melaleuca dominated open forest to woodlands fringing drainage lines or floodplains
- Ironbark woodland to open woodland on hills and ranges
- Modified landscapes, artifical waterbodies and wetlands



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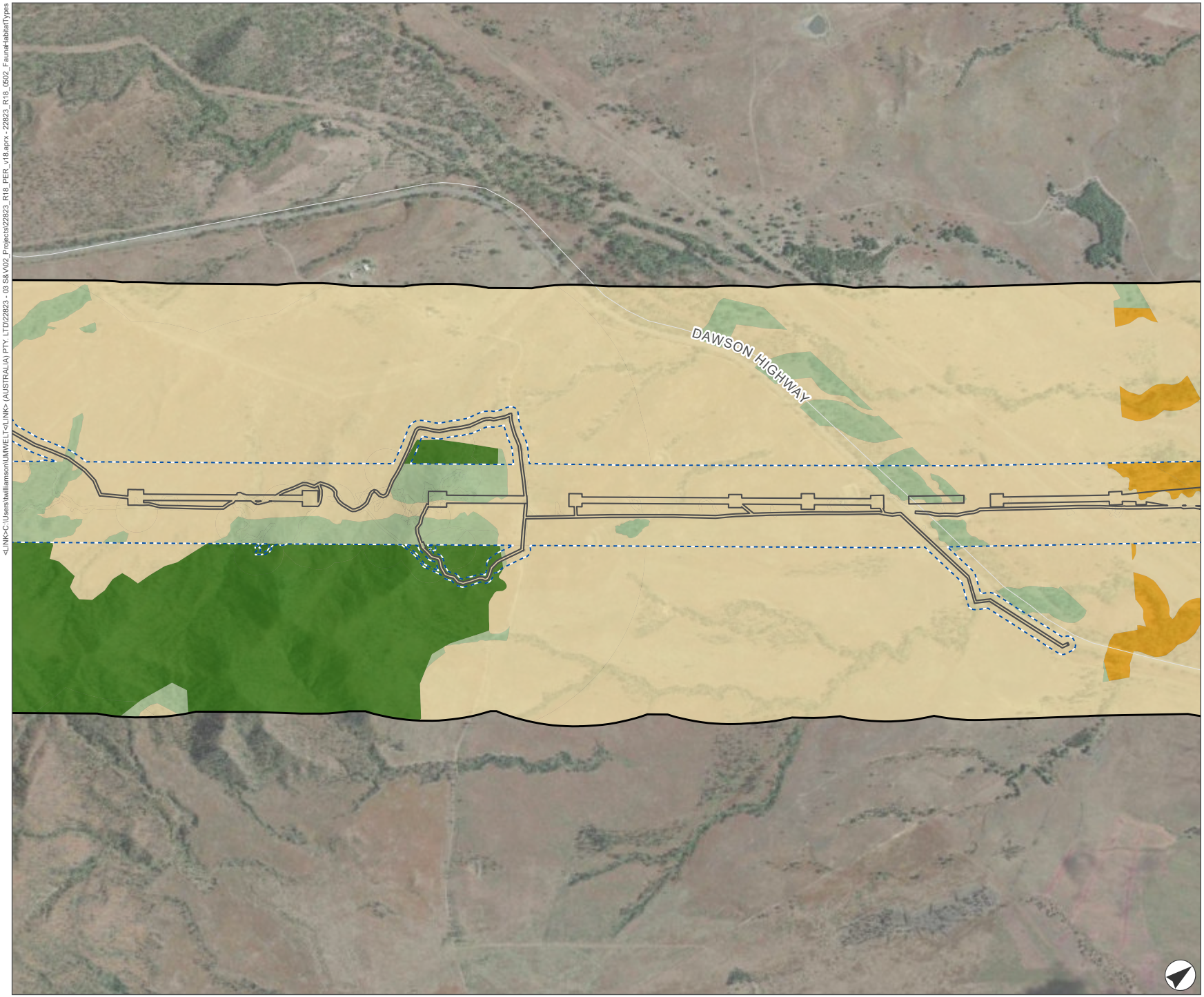


FIGURE 5.2-8

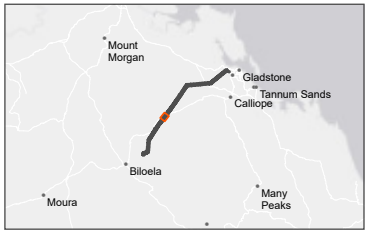
Fauna Habitat Types

Legend

- Roads
- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Habitat Types

- Blakella citriodora open forest to woodlands
- Eucalypt or Melaleuca dominated open forest to woodlands fringing drainage lines or floodplains
- Ironbark woodland to open woodland on hills and ranges
- Modified landscapes, artifical waterbodies and wetlands



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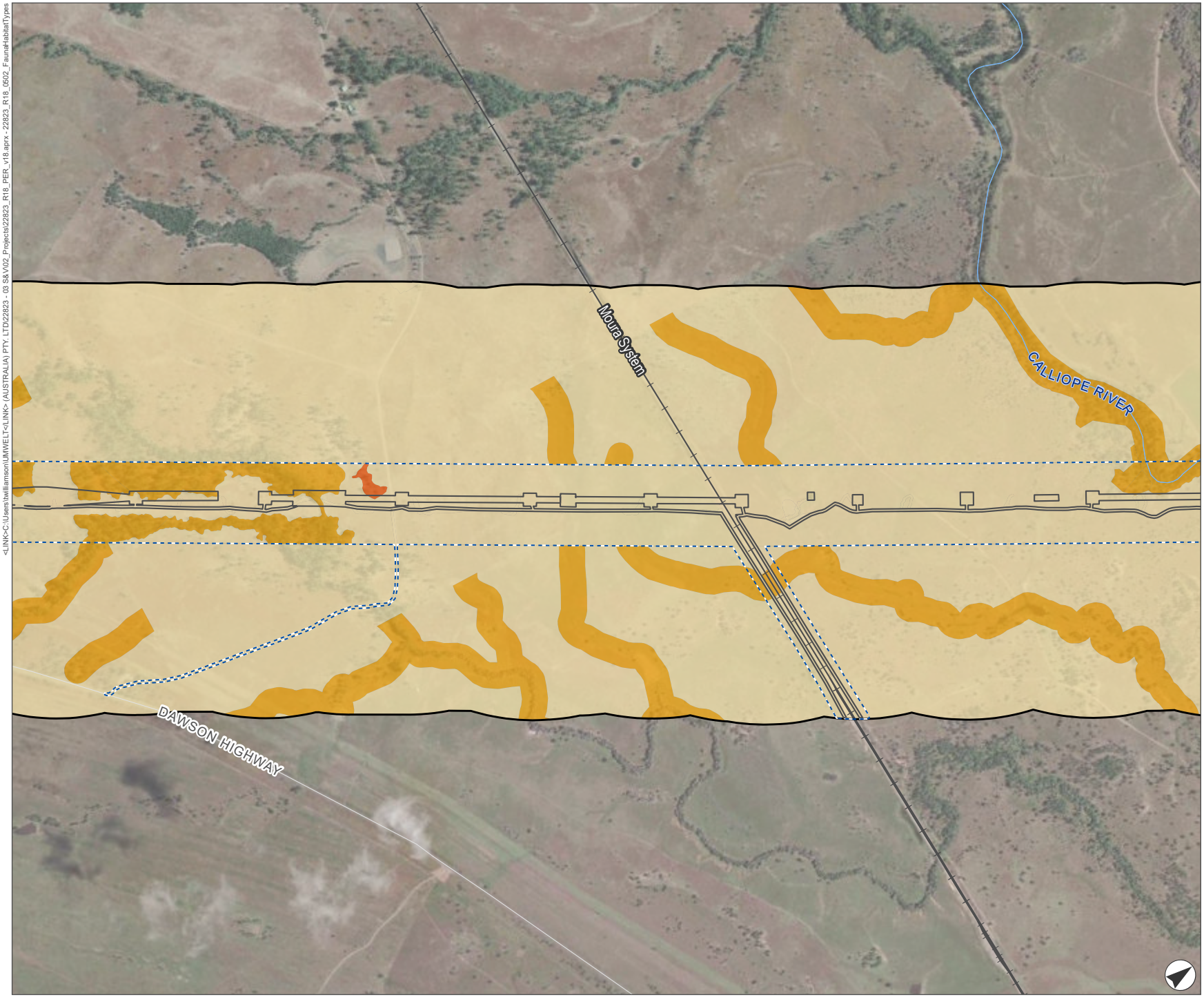


FIGURE 5.2-9

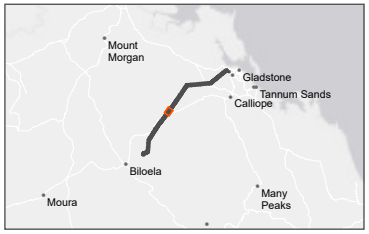
Fauna Habitat Types

Legend

- Roads
- Watercourse
- Railway
- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Habitat Types

- Eucalypt dominated open forests to woodlands on hills and ranges
- Eucalypt or Melaleuca dominated open forest to woodlands fringing drainage lines or floodplains
- Modified landscapes, artifical waterbodies and wetlands



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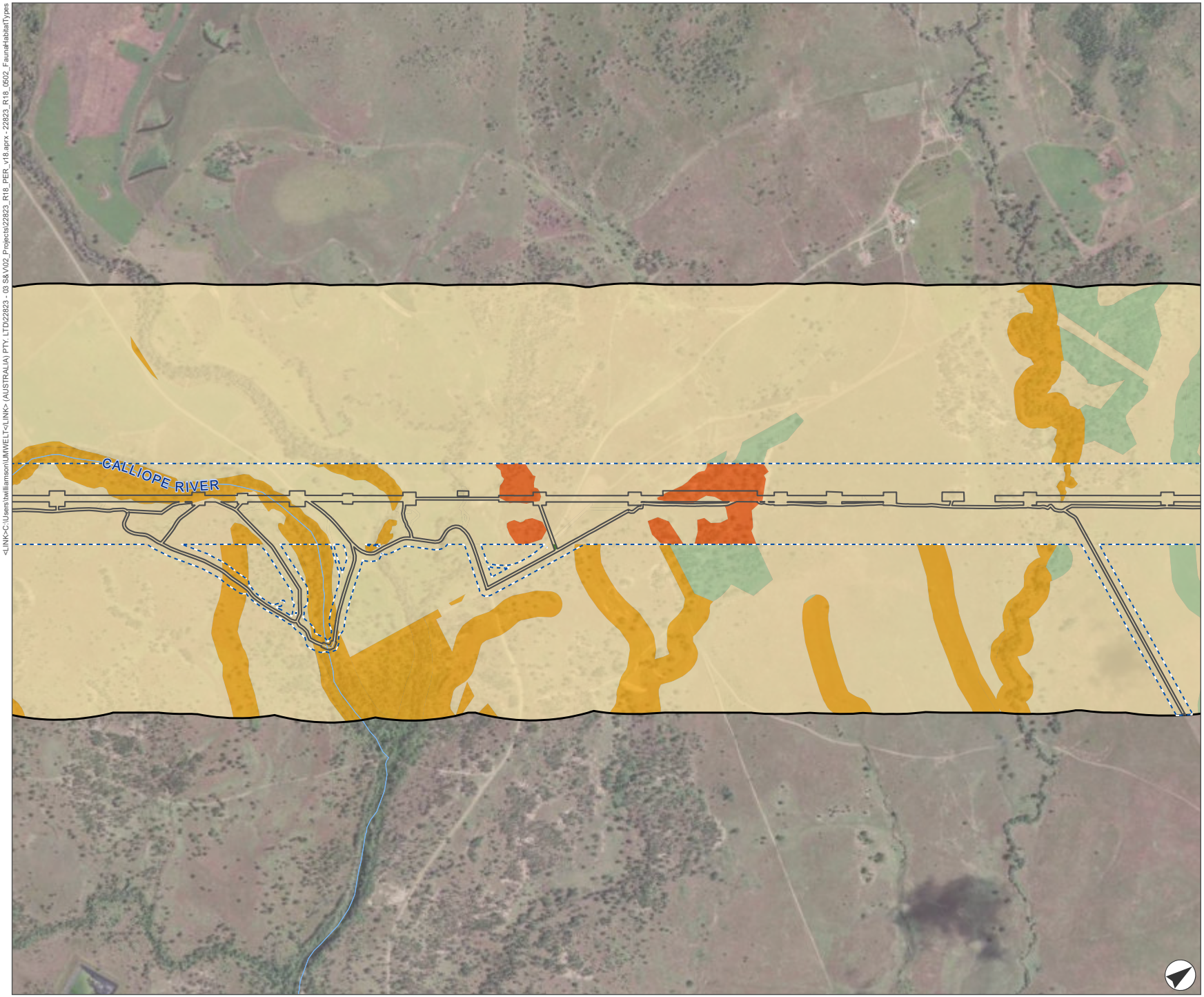


FIGURE 5.2-10

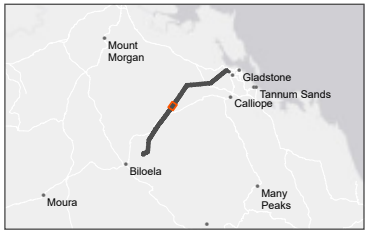
Fauna Habitat Types

Legend

- Watercourse
- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Habitat Types

- Blakella citriodora open forest to woodlands
- Eucalypt dominated open forests to woodlands on hills and ranges
- Eucalypt or Melaleuca dominated open forest to woodlands fringing drainage lines or floodplains
- Ironbark woodland to open woodland on hills and ranges
- Modified landscapes, artifical waterbodies and wetlands



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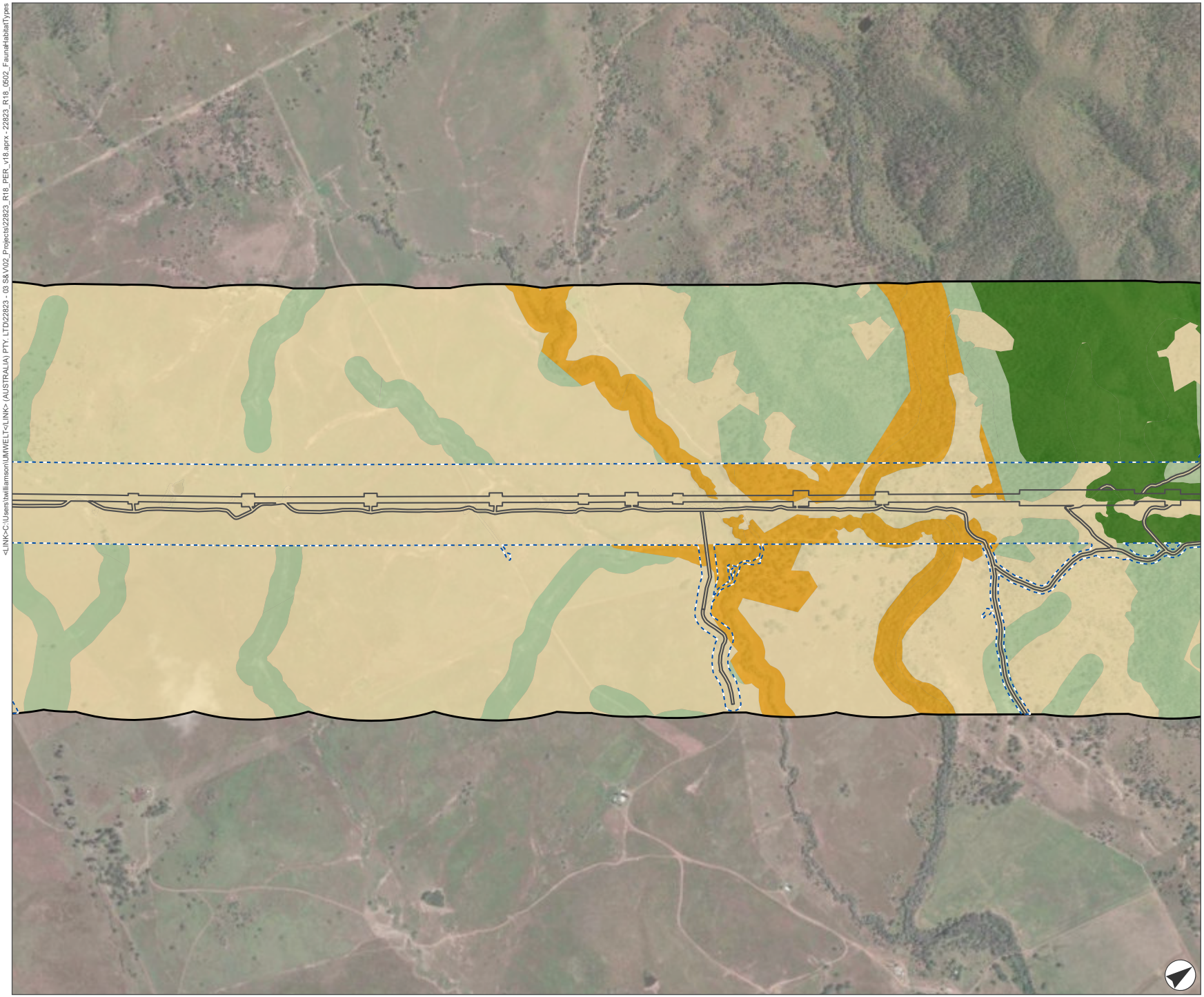


FIGURE 5.2-11

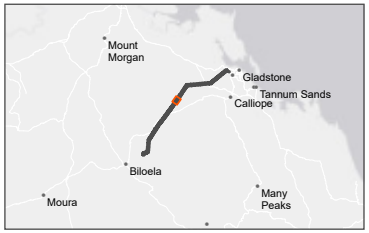
Fauna Habitat Types

Legend

- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Habitat Types

- Blakella citriodora open forest to woodlands
- Eucalypt or Melaleuca dominated open forest to woodlands fringing drainage lines or floodplains
- Ironbark woodland to open woodland on hills and ranges
- Modified landscapes, artifical waterbodies and wetlands



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FIGURE 5.2-12

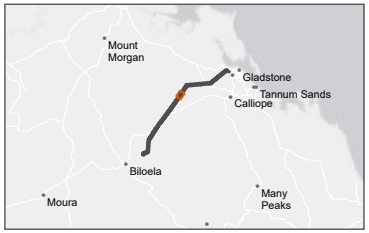
Fauna Habitat Types

Legend

- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Habitat Types

- Blakella citriodora open forest to woodlands
- Eucalypt or Melaleuca dominated open forest to woodlands fringing drainage lines or floodplains
- Ironbark woodland to open woodland on hills and ranges
- Modified landscapes, artifical waterbodies and wetlands



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FIGURE 5.2-13

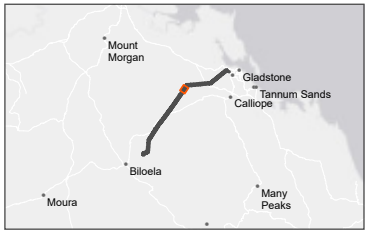
Fauna Habitat Types

Legend

- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Habitat Types

- Blakella citriodora open forest to woodlands
- Ironbark woodland to open woodland on hills and ranges
- Modified landscapes, artifical waterbodies and wetlands
- Semi-evergreen vine thicket



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FIGURE 5.2-14

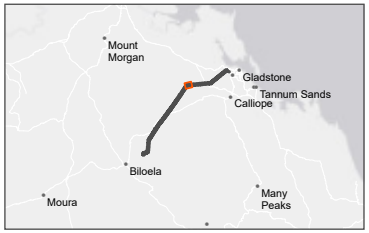
Fauna Habitat Types

Legend

- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Habitat Types

- Blakella citriodora open forest to woodlands
- Eucalypt or Melaleuca dominated open forest to woodlands fringing drainage lines or floodplains
- Ironbark woodland to open woodland on hills and ranges
- Modified landscapes, artifical waterbodies and wetlands
- Semi-evergreen vine thicket



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FIGURE 5.2-15

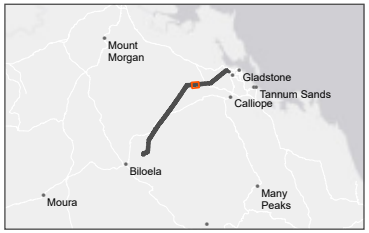
Fauna Habitat Types

Legend

- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Habitat Types

- Eucalypt or Melaleuca dominated open forest to woodlands fringing drainage lines or floodplains
- Ironbark woodland to open woodland on hills and ranges
- Modified landscapes, artifical waterbodies and wetlands



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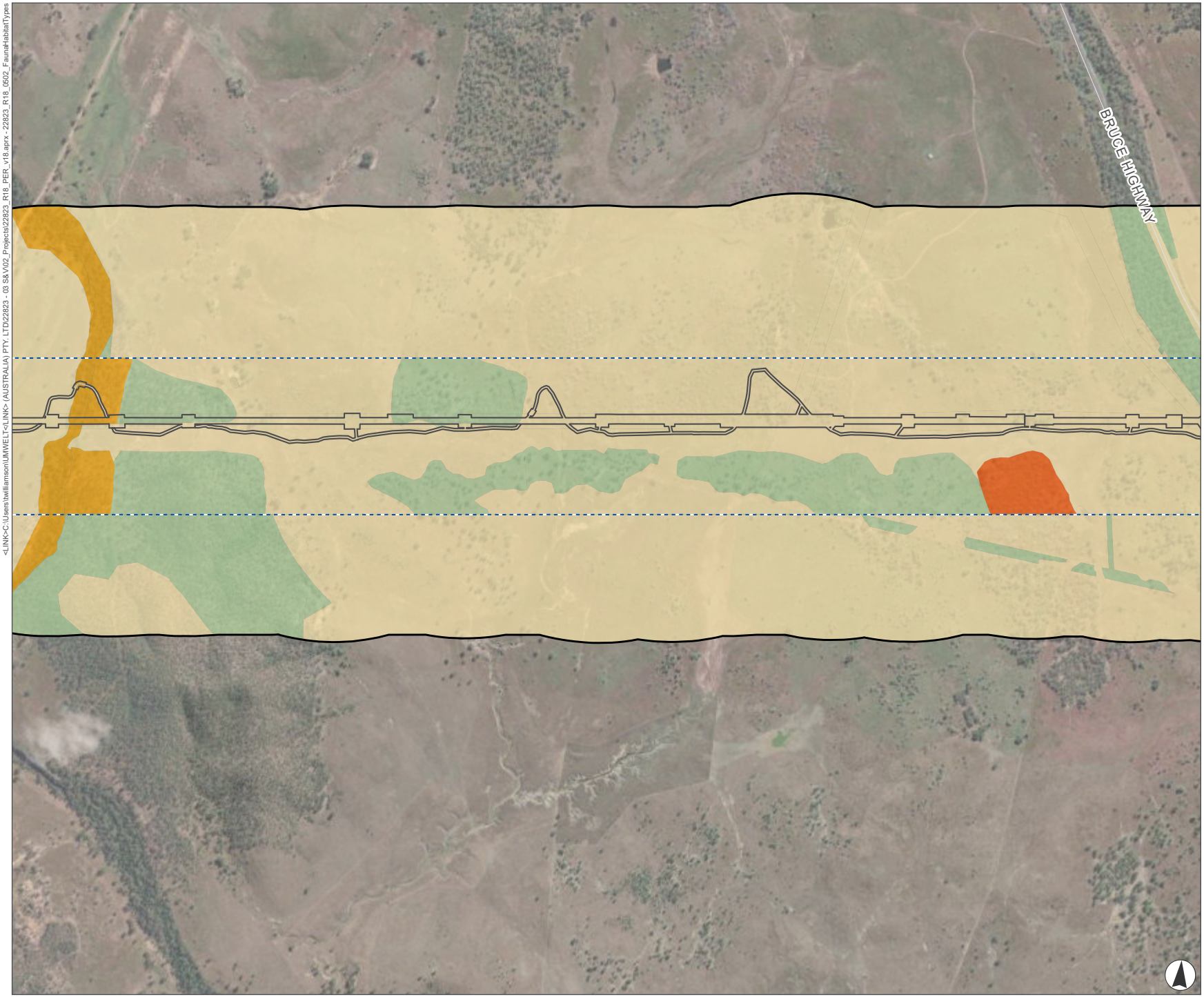


FIGURE 5.2-16

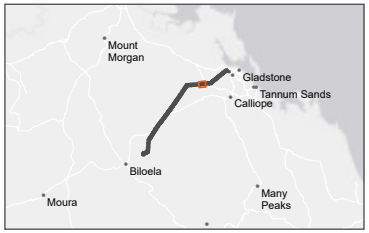
Fauna Habitat Types

Legend

- Roads
- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Habitat Types

- Eucalypt dominated open forests to woodlands on hills and ranges
- Eucalypt or Melaleuca dominated open forest to woodlands fringing drainage lines or floodplains
- Ironbark woodland to open woodland on hills and ranges
- Modified landscapes, artifical waterbodies and wetlands



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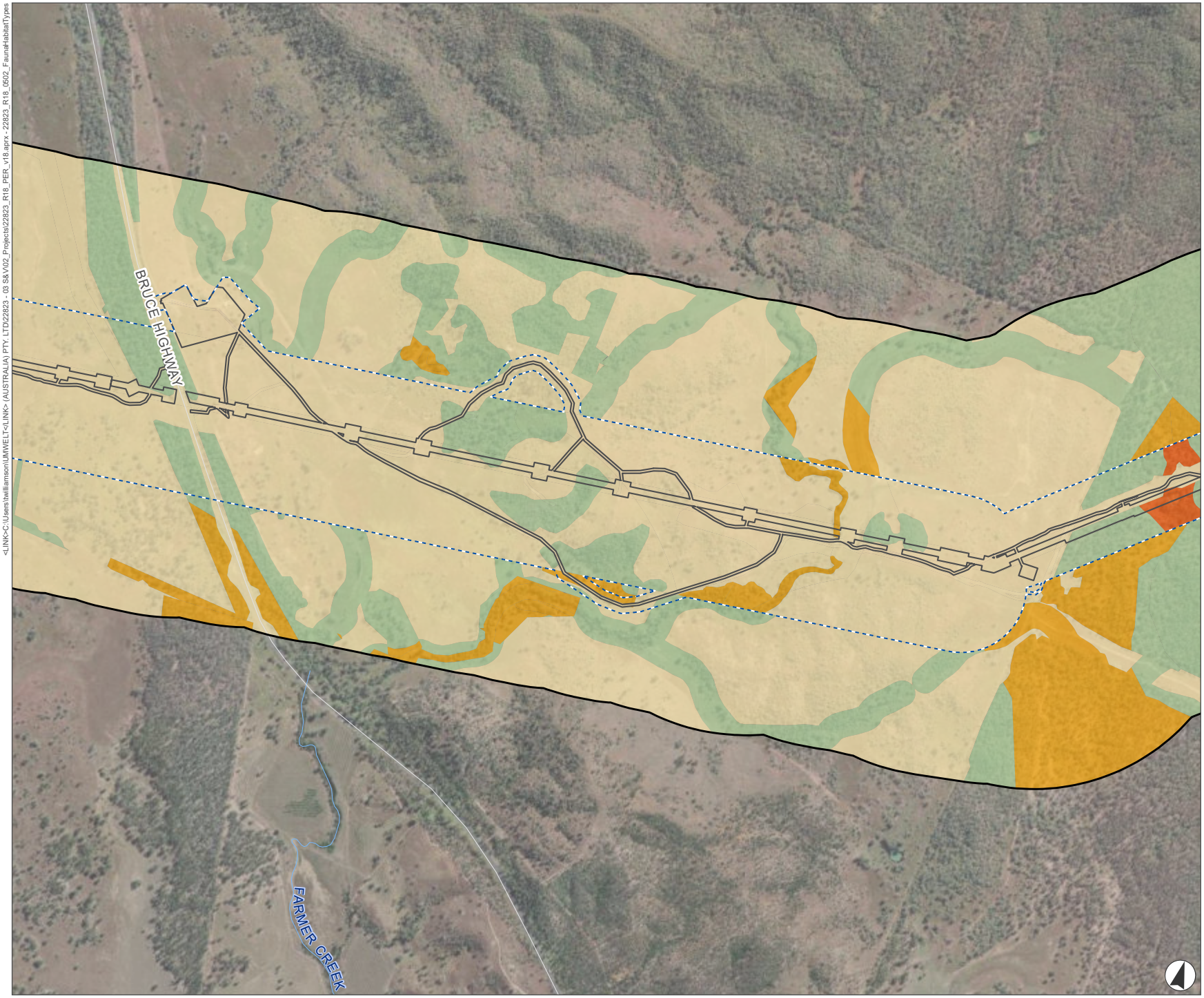


FIGURE 5.2-17

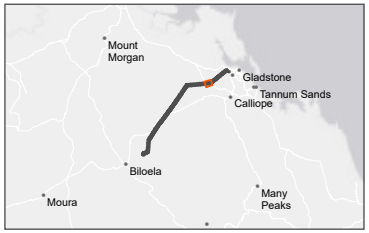
Fauna Habitat Types

Legend

- Roads
- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Habitat Types

- Eucalypt dominated open forests to woodlands on hills and ranges
- Eucalypt or Melaleuca dominated open forest to woodlands fringing drainage lines or floodplains
- Ironbark woodland to open woodland on hills and ranges
- Modified landscapes, artifical waterbodies and wetlands



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FIGURE 5.2-18

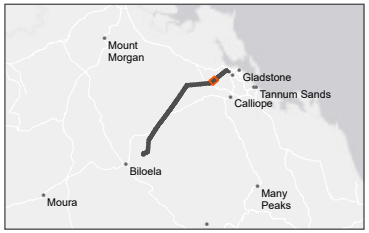
Fauna Habitat Types

Legend

- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Habitat Types

- Blakella citriodora open forest to woodlands
- Eucalypt dominated open forests to woodlands on hills and ranges
- Eucalypt or Melaleuca dominated open forest to woodlands fringing drainage lines or floodplains
- Ironbark woodland to open woodland on hills and ranges
- Modified landscapes, artifical waterbodies and wetlands



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FIGURE 5.2-19

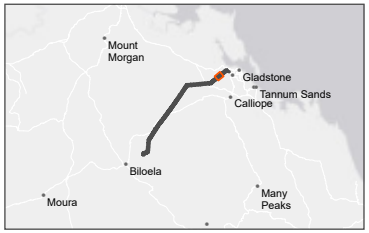
Fauna Habitat Types

Legend

- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Habitat Types

- Blakella citriodora open forest to woodlands
- Eucalypt or Melaleuca dominated open forest to woodlands fringing drainage lines or floodplains
- Ironbark woodland to open woodland on hills and ranges
- Modified landscapes, artifical waterbodies and wetlands
- Semi-evergreen vine thicket



0 0.5 1

Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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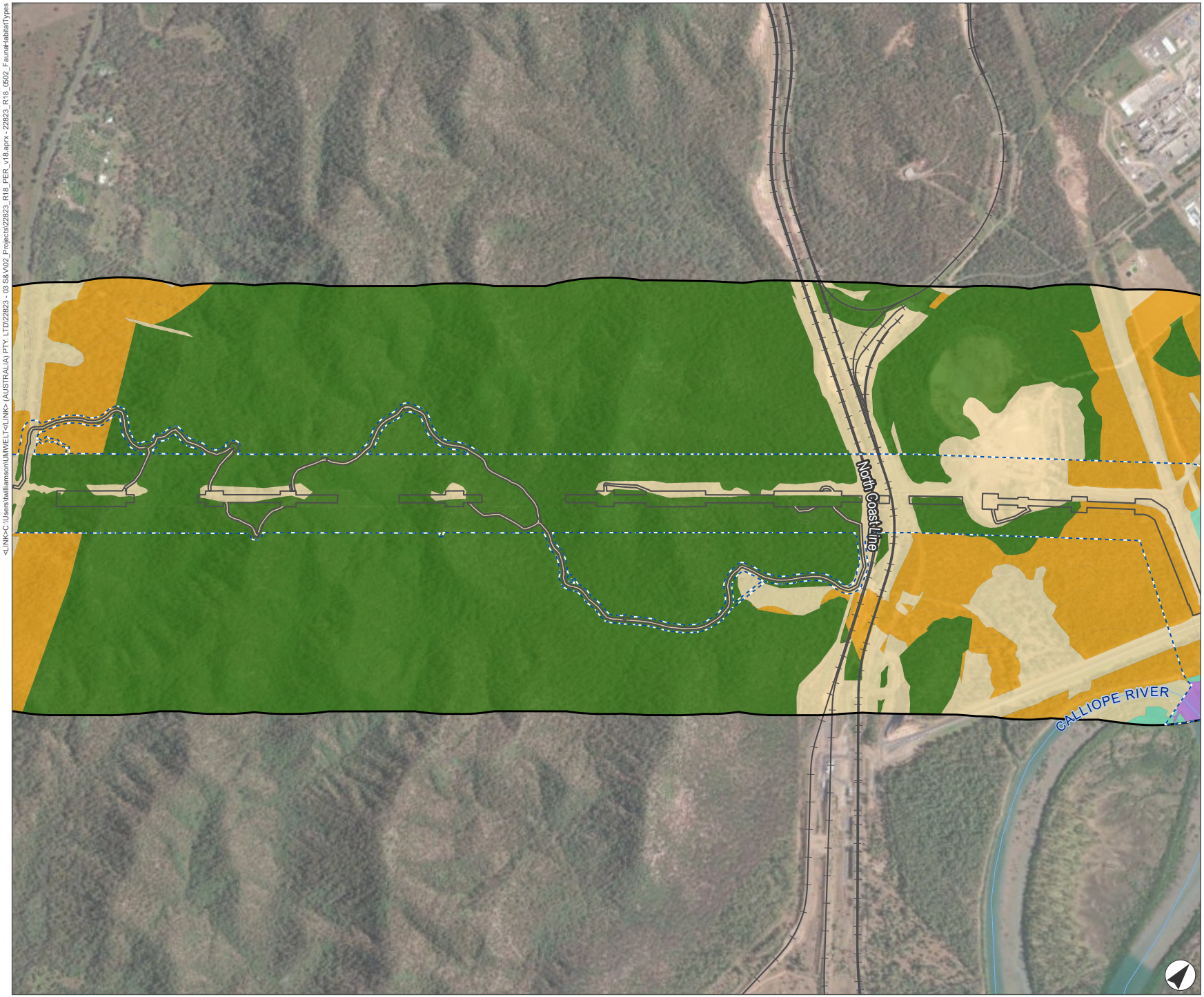


FIGURE 5.2-20

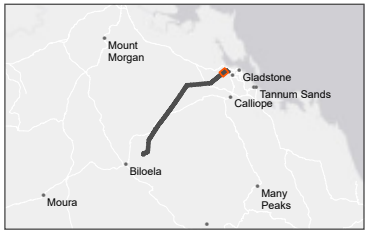
Fauna Habitat Types

Legend

- Watercourse
- Railway
- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Habitat Types

- Blakella citriodora open forest to woodlands
- Eucalypt or Melaleuca dominated open forest to woodlands fringing drainage lines or floodplains
- Intertidal zones and estuaries
- Modified landscapes, artifical waterbodies and wetlands
- Tidal flats dominated by mangroves, sedges and grasses



0 0.5 1

Kilometres

Scale 1:20,000 at A4
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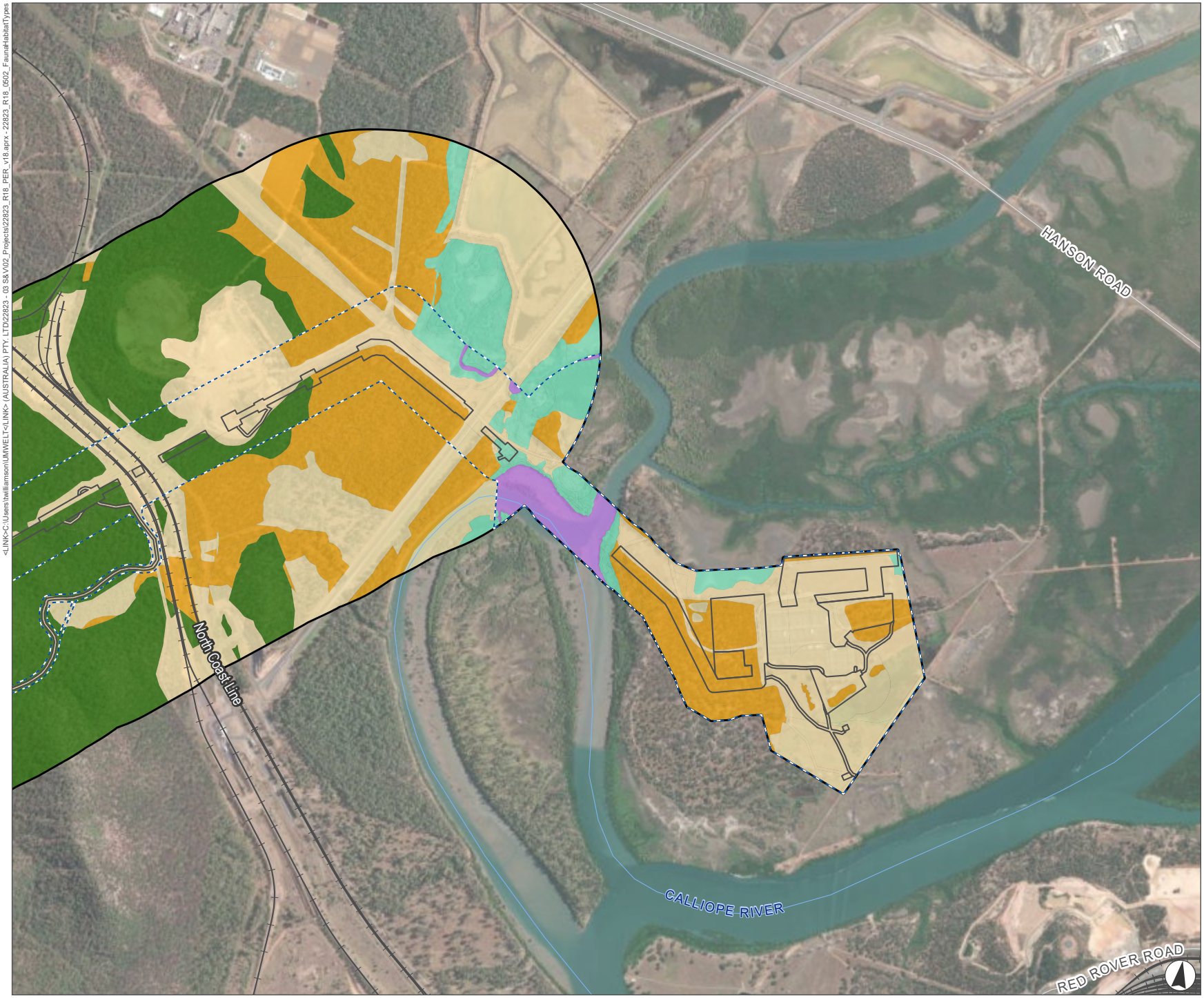


FIGURE 5.2-21

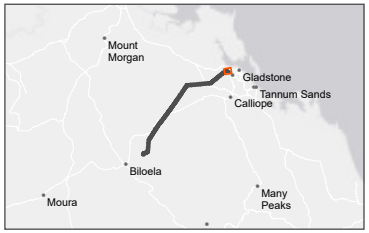
Fauna Habitat Types

Legend

- Roads
- Watercourse
- Railway
- Field Survey Extent
- Disturbance Footprint
- Project Area

Fauna Habitat Types

- Blakella citriodora open forest to woodlands
- Eucalypt or Melaleuca dominated open forest to woodlands fringing drainage lines or floodplains
- Intertidal zones and estuaries
- Modified landscapes, artifical waterbodies and wetlands
- Tidal flats dominated by mangroves, sedges and grasses



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Kilometres

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5.2.3 Flora and Fauna Diversity

5.2.3.1 Flora

A total of 386 flora species from 75 families and 237 genera were identified during the field surveys. The plant families representing the most taxa were Leguminosae (57 taxa), Poaceae (48 taxa), Myrtaceae (28 taxa) and Asteraceae (27 taxa).

A total of 80 introduced species were identified within the Project Area, which are discussed further in **Section 5.2.4**. A list of all flora species identified within the Project Area is provided in **Appendix I**.

5.2.3.2 Fauna

A total of 185 fauna species were recorded during the field surveys, comprising 129 birds, 44 mammals, six reptiles and six amphibians. A total of 10 introduced fauna species were recorded within the Project Area which are further discussed in **Section 5.2.5**. The full list of species recorded within the Project Area is provided in **Appendix I.**

Birds

A total of 129 birds were recorded during the field surveys. This includes a range of commonly occurring birds of the region occupying various bird groups. Bird groups and example species observed include:

- Birds of prey–Brown falcon (*Falco berigora*), nankeen kestrel (*Falco cenchroides*), wedge-tailed eagle (*Aquila audax*), whistling kite (*Haliastur sphenurus*), black kite (*Milvus migrans*) and brahminy kite (*Haliastur indus*).
- Parrots–Australian king-parrot (*Alisterus scapularis*), red-winged parrot (*Aprosmictus erythropterus*), sulphur-crested cockatoo (*Cacatua galerita*), red-tailed black cockatoo (*Calyptorhynchus banksii*), pale-headed rosella (*Platycercus adscitus*) and lorikeet species (*Trichoglossus* spp.).
- Nocturnal birds–Australian owlet-nightjar (*Aegotheles cristatus*), white-throated nightjar (*Eurostopodus mystacalis*) and tawny frogmouth (*Podargus strigoides*).
- Wetland / waterbirds–Australasian grebe (*Tachybaptus novaehollandiae*), Australian wood duck (*Chenonetta jubata*), black-winged stilt (*Himantopus himantopus*), egrets (*Egretta* spp.) and herons (*Ardea* spp.).
- Woodland birds–including small woodland birds such as varied sittella (*Daphoenositta chrysoptera*), weebill (*Smicrornis brevirostris*) and eastern yellow robin (*Eopsaltria australis*), as well as various honeyeater species and larger woodland birds including grey crowned babbler (*Pomatostomus temporalis*) and pied currawong (*Strepera graculina*).

One bird species listed under the EPBC Act was recorded within the Project Area: squatter pigeon (southern).

Mammals

A total of 44 mammal species were recorded during the field surveys, including five macropod species, 20 bat species, three arboreal mammals, seven ground-dwelling mammals and nine feral species.

Two mammal species is listed under the EPBC Act were recorded within the Field Survey Extent; the grey-headed flying-fox and koala.

Reptiles and Amphibians

Six amphibians (including one introduced species) and six reptile species were recorded during the field surveys. These species include the green treefrog (*Litoria caerulea*), broad-palmed rocketfrog (*Litoria latopalmata*), salmon striped frog (*Limnodynastes salmini*), ornate burrowing frog (*Platyplectrum ornatum*), copper backed broodfrog (*Pseudophryne raveni*) and cane toad (*Rhinella marina*). The reptile species include tommy roundhead (*Diporiphora australis*), carpet python (*Morelia spilota*), bearded dragon (*Pogona barbata*), barking gecko (*Underwoodisaurus milii*) and collared delma (*Delma torquata*).

Collared delma is listed under the EPBC Act and was recorded within the Field Survey Extent.

5.2.4 Weeds

Multiple Weeds of National Significance (WoNS) were detected across the Project Area during surveys, with varying distributions. Species such as *Lantana camara**, *Cryptostegia grandiflora**, and *Opuntia spp.**, are widespread, while others like *Dolichandra unguis-cati** are confined to a few riparian points. **Table 5.5** details the WoNS and Restricted Matters listed under the *Biosecurity Act 2014* that were recorded within the Project Area.

Restricted matter (Queensland) weeds also exhibited distinct patterns. *Sporobolus natalensis** and *S. pyramidalis** (giant rat's tail grass) are common in multiple properties, particularly in the eastern half of the Project Area (Section C-D), while *Lantana montevidensis** is prevalent in Sections A to D. Localised infestations included *Parthenium hysterophorus** to three landholder properties, and *Hymenachne amplexicaulis** alongside a single dam.

There remain large sections of the alignment that remain free of *Sporobolus natalensis** and *S. pyramidalis**, *Parthenium hysterophorus** and *Dolichandra unguis-cati**, which will be factored into the biosecurity plans during construction and operation of the Project.

Table 5.5 Occurence of WoNS and Restricted Matter (Queensland) Weeds within the Project Area

Weed Species	WoNS Status	QLD Biosecurity Status	Occurrence	Dominant Areas
Cat's claw creeper *Dolichandra unguis-cati**	**Yes**	**Restricted**	Occasional	Along Calliope River and Harper Creek in Section B
Chinese apple *Ziziphus mauritiana**	-	**Restricted**	Occasional	Section C, near Bruce Highway
Chinese celtis *Celtis sinensis**	-	**Restricted**	Individual	Near Harper Creek, Galletly property
Creeping lantana *Lantana montevidensis**	-	**Restricted**	Widespread	Widely established along length of the Project Area

Weed Species	WoNS Status	QLD Biosecurity Status	Occurrence	Dominant Areas
Dutchman's pipe *Aristolochia elegans**	-	**Restricted**	Occasional	Along Collards Creek in Section B and Oaky Creek in Section D
Giant rat's tail grass *Sporobolus natalensis** and *S. pyramidalis**	-	**Restricted**	Widespread	Dominant in parts of Section C and D and one area in mid-Section B
Groundsel bush *Baccharis halimifolia**	-	**Restricted**	Occasional	Section A
Hymenachne *Hymenachne amplexicaulis**	-	**Restricted**	Individual	At a single dam in mid-Section D
Lantana *Lantana camara**	**Yes**	**Restricted**	Widespread	Widely established throughout length of Project Area
Mother-of-millions *Bryophyllum delagoense**	-	**Restricted**	Occasional	Along Larcom Creek, Section C
Parthenium weed *Parthenium hysterophorus**	**Yes**	**Restricted**	Occasional	Sporadically dominant at northern portion of Section B and part of Section D
Prickly pear *Opuntia stricta**, & *O. tomentosa**	**Yes**	**Restricted**	Widespread	Widely established Along the length of the Project Area
Rubber vine *Cryptostegia grandiflora**	**Yes**	**Restricted**	Widespread	Widely established Along the length of the Project Area
Woolly senna *Senna hirsute**	-	**Restricted**	Individual	Sparse along Branch Creek, Section C
Yellow bells *Tecoma stans**	-	**Restricted**	Individual	Sparse along Farmer Creek, Section D
Yellow oleander *Cascabela thevetia**	-	**Restricted**	Occasional	Along Alma Creek and Calliope River in Section B

5.2.5 Introduced Fauna

A total of 10 introduced fauna species were identified within the Project Area during the field surveys. Five of the introduced species (including cane toad, cat, pig, rabbit and fox) are linked to EPBC Act Key Threatening Processes which have been detailed in **Chapter 6**. **Table 5.6** provides a breakdown of the introduced species identified within the Project Area, their corresponding EPBC Act Key Threatening Processes and status under the *Biosecurity Act 2014*.

Table 5.6 Introduced Fauna Recorded in Project Area

Common Name	Scientific Name	Queensland *Biosecurity Act 2014* Status	EPBC Act 'Key Threatening Processes'
Cattle	*Bos taurus**	-	-
Cat	*Felis catus**	Categories 3, 4, 6 restricted matter	Predation by feral cats on native species
Black rat	*Rattus rattus**	-	-
Pig	*Sus scrofa**	Categories 3, 4, 6 restricted matter	Predation, habitat degradation, competition, and disease transmission by feral pigs
Dingo	*Canis lupus familiaris**	Categories 3, 4, 6 restricted matter	-
Dog	*Canis familiaris**	Categories 3, 4, 6 restricted matter	-
Red fox	*Vulpes vulpes**	Categories 3, 4, 5, 6 restricted matter	Predation by European red fox
Rabbit	*Oryctolagus cuniculus**	Categories 3,4, 6 restricted matter	Competition and land degradation by rabbits
Cane toad	*Rhinella marina**	Invasive biosecurity matter	Lethal toxic poisoning, predation by cane toads, larval competition with frog tadpoles, parasitic transfer, competition for terrestrial food and competition for shelter sites
House mouse	*Mus musculus**	Invasive biosecurity matter	-

5.3 Threatened Ecological Communities

A total of 11 TECs were identified in the PMST results. As detailed in **Table 5.7**, six are known or potentially occurring in the desktop search extent based on the presence of suitable vegetation or state mapped REs. Of these, three were confirmed to be present within the Field Survey Extent and an additional TEC was modelled within the Project Area. These TECs, along with the vegetation assemblages / analogous REs which may constitute these TECs within the Project Area and their listing status, are discussed in **Sections 5.3.1.1** to **5.3.1.3**. Their extent is shown in **Figure 5.3**.

The remaining five TECs are considered unlikely to occur within the Project Extent as suitable vegetation assemblages / analogous REs were not identified via the desktop assessment or field surveys. The likelihood of occurrence assessment for all TECs is provided in **Appendix E**.

Table 5.7 TECs Identified from the PMST Database and Confirmed within or Adjacent to the Project Area

TEC	Corresponding REs within the Brigalow Belt or South East Queensland Bioregions within the Project Area	EPBC Act Status	Proximity to Project Area
Brigalow (*Acacia harpophylla* dominant and co-dominant) (Brigalow TEC)	11.4.3 (State mapped only) and 11.11.14	E	RE 11.11.14 was ground-truthed in the first iteration of the Disturbance Footprint (which in now south of the present Project Area). RE 11.4.3 was State mapped within the Project Area, but not observed. This TEC is not discussed further in this assessment.
Coolibah–Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	11.3.27f (State mapped only, was not mapped within the Field Survey Extent)	E	Outside of the Field Survey Extent, not discussed further in this assessment.
Poplar Box Woodland on Alluvial Soils	11.3.2 (State mapped only, was not mapped within the Field Survey Extent)	E	Outside of the Field Survey Extent, not discussed further in this assessment.
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions (SEVT TEC)	11.3.11, 11.8.3 (State mapped only) and 11.11.18	E	RE 11.11.18 was ground-truthed within the Field Survey Extent. RE 11.3.11 and 11.8.3 were State mapped within the Project Area.
Subtropical and Temperate Coastal Saltmarsh (Coastal Saltmarsh TEC)	11.1.3 (State mapped only) and 12.1.2	V	RE 12.1.2 was ground-truthed within the Field Survey Extent. RE 11.1.3 was State mapped within the Project Area.
Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions (Eucalypt Floodplain Forest TEC)	12.3.3 and 12.3.7 (State mapped only)	E	RE 12.3.3 was ground-truthed within the Field Survey Extent. RE 12.3.7 was State mapped within the Project Area.

* E: Endangered. V: Vulnerable.

5.3.1.1 Semi-evergreen Vine Thickets of the Brigalow Belt (North and South) and Nandewar Bioregions

Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions (SEVT) TEC is an extreme form of dry seasonal subtropical rainforest, comprising trees with microphyll-sized leaves. It occurs in areas with a subtropical, seasonally dry climate. *Brachychiton* spp. are a common emergent in Queensland (McDonald, 2010). Floristic composition varies across the ecological community's range. In the Brigalow Belt it is generally characterised by the prominence of vine thicket type species and trees with microphyll sized leaves. In Queensland, the TEC includes ten REs (McDonald, 2010). No key diagnostic characteristics or condition thresholds are accepted for this TEC, therefore, assessment against the description of the TEC in the *National recovery plan for the "Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions" ecological community* (McDonald, 2010) is considered an adequate assessment.

Within the Field Survey Extent, 14 patches of remnant and regrowth RE 11.11.18 are considered analogous with the SEVT TEC. RE 11.11.18 is one of the identified 10 REs that comprise the TEC and the patches are consistent with the description of the TEC within the *National recovery plan for the "Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions" ecological community* (McDonald, 2010). The patches typically occurred as a low vine-thicket and occasionally with very sparse, emergent *Eucalyptus crebra*. T1 and T2 species included *Terminalia porphyrocarpa, Secamone elliptica, Alectryon tomentosus* and *Alphitonia excelsa*. **Table 5.8** includes a detailed description of this RE.

Two additional REs (RE 11.3.11 and 11.8.3) were State mapped within the Project Area but outside of the Field Survey Extent. These patches do not occur within the Disturbance Footprint.

5.3.1.2 Subtropical and Temperate Coastal Saltmarsh

Subtropical and Temperate Coastal Saltmarsh (Coastal Saltmarsh) TEC occurs along the coastline within the subtropical and temperate climatic zones. It occurs in coastal areas under regular or intermittent tidal influence. Coastal Saltmarsh TEC typically comprises salt-tolerant grasses, herbs, sedges, rushes and shrubs less than 0.5 m tall. Succulent herbs, shrubs and grasses often dominate.

A total of 27 patches of remnant RE 12.1.2 were identified within and adjacent to the Field Survey Extent in Section E of the Project Area, totalling 8.0 ha, which are analogous the Coastal Saltmarsh TEC. These patches meet the key diagnostic characteristics and condition thresholds for the TEC (Department of Sustainability Environment Water Population and Communities, 2013), as described in **Table 5.8**.

One additional RE (RE 11.1.3) was State mapped within the Project Area but outside of the Field Survey Extent. These patches do not occur within the Disturbance Footprint and have not been subject to assessment.

Table 5.8 Coastal Saltmarsh TEC Key Diagnostic Characteristics and Condition Thresholds

Key Diagnostic Characteristics and Condition Thresholds	Assessment of Patches
Key Diagnostic Characteristics	
Occurs south of 23°37'S latitude–from the central Mackay coast on the east coast of Australia, southerly around to Shark Bay on the west coast of Australia (26° latitude) and including the Tasmanian coast and island within the above range.	Yes, patches occur between 23°50'S and 23°52'S, south of the central Mackay coast on the east coast of Australia.

Key Diagnostic Characteristics and Condition Thresholds		Assessment of Patches
Occurs on the coastal margin, along estuaries and coastal embayments and on low wave energy coasts.		Yes, most patches occur in Callemondah, on an island surrounded and intersected by the Calliope River, or just west of the Calliope River. The Project Area occurs approximately 3.5 km from the mouth of the Calliope River, where it opens to Gladstone Harbour.
Occurs on places with at least some tidal connection, including rarely inundated supratidal areas, intermittently open or closed lagoons, and groundwater tidal influences, but not areas receiving only aerosol spray.		Yes, occurs in areas of tidal connection.
Occurs on sandy or muddy substrate and may include coastal clay pans (and the like).		Yes, occurred on sandy soils.
Consists of dense to patchy areas of characteristic coastal saltmarsh plan species (i.e. salt-tolerant herbs, succulent shrubs or grasses, that may also include bare sediment as part of the mosaic).		Yes, patches were typically dominated by *Sporobolus virginicus*.
Proportional cover by tree canopy such as mangroves, Melaleucas or Casuarinas is not greater than 50%, no is the proportional ground cover by seagrass greater than 50%.		Yes, tree canopy did not exceed 50%, nor did seagrass cover.
Condition Threshold		
Where the ecological community intergrades with an adjacent community, such as seagrass, mangroves, *Melaleuca* spp. and *Casuarina* spp. swamp, or freshwater marshes, then in this ecotone region, if 50% or more of the groundcover/understorey is comprised of coastal saltmarsh vegetation then it is considered to be the community.		n/a. Integration did not occur with adjacent vegetation types.
The minimum patch size for isolated patches is 0.1 ha. The minimum patch size for a mosaic of patches, where patches are within 30 m of each other, collectively, is 0.1 ha.		Yes, all isolated patches are >0.1 ha.
The community has some form of ongoing connection to the tidal regime, via surface or ground waters. It may be regular as per lunar tides, or periodic and intermittent, as via the highest tides or storm surges.		Yes, it is assumed that there is a connection to tidal regime.
The following are excluded from the Coastal Saltmarsh community.	Saltmarsh occurring in seepage zones on sea cliffs and elevated rock platforms above the tidal limit and on elevated headlands subject only to aerosolic salt.	No, patches do not occur above tidal limits.
	Saltmarsh occurring on inland saline soils with no tidal connection.	No, patches do have a tidal connection.
	Isolated patches of saltmarsh <0.1 ha.	No, all patches are >0.1 ha.
	Patches or areas of saltmarsh that contain >50% weed s (i.e. patches must be dominated by native saltmarsh plant species to be the TEC).	No, patches are dominated by native saltmarsh plant species.

Key Diagnostic Characteristics and Condition Thresholds		Assessment of Patches
	Patches of saltmarsh (possibly senescent) within the coastal margin that are disconnected (either naturally or artificially) from a tidal regime but were once connected. However, should the patch be reconnected to the tidal regime (e.g. via removal of an artificial barrier, or constructing a pipeline under a roadway), then the patch can become part of the TEC (if it meets other key diagnostic characteristics and condition thresholds).	n/a. The patches are connection to the tidal regime.

5.3.1.3 Subtropical Eucalypt Floodplain Forest and Woodland of the New South Wales North Coast and South East Queensland Bioregions

Subtropical Eucalypt Floodplain Forest and Woodland of the New South Wales North Coast and South East Queensland Bioregions (Eucalypt Floodplain Forest) TEC occurs on alluvial landforms, including floodplain, riparian zones, alluvial flats, floodplain/alluvial terraces and periodically flooded depressions. Structurally, the TEC varies from a tall, open forest to woodland. The tree canopy is typically dominated by eucalypts and/or other myrtaceous species, including *Angophora*, *Corymbia*, *Lophostemon* and *Syncarpia*, and may exceed 40 m in height. A mid-lay or sub-canopy of small trees may be present, with very sparse to dense shrubs (Department of Climate Change, Energy, the Environment and Water, 2022a).

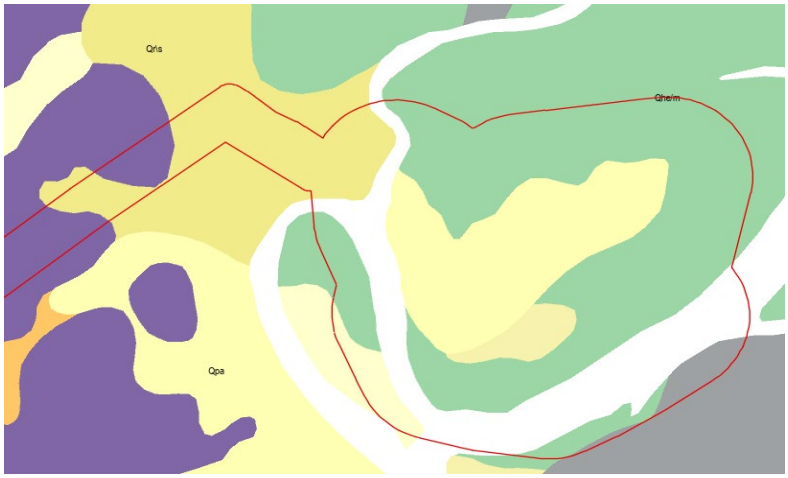
A total of nine patches of RE 12.3.3 were recorded within and adjacent to the Field Survey Extent which met the key diagnostic criteria and condition thresholds for the Eucalypt Floodplain Forest TEC (Department of Climate Change, Energy, the Environment and Water, 2022a). The patches encompass a total area of 38.9 ha. An assessment against the key diagnostic criteria and condition thresholds is provided in **Table 5.9** and **Table 5.10.** Patches that are confirmed to be the TEC are shown in **Figure 5.3**. **Table 5.11** details the assessment results.

Three discrete patches of RE 12.3.3 were <0.5 ha and therefore, do not meet the condition thresholds for the TEC. Patches were small and isolated. These patches are not considered further within this assessment.

An additional analogous RE (RE 12.3.7) was State mapped within Project Area, but outside of the Field Survey Extent and Disturbance Footprint. This patch was not subject to assessment.

Table 5.9 Eucalypt Floodplain Forest TEC Key Diagnostic Characteristics

Key Diagnostic Characteristics and Condition Thresholds	Assessment of Patches within Project Area
It occurs in the New South Wales North Coast (NNC) and South Eastern Queensland (Interim Biogeographic Regionalisation for Australia (IBRA) bioregions, and on Curtis Island in the Brigalow Belt North IBRA Bioregion.	Yes, patches occur within the South Eastern Queensland IBRA bioregion just north-west of Gladstone.

Key Diagnostic Characteristics and Condition Thresholds	Assessment of Patches within Project Area
It occurs in the catchments of the eastern watershed of the Great Dividing Range, typically in the lower reaches.	Yes, patches occur within the eastern watershed of the Great Dividing Range.
It occurs at elevations up to 250 m ASL, most typically below 50 m ASL.	Yes, patches occur below 50 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, fans, terraces, and localised colluvial fans; as well as on localised depressions amongst low rises and on associated sites where water can pond.	Yes, patches have conservatively been considered to occur on alluvial soils. Upon review of the detailed surface geology – Queensland (Department of Natural Resources and Mines, Manufacturing, and Regional and Rural Development, 2023) mapping, patches of RE 12.3.3 north of the Calliope River occur on colluvial soils (Qr\s>Tr, sand and subordinate silt and clay; residual soil and colluvium) (**Photo 5.9**). However, the accuracy of this data is uncertain and due to the proximity to the Calliope River, the landform is considered alluvial for the purposes of this assessment.  **Photo 5.9 Surface Geology within Section E**
It occurs on alluvial soils of various textures including, silts, clay loams, sandy loams, gravel and cobbles.	Yes, patches occurred on sandy soils and clay loams.
It does not typically occur on soils that are primarily marine or aeolian sands but may occur on substrates after they have been modified by fluvial activity.	Yes, patches are not marine or aeolian (wind derived) but are alluvial derived from floodplain depositional processes.
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 crown cover was typically >20%.

Key Diagnostic Characteristics and Condition Thresholds	Assessment of Patches within Project Area
It has a canopy dominated by one or 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, patches dominated by *Eucalyptus tereticornis*, *E. crebra* and *Corymbia intermedia*.
A mid-layer (including sub-canopy, and/or shrub layer) may be present, sparse or absent; and fauna may be abundant or rare.	Yes, subcanopy and shrub layer often present but very sparse. It is assumed fauna species utilised these patches.

Table 5.10 Eucalypt Floodplain Forest TEC Condition Thresholds

Biotic Thresholds		Patch Size Thresholds		
Vegetation	**Arboreal animals**	**Large patch (≥2 ha)**	**Small contiguous patch (≥0.5 ha within larger area of native vegetation ≥5 ha)**	**Small patch (≥ 0.5 ha)**
High Condition Ground cover richness >10 native species per sample plot. AND ≥20 large[3] native trees per ha AND ≥80% of its total perennial understorey vegetation cover comprises native species.	-	Class A1		Class B1
Good Condition Ground cover richness ≥ 6 native species per sample plot AND ≥10 large native trees per ha AND ≥50% of its total perennial understorey vegetation cover comprises native species.	AND ≥5 species of arboreal mammals detected in the patch	Class A2		Class B2
	-	Class B3		Class C1

Biotic Thresholds		Patch Size Thresholds	
Moderate Condition Ground Cover Richness ≥4 Native Species Per Sample Plot And at Least One of: ≥6 Very Large Native Trees[4] Per ha And/Or ≥30% Of Its Total Perennial Understorey Vegetation Cover Comprises Native Species.	-	Class C2	Not nationally protected

[3] Large native trees are >45 cm DBH.

[4] Very large native trees are >60 cm DBH.

Table 5.11 Eucalypt Floodplain Forest TEC Assessment Results

TEC ID	Patch Type	Site	Condition	Trees / ha		Ground Cover Species Richness	Understorey Cover (%)		Condition Class
				Large	Very Large		Native	Exotic	
SEFFW1	Large patch (15.2 ha)	TEC6	Remnant	6	0	8	85	45	C2
		TEC9	Remnant	8	0	5	n/a	45	
SEFFW1 Average				**7**	**0**	**7**	**85**	**45**	
SEFFW2	Small contiguous patch (1.5 ha within larger patch of native vegetation)	TEC10	Remnant	10	0	11	n/a	20	B3
SEFFW3	Small contiguous patch (1.2 ha within larger patch of native vegetation)	TEC7	Remnant	0	0	8	n/a	40	C2
SEFFW4	Small contiguous patch (1.2 ha within larger patch of native vegetation)	TEC8	Remnant	10	2	7	80	55	C2
SEFFW6	Large patch (47.6 ha)	TEC1	Regrowth	0	0	4	63.7	31	C2
		TEC2	Remnant	0	0	7	75.0	42	
		600	Remnant	1	0	n/a	80.0	65	
SEFFW6 Average				**0**	**0**	**6**	**72.9**	**46**	
SEFFW7	Large patch (4.3 ha)	TEC5	Remnant	4	2	5	70.0	38.0	C2
SEFFW8	Large patch (3.4 ha)	TEC3	Remnant / regrowth	0	0	7	70.0	20.0	C2
SEFFW9	Large patch (3.7 ha)	TEC4	Remnant	8	4	7	80.0	31.0	C2

TEC ID	Patch Type	Site	Condition	Trees / ha		Ground Cover Species Richness	Understorey Cover (%)		Condition Class
				Large	Very Large		Native	Exotic	
SEFFW10	Large patch (3.5 ha)	No assessment, outside Disturbance Footprint	Remnant	-	-	-	-	-	C2

Patch SEFFW6 will be bisected by the Project with disturbance associated with substation expansion and transmission lines. Due to the Project, a distinct patch will be separated by 50 m or greater and therefore is considered another separate patch (a break of 30 m or more is needed for patches to be considered separate). The outcome of the disturbance will isolate a 1.7 ha patch of this TEC. Patch SEFFW6 meets the C2 condition class for this TEC and as such the isolated patch will fall below the minimum requirement to be considered TEC. In addition, the alteration of the remaining patch will also provide additional edge effect impacts associated with the edge compared with the area remaining (edge to area ratio) potentially contributing to higher levels of weed infestation and lower vegetation condition. Therefore, this patch is considered too small and isolated to be considered the TEC and effectively lost due to the Project. See **Figure 5.3** for the location of area SEFFW6 reduced to below patch threshold. As a consequence of this patch being unviable, it has been included in the calculation of impacts despite an absence of direct disturbance.

The patch SEFFW9 located to the east of the existing substation will be impacted as part of the Project. As detailed in **Table 5.11**, this patch has a C2 condition category, is estimated at 3.7 ha in size and is isolated from any other similar vegetation patches. Disturbance as part of the Project will reduce the size of this patch to 1.9 ha, below the 2 ha threshold for C2 categorisation for this TEC. Similar to SEFFEW6 additional edge effects due to the Project are likely to reduce the long term viability of the remaining TEC patches. Therefore, this patch is considered too small and isolated to be considered the TEC and effectively lost due to the Project. See **Figure 5.3** for the location of area SEFFW9 reduced to below patch threshold. As a consequence of this patch being unviable it has been included in the calculation of impacts despite an absence of direct disturbance.

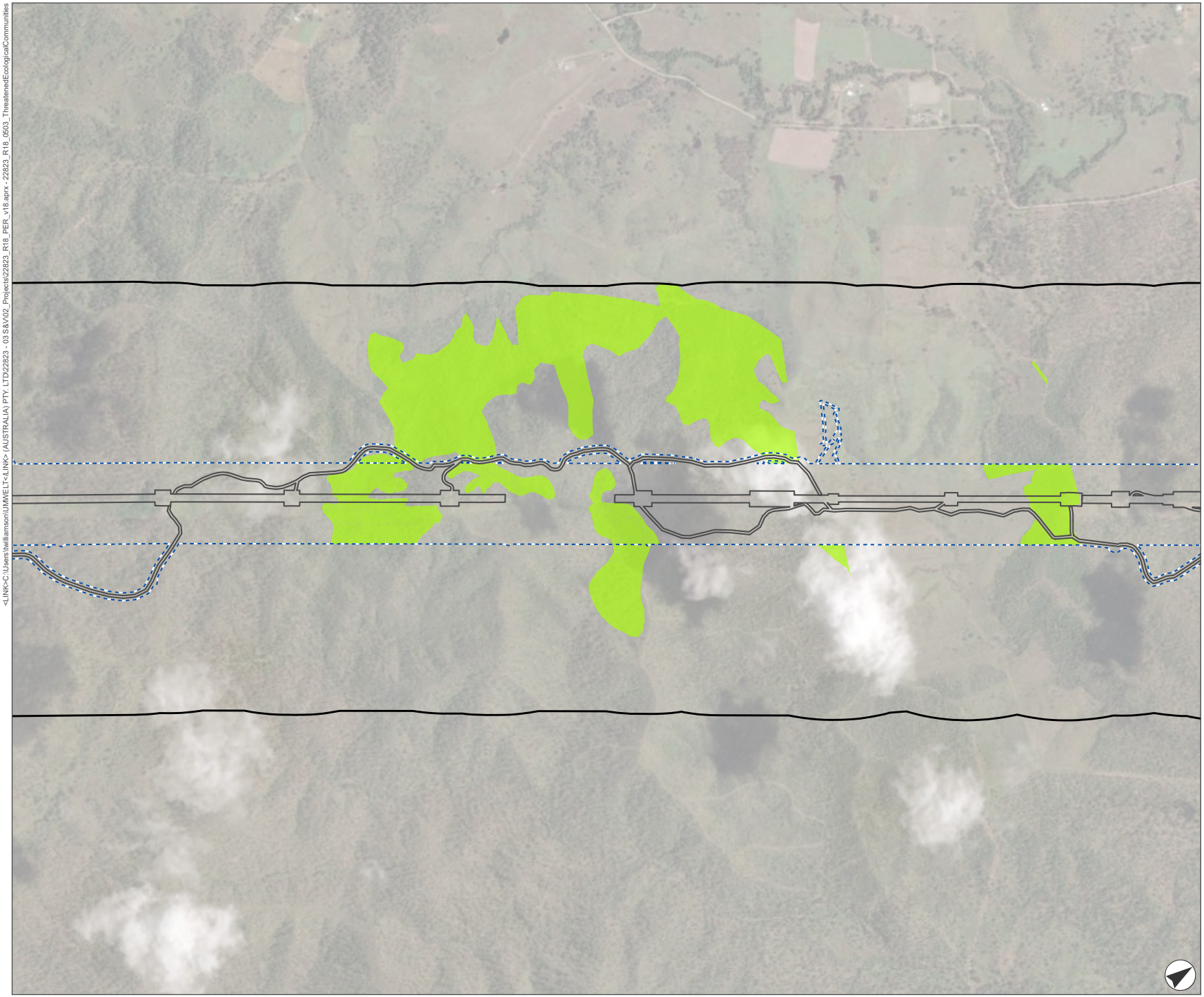


FIGURE 5.3-13

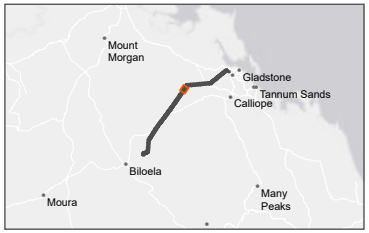
Threatened Ecological Communities within the Field Survey Extent

Legend

- Field Survey Extent
- Disturbance Footprint
- Project Area

Threatened Ecological Community

- SEVT



0 0.5 1

Kilometres

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FIGURE 5.3-19

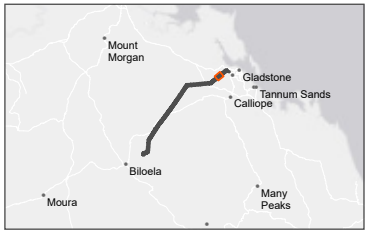
Threatened Ecological Communities within the Field Survey Extent

Legend

- Field Survey Extent
- Disturbance Footprint
- Project Area

Threatened Ecological Community

- SEVT



0 0.5 1

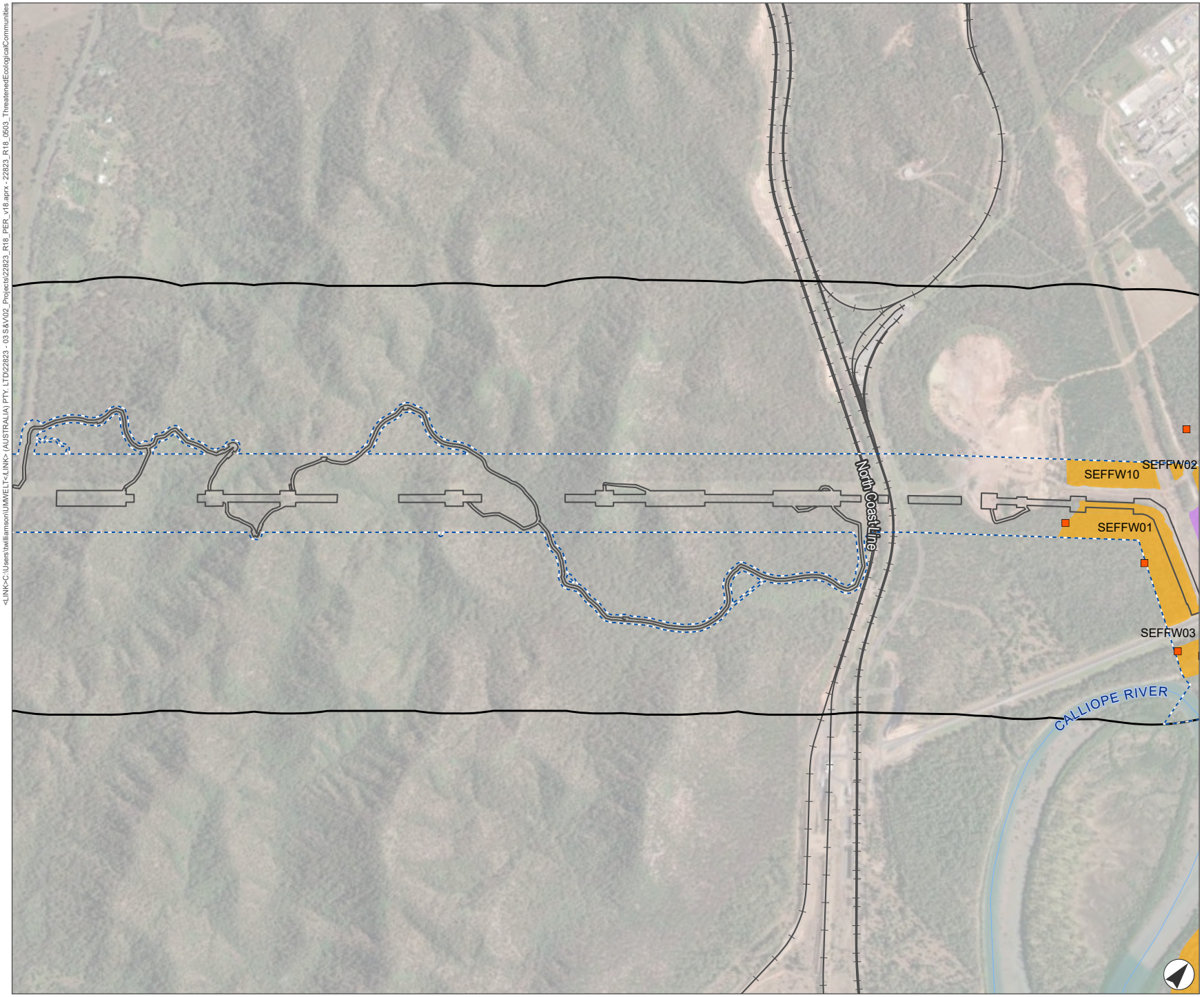
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FIGURE 5.3-20

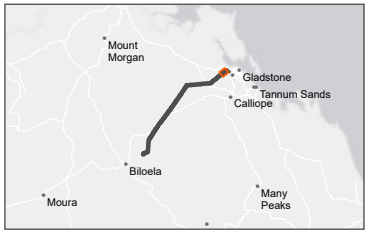
Threatened Ecological Communities within the Field Survey Extent

Legend

- TEC Assessment Location
- Watercourse
- Railway
- Field Survey Extent
- Disturbance Footprint
- Project Area

Threatened Ecological Community

- Eucalypt floodplain
- Coastal saltmarsh



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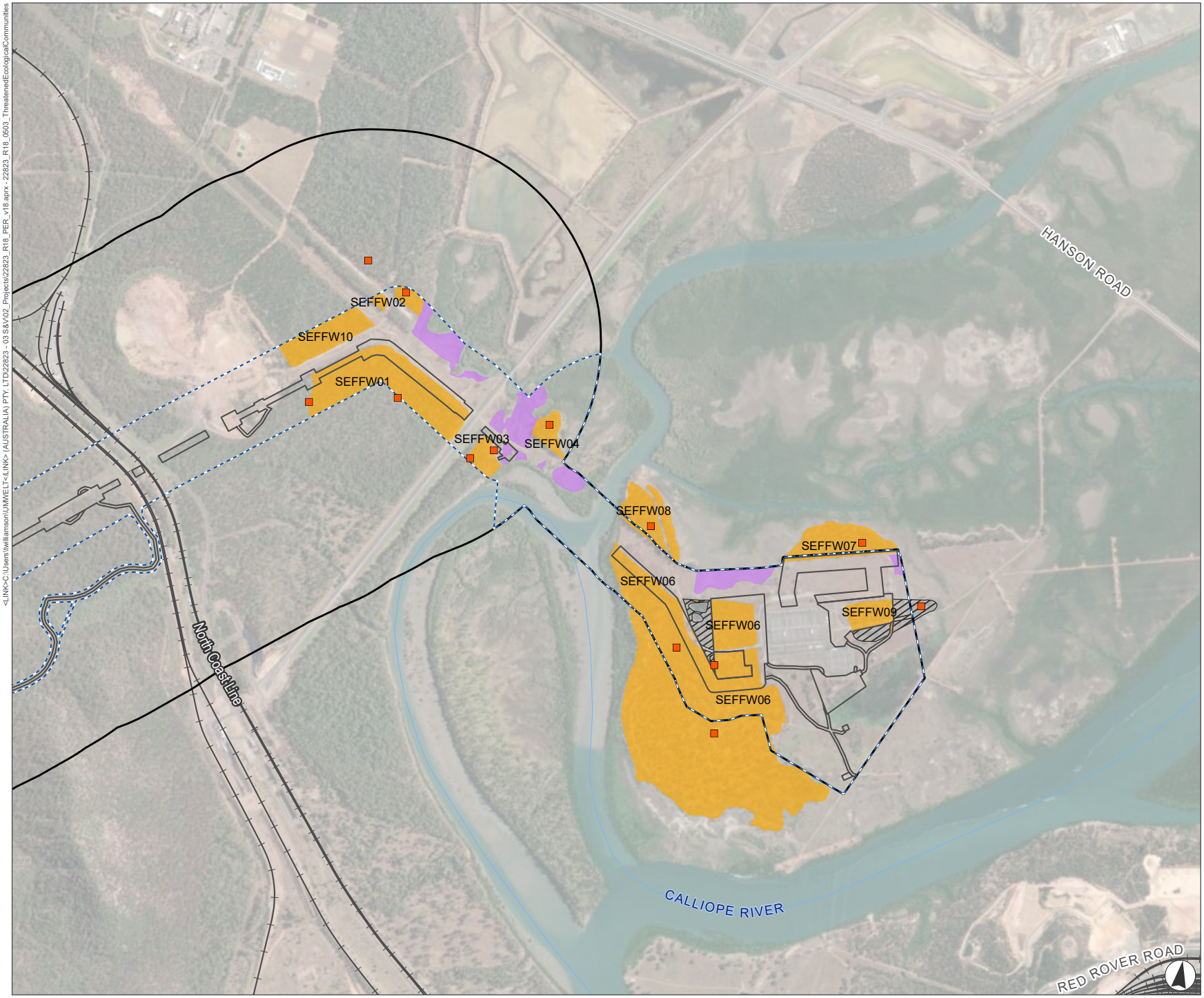


FIGURE 5.3-21

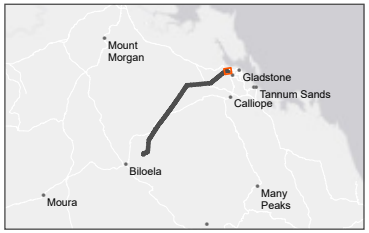
Threatened Ecological Communities within the Field Survey Extent

Legend

- TEC Assessment Location
- Roads
- Watercourse
- Railway
- Field Survey Extent
- Disturbance Footprint
- Project Area

Threatened Ecological Community

- Eucalypt floodplain
- Coastal saltmarsh
- TEC Lost Due to Project



0 0.5 1

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5.4 Threatened Species

The threatened species that are known to or potentially occur within the Project Area are discussed within this section.

5.4.1 Threatened Flora

A total of identified 25 flora species listed under the EPBC Act were identified during the desktop assessment. Of these species, three were confirmed present within the Project Area; *Cossinia australiana*, *Cycas megacarpa* and *Samadera bidwillii*. An additional three species were considered a high likelihood of occurring (**Appendix E**).

The complete likelihood of occurrence for all threatened flora is provided in **Appendix E. Figure 5.4** displays verified Wildlife Online records of known or potentially occurring threatened flora species as well as field survey observations of species known to occur within the Project Area. Species profiles, habitat modelling rules and resulting habitat models for each species are provided in their respective SIAs (**Section 8.0**).

Table 5.12 Threatened Flora Likelihood of Occurrence

Scientific Name, Common Name	EPBC Act Status[5]	Public Records and Associated Habitat	Project Findings	Photo
Known to Occur				
Cossinia australiana	E	This species was identified in the PMST as 'species or species habitat likely to occur within the feature area' and there was a WildNet record within the search extent, northeast of the Callide Mine dating from 2005 approximately 600 m from the Field Survey Extent. The majority of ALA records occur around the Callide Timber Reserve and Callide Mine, with the closest specimen situated approximately 200 m from the Project Area dating from 2018 (ALA, 2025). The species predicted distribution overlaps with the Project Area, occurring within the 'may occur' and 'likely to occur' extents (SNES, 2025).	This species was recorded within the Project Area during field surveys adjacent to Section B, within the Callide Timber Reserve. A total of 11 individuals were recorded within an ecotone between remnant RE 11.10.4 (*Eucalyptus decorticans* woodland) and 11.10.18 (semi-evergreen vine thicket) on sandstones soils at two locations approximately 100 m apart (**Figure 5.1**). The closest individuals occur approximately 170 m to the west of the Field Survey Extent. Individuals occurred at heights between 1.6 and 8.0 m tall.	
Cycas megacarpa	E	This species was identified in the PMST search as 'species or species habitat known to occur within the feature area'. Whilst no WildNet records were observed in the desktop search, likely due to security regarding these records, there are numerous ALA records along Sections A, B, C and D of the Project Area. The species predicted distribution overlaps with the Project Area, occurring within the 'may occur' and 'likely to occur' extents (SNES, 2025).	*Cycas megacarpa* was observed in several locations along Section B associated with multiple vegetation communities. From March 2023–February 2026, field surveys for this Project included the mapping of *Cycas megacarpa* individuals within the existing easement, the Field Survey Extent and adjacent vegetation. In total, approximately 5,296 individuals were observed during field surveys with an estimated 1,032 individuals occurring within the Disturbance Footprint. Where possible during field surveys, development class categories as described in Chapter 4 were recorded. Individuals within the Field Survey Extent included 606 juveniles, 730 sub-adults, 1,091 adults and 9 large adults (noting that the development class was not recorded for 2,860 individuals). Habitat where *Cycas megacarpa* occurred within the Field Survey Extent which were recorded include: • Eucalypt dominated open forests to woodlands on hills and ranges • Ironbark woodland to open woodland on hills and ranges • *Blakella citriodora* open forest to woodlands • Eucalypt dominated open forest to woodland fringing drainage lines and on floodplains • Semi-evergreen vine thicket and microphyll vine forest • Non remnant or cleared pasture. Observed individuals were noted from remnant and regrowth vegetation but also occurred in cleared areas from underneath the existing transmission corridor.	

[5] E: Endangered. V: Vulnerable.

Scientific Name, Common Name	EPBC Act Status [5]	Public Records and Associated Habitat	Project Findings	Photo
Samadera bidwillii, quassia	V	There are two recent WildNet records from 2021, with one 9.2 km north of Section D at Mt Larcom and the other situated 8 km west of Section A within the Callide Ranges. Additional ALA records occur as close as 200 m from the Project Area (dated 2018), near the Callide Mine. An ALA record from 2025 occurs within 1 km of Section D.	*Samadera bidwillii* was recorded within Section B of the Field Survey Extent, within Callide Timber Reserve (**Figure 5.4**) Approximately 441 stems were recorded over two areas approximately 500 m from each other, but the number of individuals is uncertain as *Samadera bidwillii* within the Callide area are not known to produce seed and propagate via root suckering (Naik 2016) resulting in uncertainty regarding individual counts. In addition, the boundary of a patch was plotted which was estimated to contain at a minimum 100 stems bringing the total to a minimum 541 stems within the Field Survey Extent. All *Samadera bidwillii* were recorded within remnant RE 11.10.13, which is a eucalypt woodland dominated by *Eucalyptus cloeziana* to 18 m tall, with subdominant *Eucalyptus melanoleuca, Corymbia trachyphloia* and *Blakella citriodora*. The populations included juveniles and saplings up to 2 m.	
High Likelihood of Occurrence				
Atalaya collina, Yarwun whitewood	E	The species was identified in the PMST search as ‘species or species habitat known to occur within the feature area.’ It is known from the search extent, with a WildNet record observed in 1992 located approximately 1.5 km north of the Project Area, west of Mount Stowe State Forest. The species predicted distribution also overlaps with the Project Area, occurring within the ’may occur’ and ‘likely to occur’ extents (SNES, 2025).	This species was not recorded during field surveys. The patches of vegetation observed to contain previous records of the species are directly connected to suitable vegetation within Section D and E of the Project Area, consisting of semi-evergreen vine thicket vegetation on brown-black clay loams (RE 11.11.18).	-
Bertya opponens, coolabah bertya	V	The species was identified in the PMST search as ‘species or species habitat known to occur within the feature area.’ A WildNet record occurs in the desktop search dating from 1998, approximately 5 km from the Project Area, just north of the Callide Timber Reserve. There are also numerous ALA records for *Bertya opponens* in the vicinity, with the closest located 300 m north of Section A of the Project Area, near the Callide Timber Reserve in 1992 (ALA, 2025). The species predicted distribution also overlaps with the Project Area, intersecting within the ‘likely to occur’ extent (SNES, 2025).	This species was not recorded during field surveys. Suitable habitat for the species occurs amongst a variety of vegetation communities observed within the Project Area, including shrubland, woodland, open forest with shrubby understorey and SEVT.	-
Polianthion minutiflorum	V	This species was identified in the PMST search as ‘species or species habitat known to occur within the feature area.’ The SPRAT prediction of the species distribution overlaps with the Project Area; coinciding with its ’may occur’ and ‘likely to occur’ extents (SNES, 2025). The most recent WildNet record occurs approximately 9 km north of Section A of the Project Area at the Callide Mine, dating from 2006. Numerous other ALA records are known from this area near the Batchfire Callide Coal Mine and Callide Timber Reserve, with the closest record located 1.5 km north of Section A from 1996 (ALA, 2025). This cluster of individuals constitutes the Callide Range subpopulation.	This species relies predominantly on eucalypt woodland on sandstone slopes, of which there are numerous patches within the Field Survey Extent that connect to the existing Callide population (comprised of RE 11.10.13). Given the presence of suitable habitat within the Project Area and presence of nearby records, the species has a high likelihood of occurrence.	-

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FIGURE 5.4-1

Field Verified and Database and Threatened Flora Records

Legend

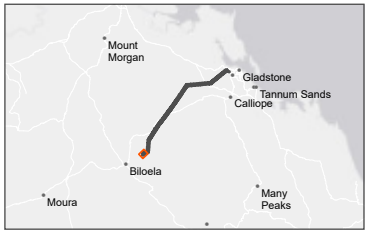
- Watercourse
- Railway
- Field Survey Extent
- Disturbance Footprint
- Project Area

Threatened Flora Records (Umwelt)

- *Cossinia australiana*

Threatened Flora Records (Wildlife Online)

- *Bertya opponens*
- *Polianthion minutiflorum*
- *Samadera bidwillii*



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FIGURE 5.4-2

Field Verified and Database and Threatened Flora Records

Legend

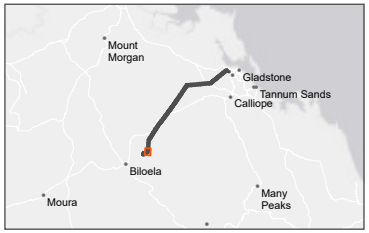
- Watercourse
- Field Survey Extent
- Disturbance Footprint
- Project Area

Threatened Flora Records (Umwelt)

- *Cossinia australiana*
- *Cycas megacarpa*

Threatened Flora Records (Wildlife Online)

- *Bertya opponens*
- *Cossinia australiana*
- *Samadera bidwillii*



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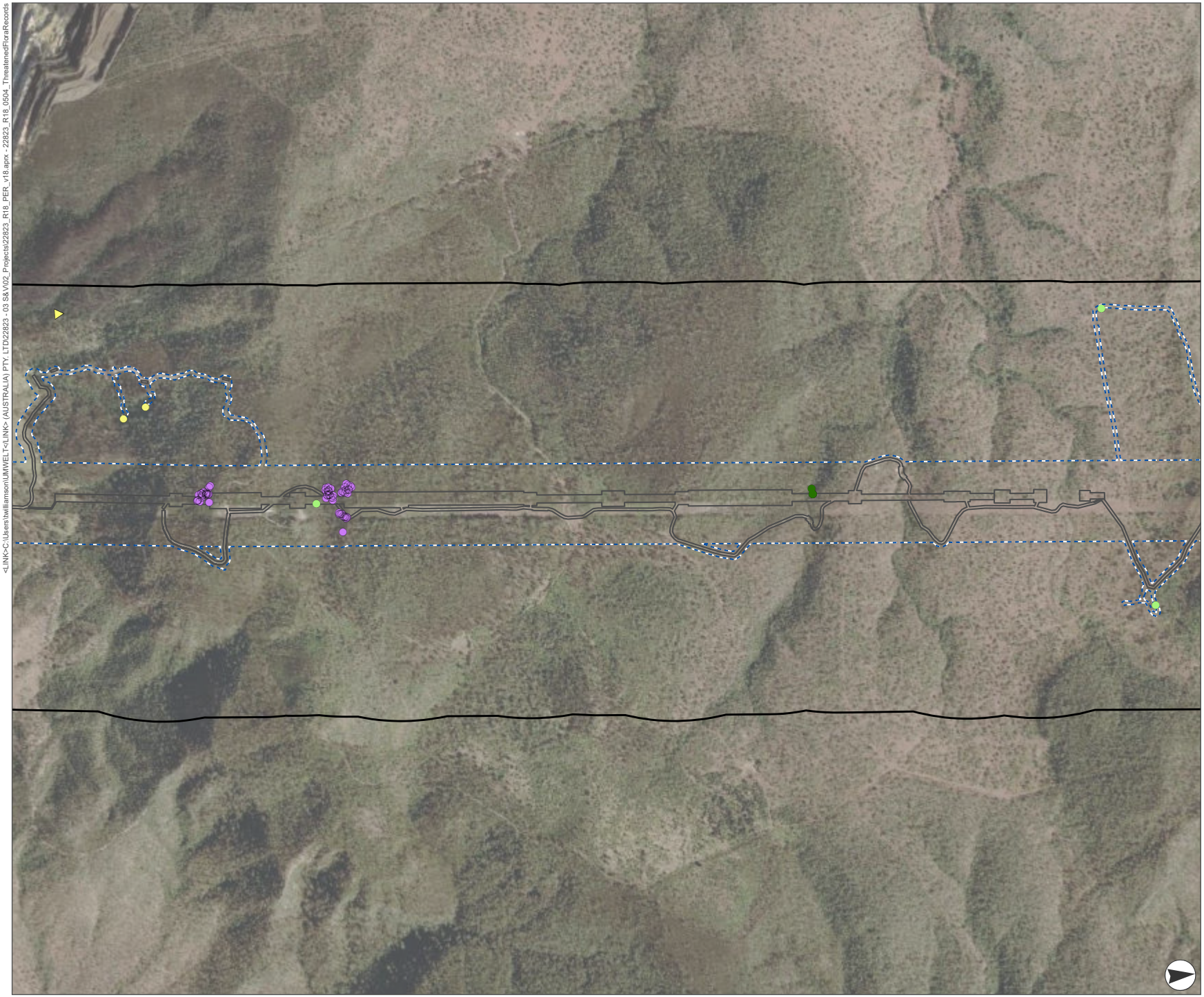


FIGURE 5.4-3

Field Verified and Database and Threatened Flora Records

Legend

- Field Survey Extent
- Disturbance Footprint
- Project Area

Threatened Flora Records (Umwelt)

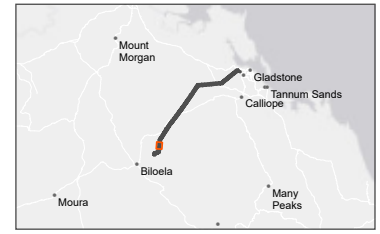
- *Cossinia australiana*
- *Cycas megacarpa*
- *Samadera bidwillii*

Threatened Flora Records (Ecologica)

- *Cycas megacarpa*

Threatened Flora Records (Wildlife Online)

- *Cossinia australiana*



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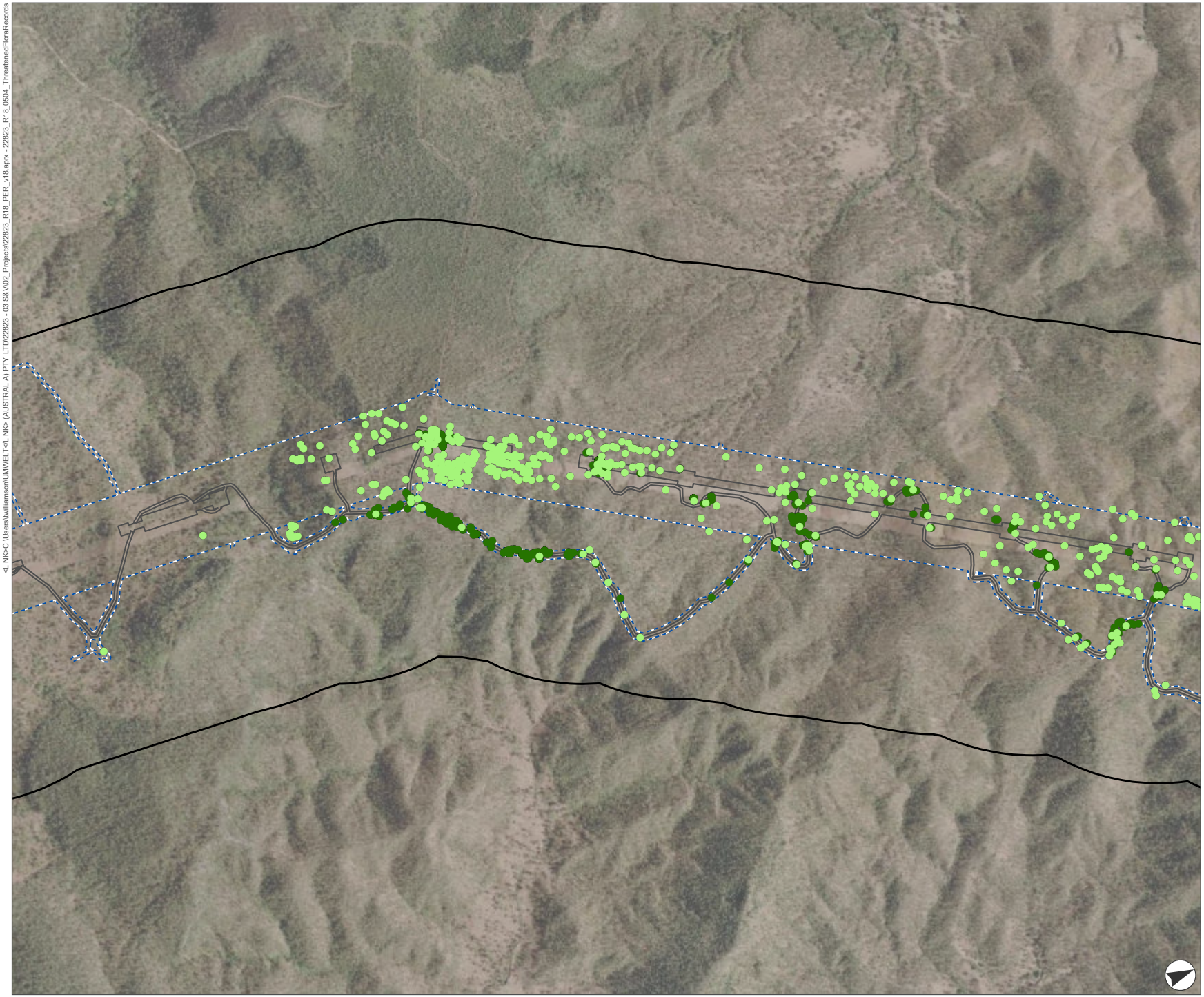


FIGURE 5.4-4

Field Verified and Database and Threatened Flora Records

Legend

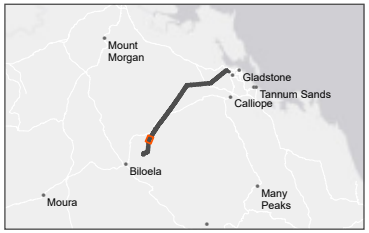
- Field Survey Extent
- Disturbance Footprint
- Project Area

Threatened Flora Records (Umwelt)

- *Cycas megacarpa*

Threatened Flora Records (Ecologica)

- *Cycas megacarpa*



0 0.5 1

Kilometres

Scale 1:20,000 at A4
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FIGURE 5.4-5

Field Verified and Database and Threatened Flora Records

Legend

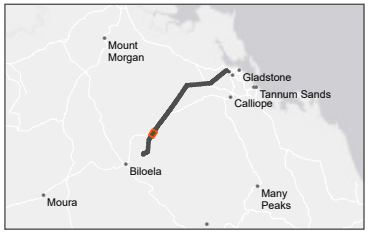
- Roads
- Field Survey Extent
- Disturbance Footprint
- Project Area

Threatened Flora Records (Umwelt)

- *Cycas megacarpa*

Threatened Flora Records (Ecologica)

- *Cycas megacarpa*



0 0.5 1

Kilometres

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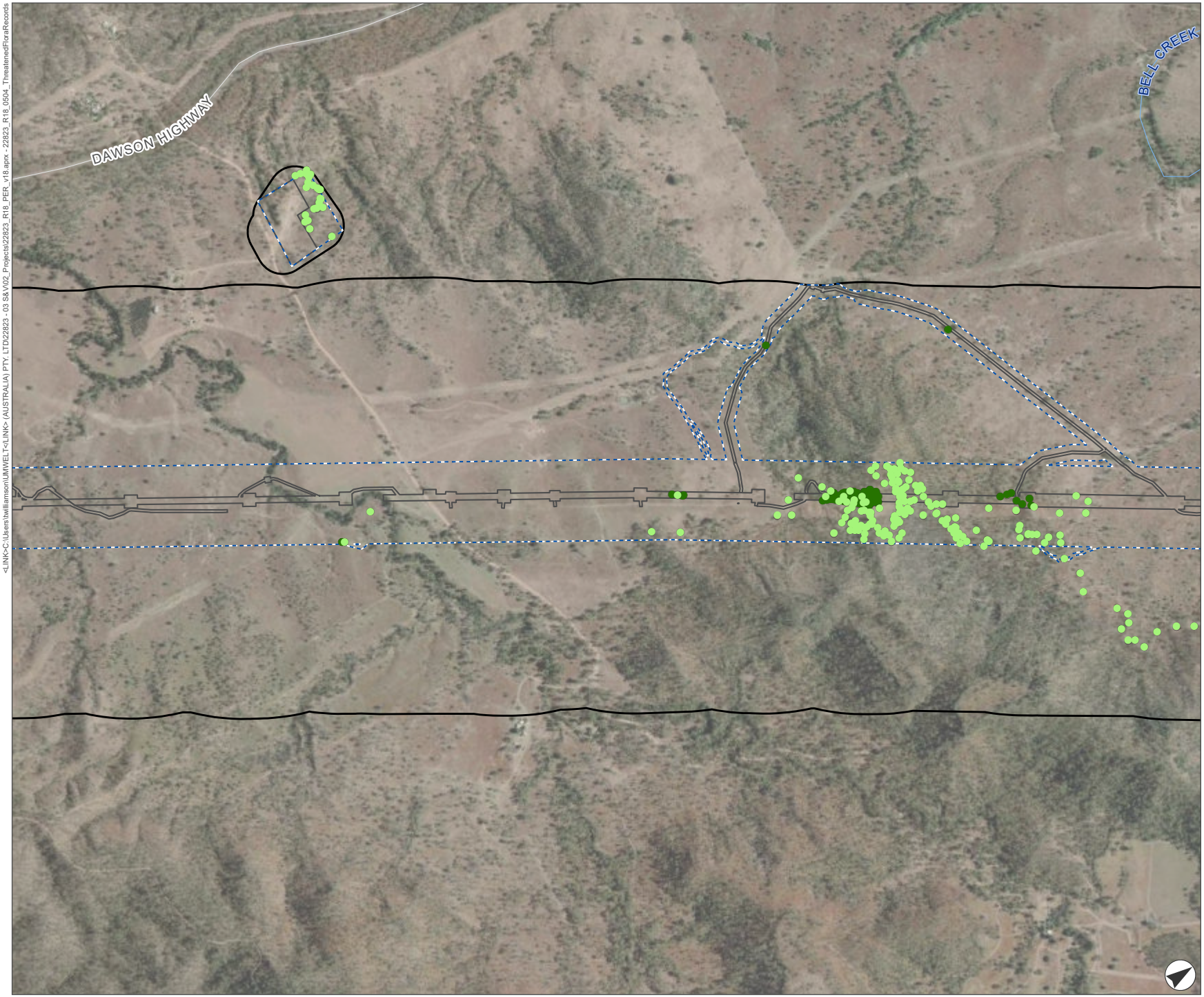


FIGURE 5.4-6

Field Verified and Database and Threatened Flora Records

Legend

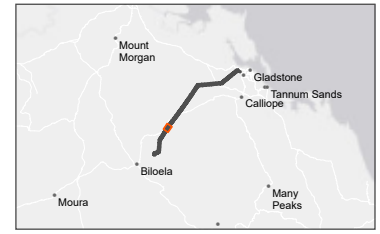
- Roads
- Watercourse
- Field Survey Extent
- Disturbance Footprint
- Project Area

Threatened Flora Records (Umwelt)

- *Cycas megacarpa*

Threatened Flora Records (Ecologica)

- *Cycas megacarpa*



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Kilometres

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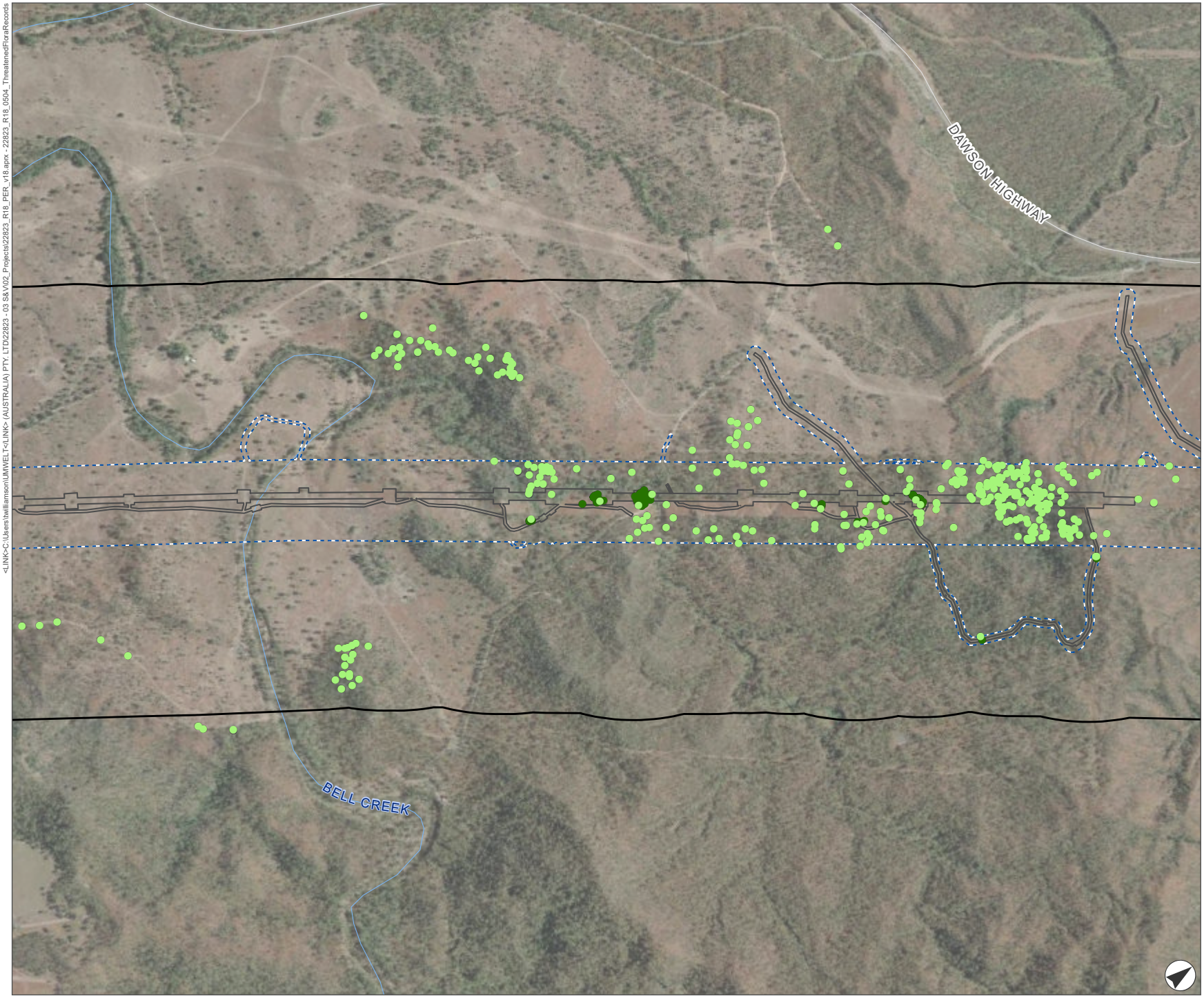


FIGURE 5.4-7

Field Verified and Database and Threatened Flora Records

Legend

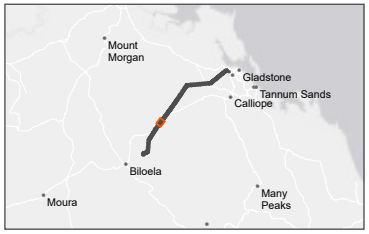
- Roads
- Watercourse
- Field Survey Extent
- Disturbance Footprint
- Project Area

Threatened Flora Records (Umwelt)

- *Cycas megacarpa*

Threatened Flora Records (Ecologica)

- *Cycas megacarpa*



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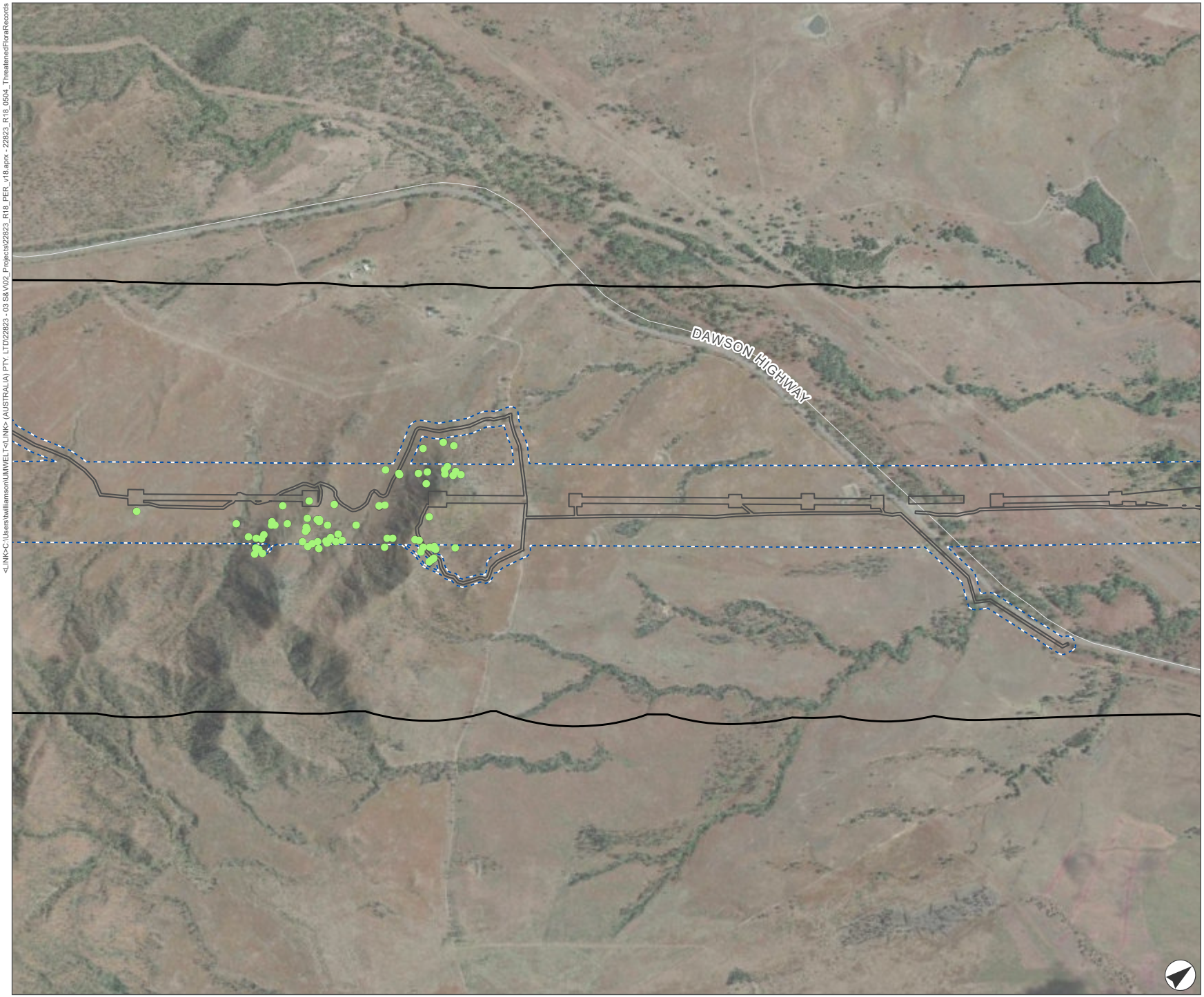


FIGURE 5.4-8

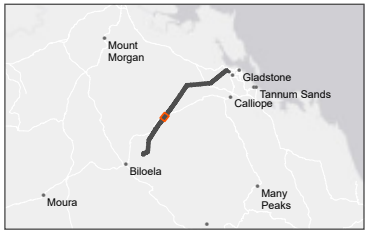
Field Verified and Database and Threatened Flora Records

Legend

- Roads
- Field Survey Extent
- Disturbance Footprint
- Project Area

Threatened Flora Records (Umwelt)

- *Cycas megacarpa*



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FIGURE 5.4-12

Field Verified and Database and Threatened Flora Records

Legend

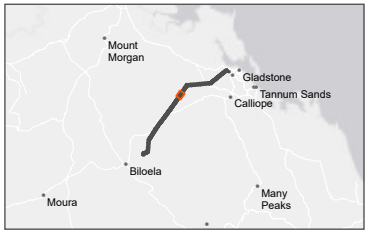
- Field Survey Extent
- Disturbance Footprint
- Project Area

Threatened Flora Records (Umwelt)

- *Cycas megacarpa*

Threatened Flora Records (Ecologica)

- *Cycas megacarpa*



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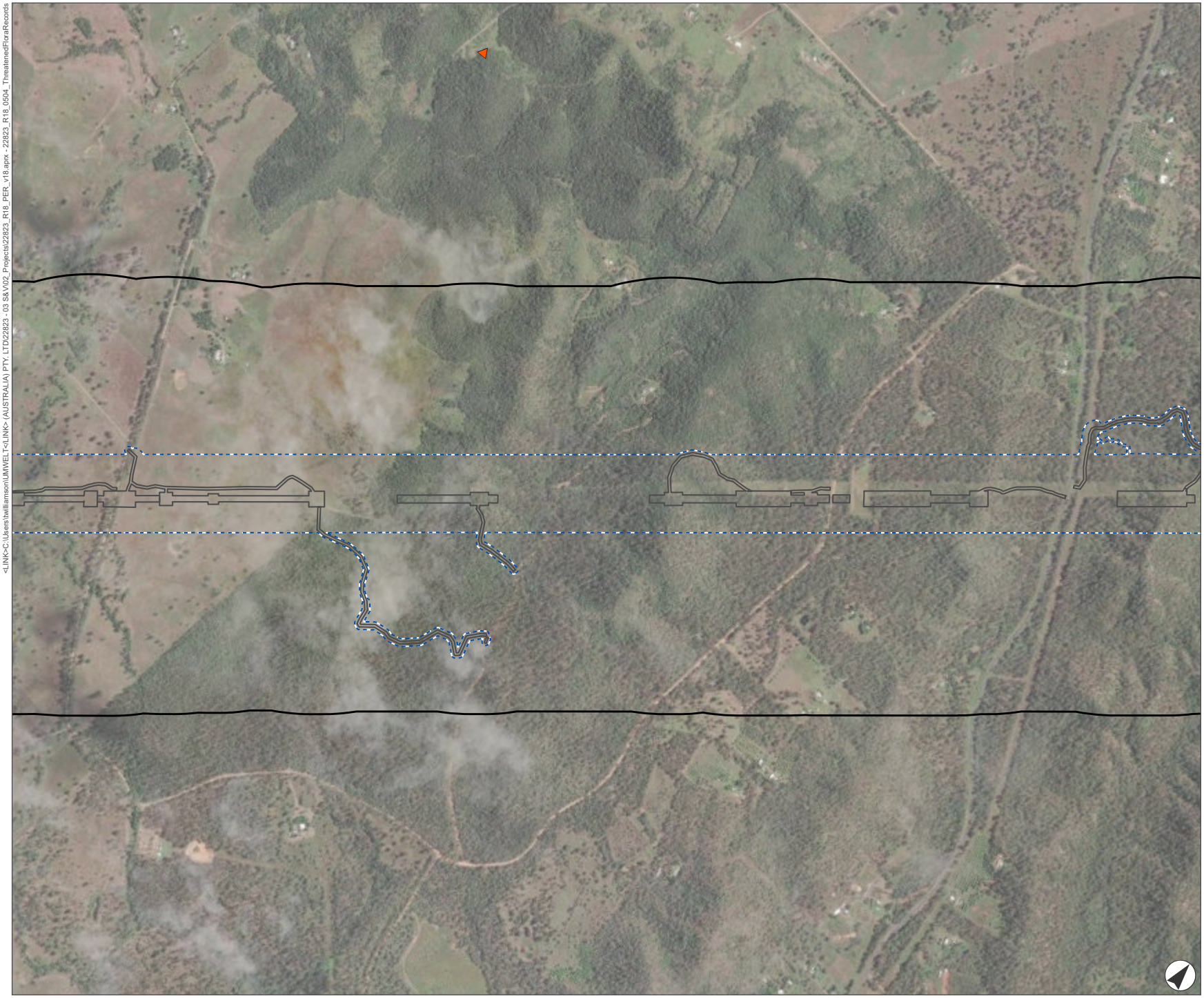


FIGURE 5.4-19

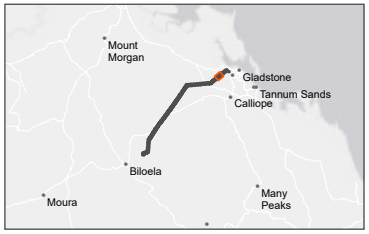
Field Verified and Database and Threatened Flora Records

Legend

- Field Survey Extent
- Disturbance Footprint
- Project Area

Threatened Flora Records (Wildlife Online)

- *Atalaya collina*



0 0.5 1

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5.4.2 Threatened Fauna

A total of identified 67 fauna species listed under the EPBC Act were identified during the desktop assessment (**Appendix E**). As detailed in **Table 5.13**, of these species, four were confirmed present within the Project Area, including:

- Collared delma (*Delma torquata*)
- Koala (*Phascolarctos cinereus*)
- Grey-headed flying-fox (*Pteropus poliocephalus*)
- Squatter pigeon (southern) (*Geophaps scripta scripta*).

Additionally, four species were identified as having a high likelihood of occurring and 20 with a moderate likelihood of occurring within the Project Area (**Appendix E**). The completed likelihood of occurrence for all threatened fauna is provided in **Appendix E**. **Figure 5.5** displays verified Wildlife online records of known of potentially occurring threatened flora species as well as field survey observations of species known to occur within the Project Area.

Table 5.13 Threatened Fauna Likelihood of Occurrence

Common Name, Scientific Name	EPBC Act Status[6]	Public Records and Associated Habitat	Project Findings	Photo
Known				
Collared delma, *Delma torquata*	V	Collared delma was identified in the PMST search as 'species or species habitat likely to' within the Project Area. SPRAT predicts that the species distribution overlaps with the Project Area; coinciding with its 'may occur' extent (SNES, 2025). No WildNet records were observed within the search extent and the closest records occur 30 km east of Section A at Kroombit Tops National Park from 2011. Specimen Hill Wind Farm occurs directly adjacent to Section B of the Project Area near Dumgree. During targeted surveys for this Project a total of five collared delma were identified (EMM, 2020).	A total of two collared delma individuals were recorded during diurnal searches at one location during May 2025 (**Figure 5.5**). They were recorded in the western portion of Section B. These records were associated with ironbark woodland (RE 11.11.15) with native tussock grasses, litter to a depth of 1.5 cm and a high abundance of stones approximately 20 cm by 20 cm in dimension.	
Grey-headed flying fox, *Pteropus poliocephalus*	V	This species was identified in the PMST search as 'foraging, feeding or related behaviour may occur' within in Project Area. SPRAT predicts that the species distribution overlaps with the Project Area; coinciding with its 'may occur' extent (SNES, 2025). The most recent WildNet record within the search extent dates from 2007, approximately 2.5 km east of Section E in Gladstone. Other ALA records are known from the coastal areas near Gladstone (ALA, 2025). Based on the quarterly data from the National Flying-fox Monitoring Program (contained within the National Flying-fox Monitoring Viewer), the nearest regularly occupied camps are in Bundaberg, approximately 160 km southeast of the Project Area. However, grey-headed flying-fox have been observed roosting at the Boyne River camp in 2019 (approximately 15 km southeast of section E), and the Calliope camp in 2015, 2019 and 2021 (approximately 15 km south of section D). The most recent observations of grey-headed flying-foxes roosting in these camps are from 2021 in Calliope (187 individuals).	Throughout the duration of the field survey program, one deceased grey-headed flying-fox was recorded on a barb-wire fence at the Calliope River substation (Section E) in March 2023, adjacent to a patch of regrowth *Eucalyptus tereticornis* woodland (RE 12.3.3). A flying-fox roost was observed during Project-associated survey to the west of the Disturbance Footprint at Callide Creek downstream from the Callide Dam. A survey of this roost did not confirm the presence of grey-headed flying-fox with little red and black flying-fox confirmed as present only. While the Project Area is situated beyond the typical foraging distance from the aforementioned camps, suitable habitat is present within the Project Area associated with *Eucalyptus crebra*, *Eucalyptus* tereticornis and *Blakella citriodora*.	-

[6] CE: Critically Endangered. E: Endangered. V: Vulnerable. M: Migratory.

Common Name, Scientific Name	EPBC Act Status[6]	Public Records and Associated Habitat	Project Findings	Photo
Koala, *Phascolarctos cinereus*	E	This species was identified in the PMST search as 'species or species habitat likely to occur' within the Project Area. SPRAT predicts that the species distribution overlaps with the Project Area; coinciding with its 'likely to occur' extent (SNES, 2025). WildNet records were identified within the desktop search extent, with the most recent dating from 2016, 4.7 km north of Section D in Aldoga. Other ALA records are scattered throughout the desktop search extent, with one historical record from 1997 occurring within 1 km of the Project Area (ALA, 2025).	One koala was recorded incidentally within the Project Area in July 2025. It was observed within the northern extent of the Callide Timber Reserve (Section B) located in a *Eucalyptus melanoleuca*. The habitat it occurred in was a *Eucalyptus cloeziana* dominated woodland (RE 11.10.13). The individuals appeared healthy, and no signs of disease were observed. This species was not detected elsewhere within the Project Area. Suitable breeding and foraging habitat are present in eucalypt woodlands and climate refugia occurs amongst vegetation that fringes watercourses. This vegetation is also linked to nearby recorded occurrences of this species in Sections A and B.	
Squatter pigeon (southern),	V	This species was identified in the PMST as 'species or species habitat known to occur' within the Project Area. The most recent WildNet record within the search extent dates from 2018, approximately 4.8 km north of Section C at Aldoga. There are numerous ALA records scattered along the Project Area, with a large number around Harper Creek 3 km south of Section B and additional records near Sections A, D and E. Specimen Hill Wind Farm occurs directly adjacent to Section B of the Project Area near Dumgree. During targeted surveys for this Project a total of seven squatter pigeons were identified (EMM, 2020).	Across the field survey program, a total of 53 squatter pigeons (southern) were recorded within and adjacent the Project Area, 33 of which occurred within the Project Area. They were recorded within Sections A to D, typically in the low-lying areas. Individuals were recorded primarily in in non-remnant vegetation and often adjacent drainage lines. Some records occurred within or adjacent patches of RE 11.3.4, 11.11.3, 11.11.4 and 11.11.4c. The largest flock was 11 individuals, recorded in May 2023.	-

Common Name, Scientific Name	EPBC Act Status[7]	Public Records and Associated Habitat	Project Findings
High			
White-throated needletail, *Hirundapus caudacutus*	V, M	This species was identified in the PMST as 'species or species habitat known to occur' within the Project Area. SPRAT predicts that the species distribution overlaps with the Project Area; coinciding with its 'likely to occur' and 'may occur' extents (SNES, 2025). The most recent WildNet record within the desktop search extent dates from 1999, approximately 7.5 km north-west of Section E in Targinie State Forest. Other ALA records are scattered around the Project Area, with a large cluster at Kroombit Tops National Park, and most recent records from 2023 approximately 8 km south of the Project Area at River Ranch (ALA, 2025). Specimen Hill Wind Farm (EPBC 2020/8864) occurs directly adjacent to Section B, near Dumgree. During targeted surveys for this Project a total of 62 white-throated needletails were identified (EMM, 2020).	This species was not detected during field surveys for the Project. With consideration of nearby desktop records, suitable roosting, foraging and dispersal habitat is considered to occur throughout the Project Area. Areas of woodland communities dominated by eucalypts, semi-evergreen vine thicket and non-remnant pasture constitute foraging and dispersal habitat. Eucalypt-dominated woodland communities that supported large trees were identified as suitable for roosting. Given the aerial nature of this species, presence of vegetation in remnant and regrowth condition that is likely to support the foraging requirements for this species.
Greater glider (southern and central), *Petauroides volans*	E	This species was identified in the PMST as 'species or species habitat known to occur' within the Project Area. SPRAT predicts that the species distribution overlaps with the Project Area; coinciding with its 'likely to occur' extent (SNES, 2025). WildNet records occur within the desktop search extent, with the nearest occurring within the Callide Timber Reserve (2015). Historical records also occur in Mount Stowe State Forest (1997), with the most recent records from 2020 recorded in the north of Kroombit Tops National Park 18 km south of the Project Area (ALA, 2025). Specimen Hill Wind Farm occurs directly adjacent to Section B of the Project Area near Dumgree. During targeted surveys for Specimen Hill Wind Farm a total of 63 individual greater gliders were identified (EMM, 2020).	This species was not recorded within the Project Area during field surveys for the Project. Suitable breeding, foraging and dispersal habitat is present within the Project Area where *Blakella citriodora* and eucalypt woodlands occur. Sections of this vegetation are also linked to nearby recorded occurrences of this species in Section B, D and E.
Yellow-bellied glider (south-eastern), *Petaurus australis australis*	V	This species was identified in the PMST as 'species or species habitat likely to occur' within the Project Area. SPRAT predicts that the species distribution overlaps with the Project Area; coinciding with its 'likely to occur' and 'may occur' extents (SNES, 2025). WildNet records occur within the desktop search extent, with the most recent dating from 1999, 3.5 km north of Section D at Gravel Creek, south of Aldoga. Additional records occur at Targinie State Forest and Kroombit Tops National Park.	This species was not recorded within the Project Area during field surveys for the Project. Suitable breeding, foraging and dispersal habitat is present within the Project Area where *Blakella citriodora* and eucalypt woodlands occur. Sections of this vegetation is also linked to nearby recorded occurrences of this species in Section B and D of the Project Area.
Water mouse, *Xeromys myoides*	V	This species was identified in the PMST as 'species or species habitat known to occur' within the Project Area. SPRAT predicts that the species distribution overlaps with the Project Area; coinciding with its 'likely to occur' extent near Gladstone (SNES, 2025). Two of the WildNet records occur within the desktop search extent from 2011, with the closest situated approximately 10 m away from Section E of the Project Area within the Port of Gladstone. The other record occurs 2 km from the Project Area at the mouth of the Calliope River.	This species was not detected during Project field surveys, including targeted surveys for the species. Suitable habitat is present for this species within the mangroves, sedges and grasses within intertidal areas of Section E. Some mangroves contained hollows, providing suitable shelter for water mouse. The intertidal areas also exhibited suitable muddy banks and mud mounds with the potential to house water mouse. Further to this, some potential but unconfirmed prey remains were identified within the Disturbance Footprint.
Moderate			
Ruddy turnstone, *Arenaria interpres*	V, M	This species is known to roost within the desktop search extent according to the PMST, and species habitat is likely to occur near Section E of the Project Area, based on the SPRAT mapping (SNES, 2025). One WildNet record occurred within the desktop search extent, dating from 1956. This record occurs approximately 7.6 km east of Section E, at Barney Point. Numerous ALA records occur along the coast near the eastern extent of the desktop search extent, with the closest occurring 5 km east of Section E from 2020.	This species was not detected during Project field surveys. Suitable habitat occurs within Section E of the Project Area, associated with the intertidal mudflats and mangrove communities, which have limited distribution within the Project Area.

[7] CE: Critically Endangered. E: Endangered. V: Vulnerable. M: Migratory.

Common Name, Scientific Name	EPBC Act Status[7]	Public Records and Associated Habitat	Project Findings
Sharp-tailed sandpiper, *Calidris acuminata*	V, M	This species is known to roost within the Project Area, according to the PMST, and species habitat 'may' or 'is likely' to overlap with the entire Project Area based on the SPRAT mapping (SNES, 2025). Numerous WildNet records occur within the desktop search extent, with the most recent occurring 6.7 km west of Section A along Valentine Plains Rd from 1993. More recent ALA records occur along the coast near Section E and amongst freshwater inland waterbodies near Section A.	This species was not detected during Project field surveys. Sporadic suitable habitat occurs within the Project Area in association with intertidal mudflats and mangroves where sedges, grasses and saltpans occur at Section E, as well as the freshwater waterbodies and larger creeks throughout the remainder of the Project Area.
Red knot, *Calidris canutus*	V, M	This species was identified in the PMST as 'species or species habitat known to occur' within the Project Area. SPRAT predicts that the species distribution overlaps with the Project Area; coinciding with its 'may occur' and 'likely to occur' extents near Gladstone (SNES, 2025). WildNet records occur within the desktop search extent. The closest and most recent record, dating from 1989, occurs approximately 1.2 km north of Section E along the Calliope River. Additional ALA records are known from the Gladstone area as recently as 2019.	This species was not detected during Project field surveys. Suitable foraging and roosting habitat occur in fragments in Section E of the Project Area, in association with intertidal mudflats.
Curlew sandpiper, *Calidris ferruginea*	CE, M	This species was identified in the PMST as 'species or species habitat known to occur' within the Project Area. SPRAT predicts that the species distribution overlaps with the Project Area; coinciding with its 'may occur' and 'likely to occur' habitat mapping (SNES, 2025). WildNet records occur within the search extent with the closest and most recent record, dating from 1989, occurring approximately 1.3 km north of Section E, along the Calliope River. Additional ALA records are known from the Gladstone coast, with records as recent as 2019.	This species was not detected during Project field surveys. Suitable foraging and roosting habitat occurs within Section E, where intertidal mudflats occur and throughout other areas of the Project Area where freshwater wetlands are known to exist. However, this habitat is limited and the inland wetlands are largely disconnected and don't provide sloping muddy banks.
Great knot, *Calidris tenuirostris*	V, M	This species was identified in the PMST as 'roosting known to occur' within the desktop search extent. SPRAT predicts that the species distribution overlaps with the Project Area; coinciding with its 'likely to occur' extent near Gladstone (Section E of the Project Area) (SNES, 2025). WildNet records occur within the desktop search extent. The most recent record, dating from 1999, occurs approximately 7.3 km north-west of Section E, near Targinie State Forest. Additional ALA records are known from the Gladstone area, with records as recent as 2019.	This species was not detected during Project field surveys. Suitable foraging and roosting habitat occur in fragments in Section E of the Project Area, in association with intertidal mudflats.
Loggerhead turtle, *Caretta caretta*	E, M	This species was identified in the PMST as 'foraging, feeding or related behaviour known to occur' within the Project Area. SPRAT predicts that the species distribution overlaps with the Project Area; coinciding with its 'likely to occur' extent (SNES, 2025). One WildNet record occurs within the desktop search extent from 1989, 2.3 km north-east of Section E, at the mouth of the Calliope River. A more recent record occurs from Tannum Sands in 2021, 20 km south-east of Section E.	This species was not detected during Project field surveys. Suitable foraging habitat may occur within Section E associated with the Calliope River. The estuarine environment associated with this section of the Project Area is likely to support seagrass foraging resources for this species. No suitable nesting habitat occurs within the Project Area. The Disturbance Footprint will not impact suitable habitat for this species.
Greater sand plover, *Charadrius leschenaultia*	V, M	This species was identified in the PMST as 'species or species habitat known to occur' within the Project Area. SPRAT predicts that the species distribution overlaps with the Project Area; coinciding with its 'may occur' and 'likely to occur' extents (SNES, 2025). WildNet records occur within the search extent. The closest and most recent record, dating from 1999, occurs approximately 7.3 km north-west of Section E near Targinie State Forest. Additional ALA records are known from the Gladstone coast, with records as recent as 2019.	This species was not detected during Project field surveys. Suitable foraging and roosting habitat occur in fragments in Section E of the Project Area, in association with intertidal mudflats.
Lesser sand plover, *Charadrius mongolus*	E, M	This species was identified in the PMST as 'roosting known to occur' within the desktop search extent. SPRAT predicts that the species distribution overlaps with the Project Area; coinciding with its 'likely to occur' extent near Gladstone (Section E of the Project Area) (SNES, 2025). WildNet records occur within the search extent. The most recent record, dating from 1956, occurs approximately 7.7 km east of Section E, at Barney Point. Additional ALA records are known from the Gladstone area, with records as recent as 2015, and numerous records from 2019 at Heron Island.	This species was not detected during Project field surveys. Suitable foraging and roosting habitat occur in fragments in Section E of the Project Area, in association with intertidal mudflats.

Common Name, Scientific Name	EPBC Act Status [7]	Public Records and Associated Habitat	Project Findings
Green turtle, *Chelonia mydas*	V, M	This species was identified in the PMST as 'breeding known to occur' within the Project Area. SPRAT predicts that the species distribution overlaps with the Project Area; coinciding with its 'likely to occur' extent (SNES, 2025). WildNet records occur within the Project Area, with the most recent record from 1989 occurring 1.3 km north-east of Section E at the mouth of the Calliope River. Numerous other ALA records occur within 6 km of the Project Area from the Calliope River and Gladstone Harbor. One record from 2016 occurs 450 m from the Project Area (ALA, 2025).	This species was not detected during Project field surveys. Suitable foraging habitat may occur within Section E associated with the Calliope River. The estuarine environment associated with this section of the Project Area is likely to support seagrass foraging resources for this species. No suitable nesting habitat occurs within the Project Area. The Disturbance Footprint will not impact suitable habitat for this species.
Northern quoll, *Dasyurus hallucatus*	E	This species was identified in the PMST as 'species or species habitat likely to occur' within the Project Area. SPRAT predicts that the species distribution overlaps with the Project Area; coinciding with its 'likely to occur' extent (SNES, 2025). WildNet records occur within the desktop search extent, dating from 2009 and occurring approximately 5.7 km south-east of Section E in Telina, Gladstone. Numerous ALA records are known from Kroombit Tops National Park, approximately 21 km south-east of Section A, with the most recent dating from 2018.	This species was not detected during Project field surveys. Suitable denning and refuge habitat for northern quoll is present in moderate densities amongst eucalypt woodlands on hills and slopes, where large boulders and rocky escarpments occur. These areas were initially identified via LiDAR imagery and ground-truthed for their suitability.
Latham's snipe, *Gallinago hardwickii*	V, M	This species was identified in the PMST as 'species or species habitat known to occur within the feature area.' SPRAT predicts that the species distribution overlaps with the Project Area; coinciding with its 'may occur' and 'likely to occur' extents (SNES, 2025). The closest and most recent WildNet record dates from 2016, approximately 4.8 km north of Section C of the Project Area, in Aldoga. Scattered ALA records occur amongst the various waterbodies that provide suitable habitat along the Project Area, with records from 2001 at Lake Callide at Section A and numerous records from the Gladstone Area.	This species was not detected during Project field surveys. Suitable habitat occurs within several sections of the Project Area, where permanent and ephemeral wetlands occur.
Painted honeyeater, *Grantiella picta*	V	This species was identified in the PMST as 'species or species habitat known to occur' within the Project Area. SPRAT predicts that the species distribution overlaps with the Project Area; coinciding with its 'may occur' extent (SNES, 2025). Despite this, no WildNet records occur within the desktop search extent and there are limited ALA records within the desktop search extent. The closest ALA records are located 11 km west of the Project Area, in Biloela from 2017 and another near Rockhampton. It may migrate into the Project Area based on mistletoe presence; however, the highest concentrations of species records occur between Roma, Qld and the Grampians, Victoria.	This species was not detected during Project field surveys. Suitable habitat occurs in association with *Acacia* and *Casuarina* woodland with sporadic mistletoe species recorded during field surveys. Whilst desktop records did not occur within the search extent, this species is highly mobile with movements driven by resource availability. Some suitable habitat occurs within the Project Area.
Nunivak bar-tailed godwit, *Limosa lapponica baueri*	E, M	This species was identified in the PMST as 'species or species habitat known to occur' within the Project Area. SPRAT predicts that the species distribution overlaps with the Project Area; coinciding with its 'likely to occur' and 'may occur' extents (SNES, 2025). The most recent WildNet record within the desktop search extent dates from 1999 and occurs approximately 7.5 km north-west of Section E in Targinie State Forest. Other ALA records are scattered around Gladstone near Section E of the Project Area, with records as recent as 2016 from Boyne Island (ALA, 2025).	This species was not detected during Project field surveys. Suitable habitat occurs within several sections of the Project Area, where permanent and ephemeral wetlands occur.
Flatback turtle, *Natator depressus*	V, M	This species was identified in the PMST as 'breeding known to occur' within the Project Area. SPRAT predicts that the species distribution overlaps with the Project Area; coinciding with its 'likely to occur' extent (SNES, 2025). One WildNet record occurs in the desktop search extent near Gladstone from 1972, approximately 10 km east of Section E.	This species was not detected during Project field surveys. Suitable foraging habitat may occur within Section E associated with the Calliope River. The estuarine environment associated with this section of the Project Area is likely to support seagrass foraging resources for this species. No suitable nesting habitat occurs within the Project Area.
Eastern curlew, *Numenius madagascariensis*	CE, M	This species was identified in the PMST as 'species or species habitat known to occur' within the Project Area. SPRAT predicts that the species distribution overlaps with the Project Area; coinciding with its 'likely to occur' and 'may occur' extents (SNES, 2025). The most recent WildNet record within the desktop search extent dates from 1999 and occurs approximately 7.5 km north-west of Section E in	This species was not detected during Project field surveys. Suitable foraging and roosting habitat occurs in limited extents within Section E, where intertidal mudflats are present.

Common Name, Scientific Name	EPBC Act Status [7]	Public Records and Associated Habitat	Project Findings
		Targinie State Forest. Other ALA records are scattered along the coast of Gladstone near Section E of the Project Area, with records as recent as 2024 from Port Curtis (7 km east of Project Area) (ALA, 2025).	
Australian painted snipe, *Rostratula australis*	E	This species was identified in the PMST as 'species or species habitat likely to occur' within the Project Area and SPRAT predicts that the species distribution overlaps with the Project Area; coinciding with its 'likely to occur' extent (SNES, 2025). Despite this, no WildNet records are present within the desktop extent. Limited ALA records occur beyond the desktop search area, with the closest located 8 km east of Section E in Gladstone in 2011.	This species was not detected during Project field surveys. Suitable foraging and roosting habitat occur in the Project Area with the presence of wetlands and intertidal grasslands. Further habitat is present in dams with suitable fringing vegetation.
Common greenshank, *Tringa nebularia*	E, M	This species was identified in the PMST as 'species or species habitat known to occur' within the desktop search extent'. SPRAT predicts that the species distribution overlaps with the Project Area; coinciding with its 'likely to occur' extent (SNES, 2025). The most recent WildNet record within the desktop search extent dates from 1999 and occurs approximately 7.5 km north-west of Section E in Targinie State Forest. Other ALA records are scattered along the coast of Gladstone near Section E of the Project Area, with records as recent as 2019 (ALA, 2025).	This species was not detected during Project field surveys. Suitable habitat occurs in limited amounts within Section E, amongst mudflats, mangroves or grasslands.
Black-breasted button-quail, *Turnix melanogaster*	V	This species was identified in the PMST as 'species or species habitat known to occur' within the Project Area. SPRAT predicts that the species distribution overlaps with the Project Area; coinciding with its 'likely to occur' and 'may occur' extents (SNES, 2025). The most recent WildNet record within the search extent dates from 1999 and occurs approximately 2 km north of Section D, near Aldoga. Other ALA records are scattered more broadly, with one undated record located south of the Project Area at Kroombit Tops National Park, and records from 1997 and 1999 occurring approximately 10 km north of Section D. Boyne Island also has scattered records ranging from 2007–2017 (ALA, 2025).	This species was not detected during Project field surveys. Suitable breeding and foraging habitat are present along sections of the Project Area, within semi-evergreen vine thicket where suitable leaf litter is present. Platelet sites were identified during field surveys, however, these were confirmed to be associated with painted button-quail (*Turnix varius*) (confirmed by scat and detection via camera trap).
Terek sandpiper, *Xenus cinereus*	V, M	This species was identified in the PMST as 'roosting known to occur' within the desktop search extent and SPRAT predicts that the species distribution overlaps with the Project Area, coinciding with its 'likely to occur' extent near Gladstone (SNES, 2025). WildNet records occur within the desktop search extent, with the most recent dating from 1980, approximately 6.5 km north of Section E. at Passage Islands. Other ALA records occur as recently as 2020 from the Gladstone area (ALA, 2025).	This species was not detected during Project field surveys. Suitable habitat occurs in limited amounts within Section E, amongst mudflats, mangroves or grasslands.

5.5 Migratory Species

A total of 25 migratory fauna species listed under the EPBC Act (excluding those that are also listed as threatened (**Section 5.4.2**)) were identified during the desktop assessment (**Appendix E**). As detailed in **Table 5.14**, of these species, two were confirmed present within the Project Area; fork-tailed swift (*Apus pacificus*) and eastern osprey (*Pandion haliaetus*). Additionally, four migratory species were considered to have a moderate likelihood of occurring. The completed likelihood of occurrence for all threatened fauna is provided in **Appendix E**.

Figure 5.5 displays verified Wildlife online records of known or potentially occurring migratory species as well as field survey observations of species known to occur within the Project Area.

Table 5.14 Migratory Fauna Likelihood of Occurrence

Common Name, Scientific Name	EPBC Status[8]	Public Records and Associated Habitat	Project Findings
Known			
Fork-tailed swift, *Apus pacificus*	M	This species was identified in the PMST as 'species or species habitat likely to occur' within Project Area. SPRAT predicts that the species distribution overlaps with the Project Area; coinciding with its 'likely to occur' extent (SNES, 2025). While no WildNet records occur within the desktop assessment area, numerous ALA records within the Field Survey Extent.	Across the field survey program, this species was recorded flying over the Project Area on three separate occasions. The largest flock was estimated at 1,000 individuals in March 2023 and an additional 15 individuals recorded in a similar location on the same day at a different time. A further five individuals were recorded the following day at a new location. The air space above remnant, regrowth and non-remnant woody vegetation all has the potential to be used by this species for foraging and dispersal within the Project Area.
Eastern osprey, *Pandion haliaetus*	M	This species was identified in the PMST as 'breeding known to occur' in the Project Area.' SPRAT predicts that the species distribution overlaps with the Project Area; coinciding with its 'may occur' and 'likely to occur' extents (SNES, 2025). Despite this, no WildNet records occur within the desktop search extent. ALA records are known from the desktop search extent (mostly eBird), with the majority situated around Gladstone (ALA, 2025).	In March 2023, a single eastern osprey was also recorded at the Calliope River substation, within Section E of the Project Area. It was roosting on powerlines. Suitable habitat occurs within Section E of the Project Area, in association with the Calliope River.
Moderate			
Common sandpiper, *Actitis hypoleucos*	M	This species was identified in the PMST as 'species or species habitat known to occur' within the Project Area. SPRAT predicts that the species distribution overlaps with the Project Area; coinciding with its 'may occur' and 'likely to occur' extents (SNES, 2025). However, no WildNet records occur within the desktop search extent. Recent ALA records occur in Gladstone from 2020 (ALA, 2025).	This species was not recorded during Project field surveys. Suitable habitat may occur within Section E of the Project Area on muddy margins and banks.
Oriental cuckoo, *Cuculus optatus*	M	This species was identified in the PMST as 'species or species habitat may occur' within the Project Area. SPRAT predicts that the species distribution overlaps with the Project Area; coinciding with its 'may occur' extent (SNES, 2025). Recent ALA records occur from Gladstone in 2019, however no WildNet records occur within the search extent (ALA, 2025).	This species was not recorded during Project field surveys. Suitable habitat may occur within several sections of the Project Area, within open Eucalypt woodlands.
Bar-tailed godwit, *Limosa lapponica*	M	This species was identified in the PMST as 'species or species habitat known to occur' in the Project Area. SPRAT predicts that the species distribution overlaps with the Project Area; coinciding with its 'likely to occur' extent (SNES, 2025). No WildNet records occur within the desktop search extent. Despite this, some ALA records are known from the Gladstone area, with the most recent dating from 2019 (ALA, 2025).	This species was not recorded during Project field surveys. Suitable habitat occurs within Section E of the Project Area, on mudflats.
Pacific golden plover, *Pluvialis fulva*	M	This species was identified in the PMST as 'roosting known to occur' in the Project Area. No predicted distribution occurs with the Project Area in SPRAT (SNES, 2025). Furthermore, no WildNet records occur within the desktop search extent. Despite this, some ALA records are known from the Gladstone area, with the most recent dating from 2019 (ALA, 2025).	This species was not recorded during Project field surveys. Suitable habitat occurs within Section E of the Project Area, within mudflats and mangroves.

[8] M: Migratory

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FIGURE 5.5-1

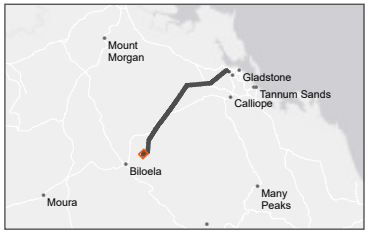
Field Verified and Database Threatened Fauna and Migratory Species

Legend

- Watercourse
- Railway
- Field Survey Extent
- Disturbance Footprint
- Project Area

Threatened Fauna Records (Wildlife Online)

- koala



0 0.5 1

Kilometres

Scale 1:20,000 at A4
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FIGURE 5.5-2

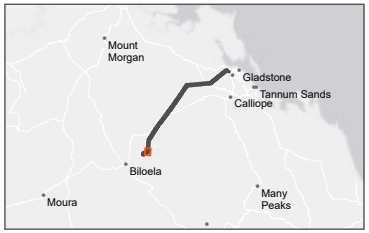
Field Verified and Database Threatened Fauna and Migratory Species

Legend

- Watercourse
- Field Survey Extent
- Disturbance Footprint
- Project Area

Threatened Fauna Records (Wildlife Online)

- koala



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FIGURE 5.5-4

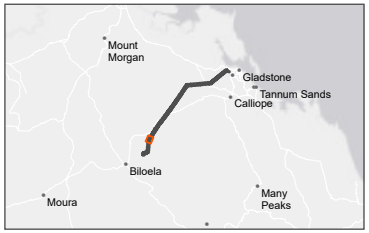
Field Verified and Database Threatened Fauna and Migratory Species

Legend

- Field Survey Extent
- Disturbance Footprint
- Project Area

Threatened Fauna Records (Umwelt)

- Koala



0 0.5 1

Kilometres

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FIGURE 5.5-5

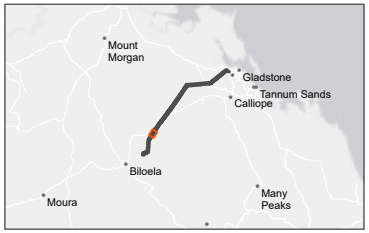
Field Verified and Database Threatened Fauna and Migratory Species

Legend

- Roads
- Field Survey Extent
- Disturbance Footprint
- Project Area

Threatened Fauna Records (Umwelt)

- Collared Delma



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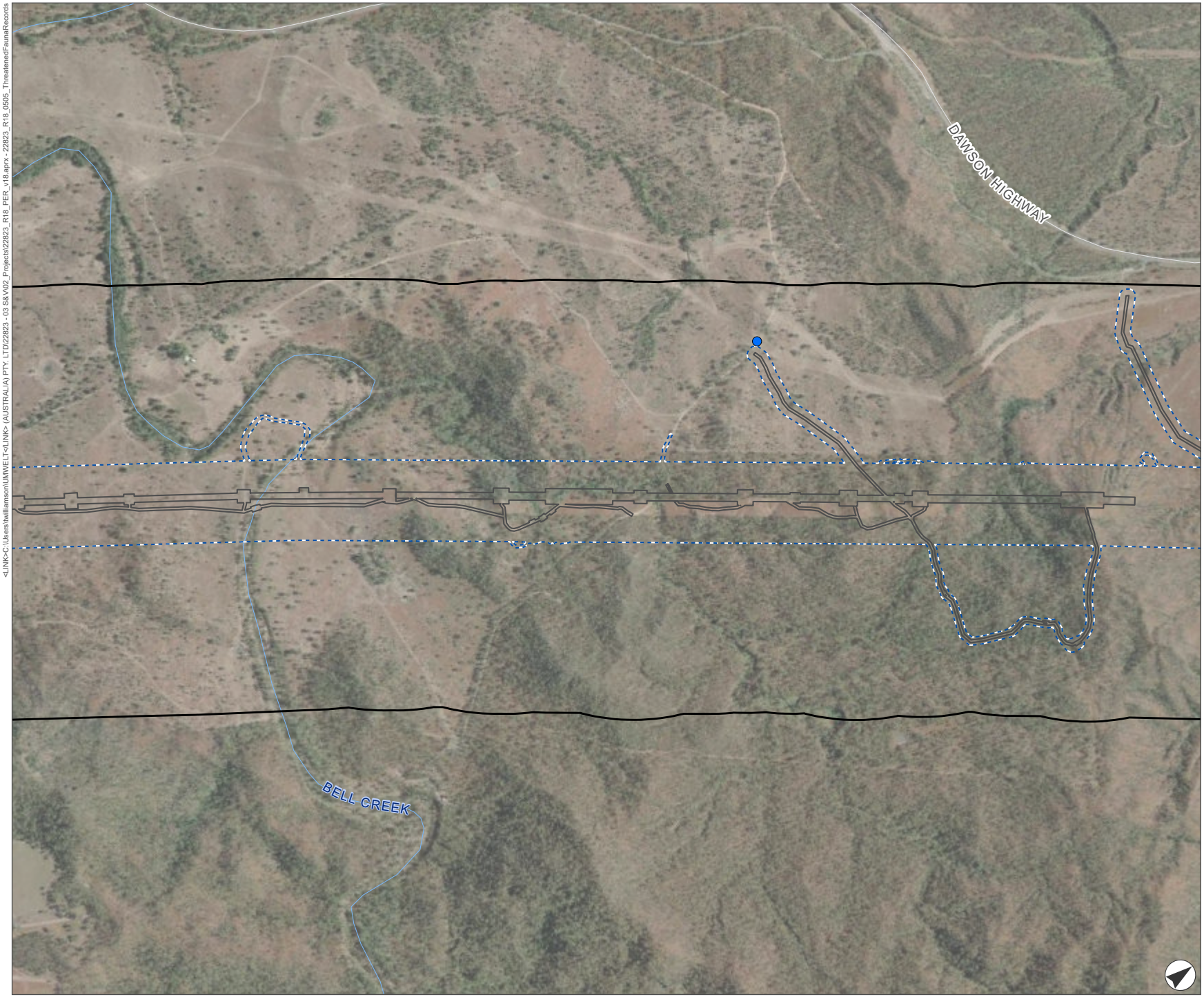


FIGURE 5.5-7

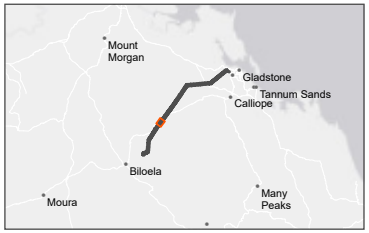
Field Verified and Database Threatened Fauna and Migratory Species

Legend

- Roads
- Watercourse
- Field Survey Extent
- Disturbance Footprint
- Project Area

Threatened Fauna Records (Umwelt)

- Squatter Pigeon (southern)



0 0.5 1

Kilometres

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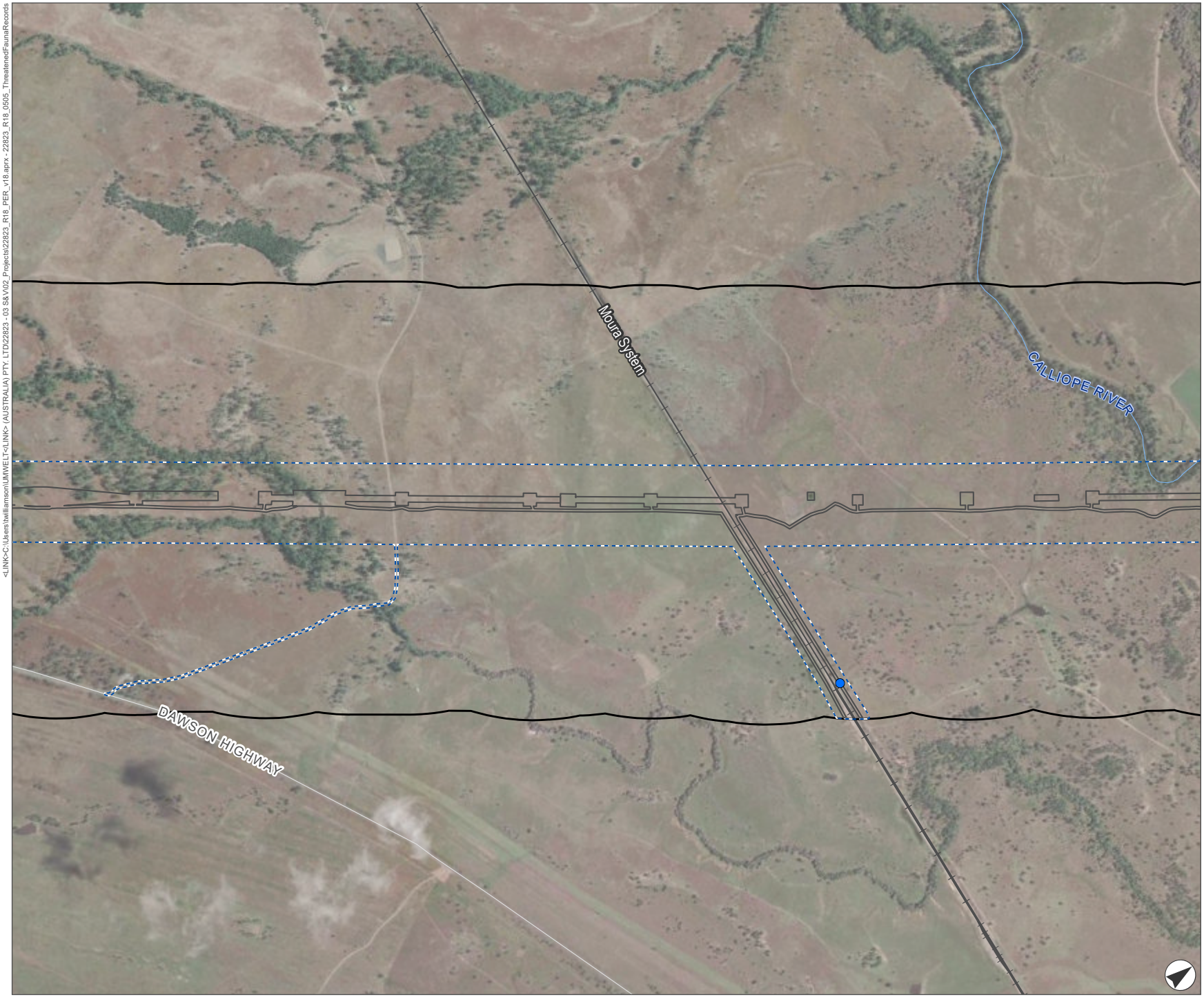


FIGURE 5.5-9

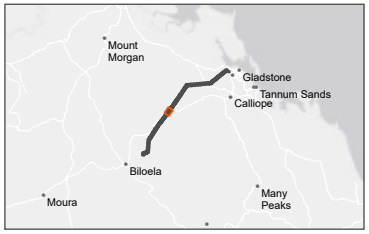
Field Verified and Database Threatened Fauna and Migratory Species

Legend

- Roads
- Watercourse
- Railway
- Field Survey Extent
- Disturbance Footprint
- Project Area

Threatened Fauna Records (Umwelt)

- Squatter Pigeon (southern)



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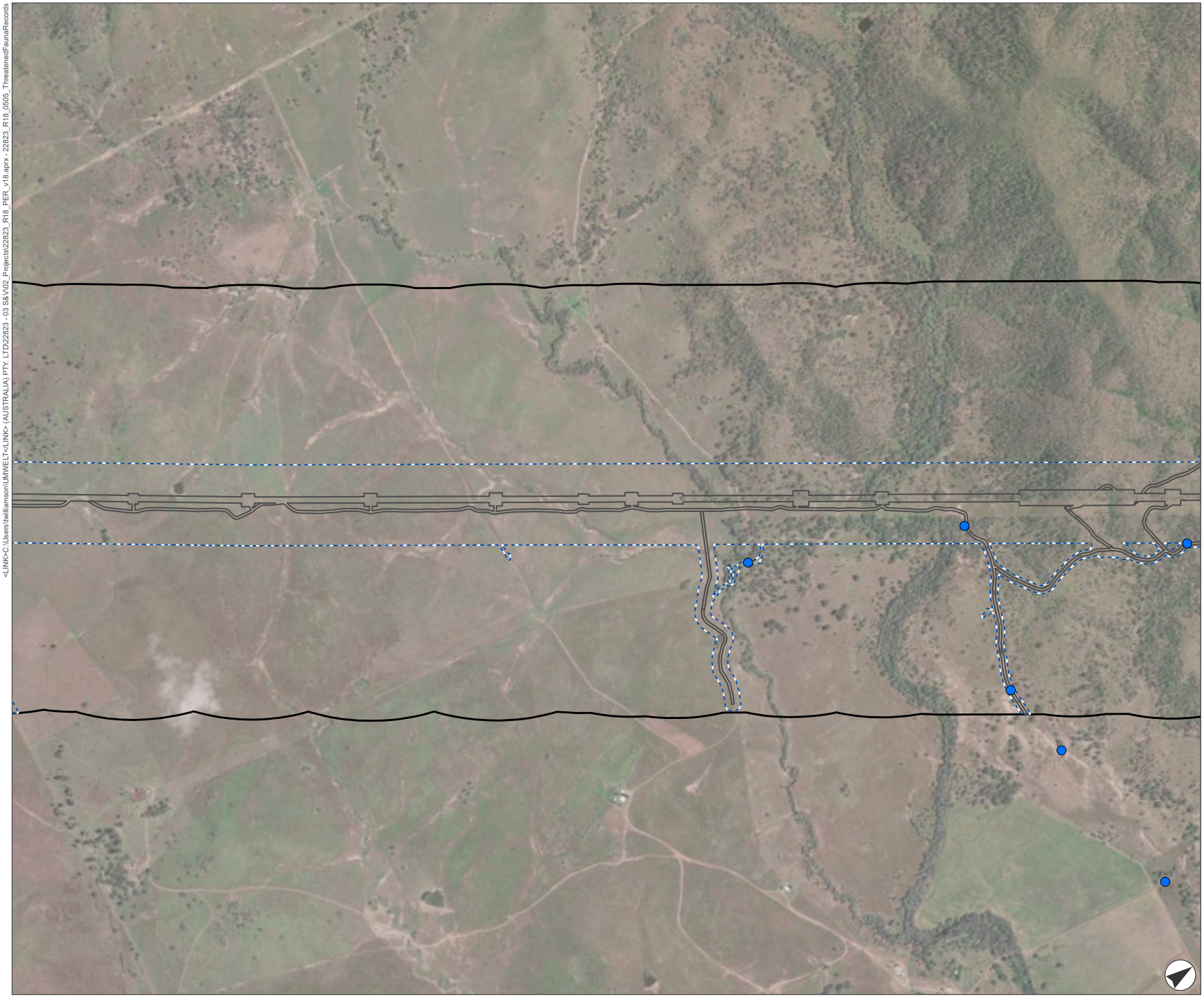


FIGURE 5.5-11

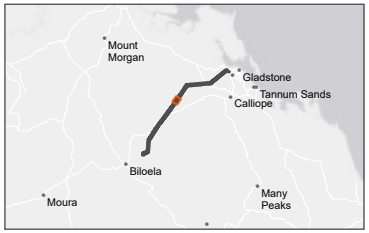
Field Verified and Database Threatened Fauna and Migratory Species

Legend

- Field Survey Extent
- Disturbance Footprint
- Project Area

Threatened Fauna Records (Umwelt)

- Squatter Pigeon (southern)



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FIGURE 5.5-12

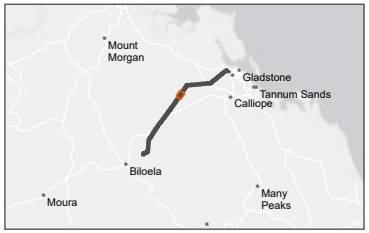
Field Verified and Database Threatened Fauna and Migratory Species

Legend

- Field Survey Extent
- Disturbance Footprint
- Project Area

Threatened Fauna Records (Umwelt)

- Squatter Pigeon (southern)



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FIGURE 5.5-17

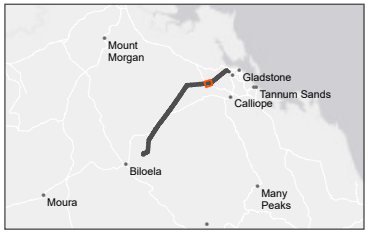
Field Verified and Database Threatened Fauna and Migratory Species

Legend

- Roads
- Field Survey Extent
- Disturbance Footprint
- Project Area

Threatened Fauna Records (Umwelt)

- Squatter Pigeon (southern)



0 0.5 1

Kilometres

Scale 1:20,000 at A4
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Image Source: ESRI Basemap (2025) | **Data Source:** Queensland D of Resources (2025)

FIGURE 5.5-18

Field Verified and Database Threatened Fauna and Migratory Species

Legend

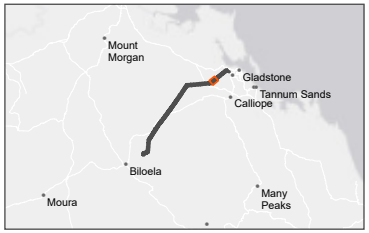
- Field Survey Extent
- Disturbance Footprint
- Project Area

Threatened Fauna Records (Wildlife Online)

- black-breasted button-quail
- koala
- squatter pigeon (southern subspecies)
- yellow-bellied glider (southern subspecies)

Threatened Fauna Records (Umwelt)

- Squatter Pigeon (southern)



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Kilometres

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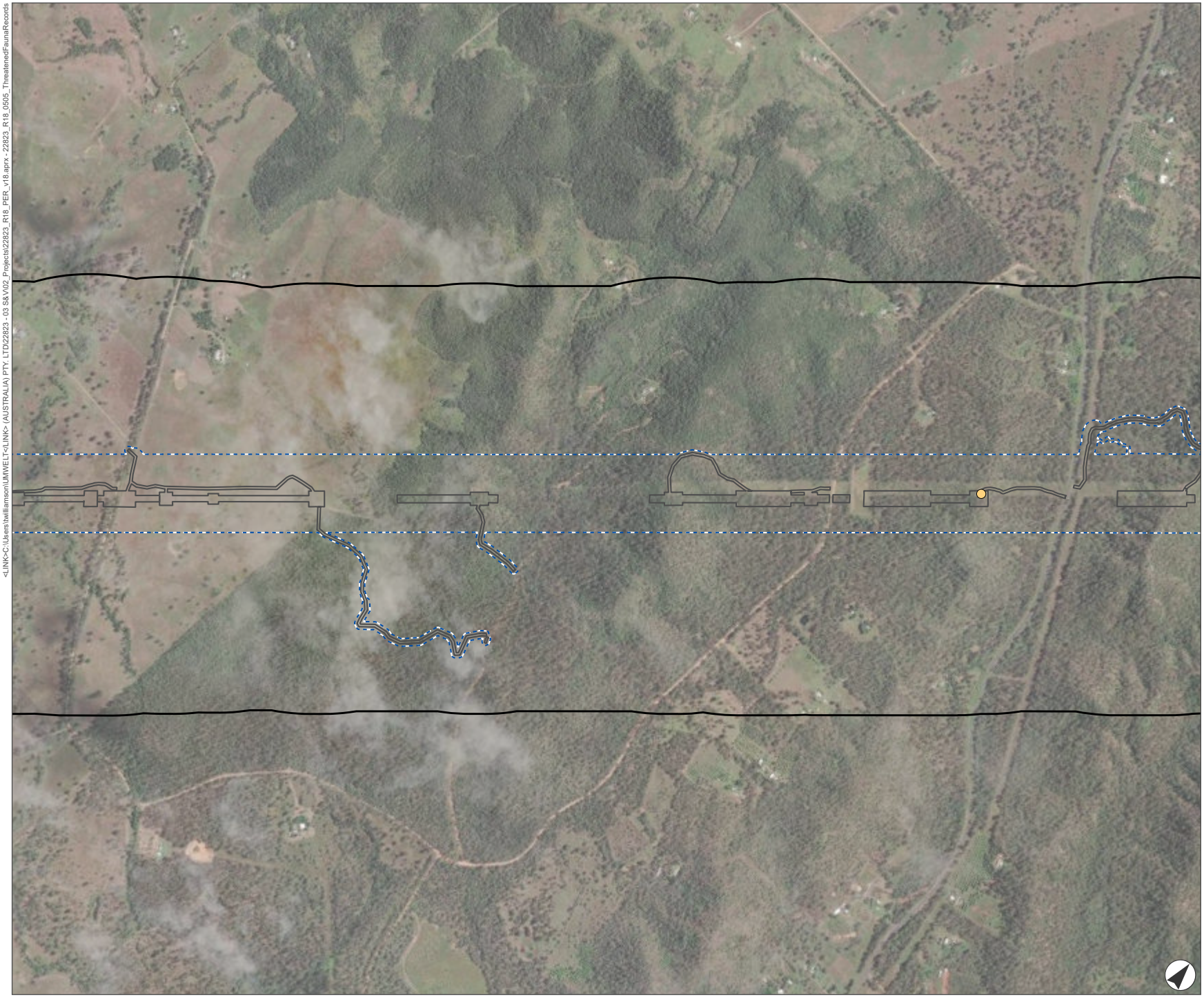


FIGURE 5.5-19

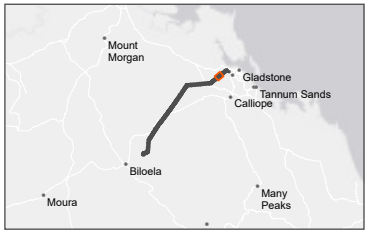
Field Verified and Database Threatened Fauna and Migratory Species

Legend

- Field Survey Extent
- Disturbance Footprint
- Project Area

Threatened Fauna Records (Umwelt)

- Fork-tailed Swift



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Kilometres

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FIGURE 5.5-20

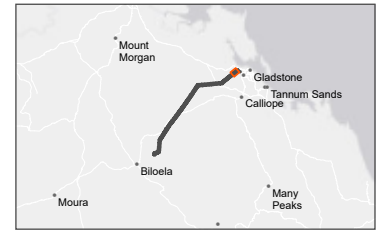
Field Verified and Database Threatened Fauna and Migratory Species

Legend

- Watercourse
- Railway
- Field Survey Extent
- Disturbance Footprint
- Project Area

Threatened Fauna Records (Wildlife Online)

- squatter pigeon (southern subspecies)



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Kilometres

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FIGURE 5.5-21

Field Verified and Database Threatened Fauna and Migratory Species

Legend

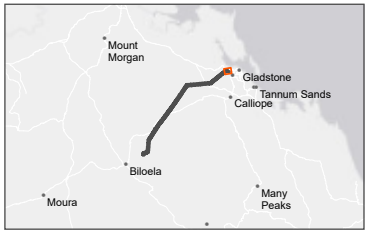
- Roads
- Watercourse
- Railway
- Field Survey Extent
- Disturbance Footprint
- Project Area

Threatened Fauna Records (Wildlife Online)

- Western Alaskan bar-tailed godwit
- common greenshank
- curlew sandpiper
- eastern curlew
- red knot
- sharp-tailed sandpiper
- water mouse

Threatened Fauna Records (Umwelt)

- Grey-headed Flying Fox
- Eastern Osprey



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5.6 Great Barrier Reef Marine Park

The Great Barrier Reef Marine Park[9] (GBRMP) is protected under the *Great Barrier Reef Marine Park Act 1975* (Cth) (GBRMP Act) that established the GBRMP and the Great Barrier Reef Marine Park Authority (GBRMPA) as a Commonwealth statutory authority responsible for its protection.

Section 2A(1) of the GBRMP Act notes the Act's objective is to *'provide for the long-term protection and conservation of the environment, biodiversity and heritage values of the Great Barrier Reef Region'*. In 2009 the GBRMP was included as a MNES under the EPBC Act.

This section provides a description of the location of the Project in relation to the GBRMP, the land uses between the Project and the GBRMP, and the GBRMP zoning closest to the Project.

5.6.1 Location of GBRMP

The easternmost extent of the Project, being Section E, is located approximately 16 km from the closest GBRMP boundary at The Narrows, with the Port of Gladstone lying in between (**Figure 5.6**). The Project is also located 20 km and 30 km from the GBRMP boundaries near Southend and Tannum Sands, respectively.

The hydrological connection to the GBRMP is via The Narrows, between Curtis Island and Facing Island, and south of Facing Island. South of Facing Island is the entry to the Port of Gladstone and is the largest of the hydrological connections to the GBRMP.

[9] With respect to describing the environment of the GBRMP, the State marine park–Great Barrier Reef Coast Marine Park (GBR Coast MP) is considered the same as the GBRMP.

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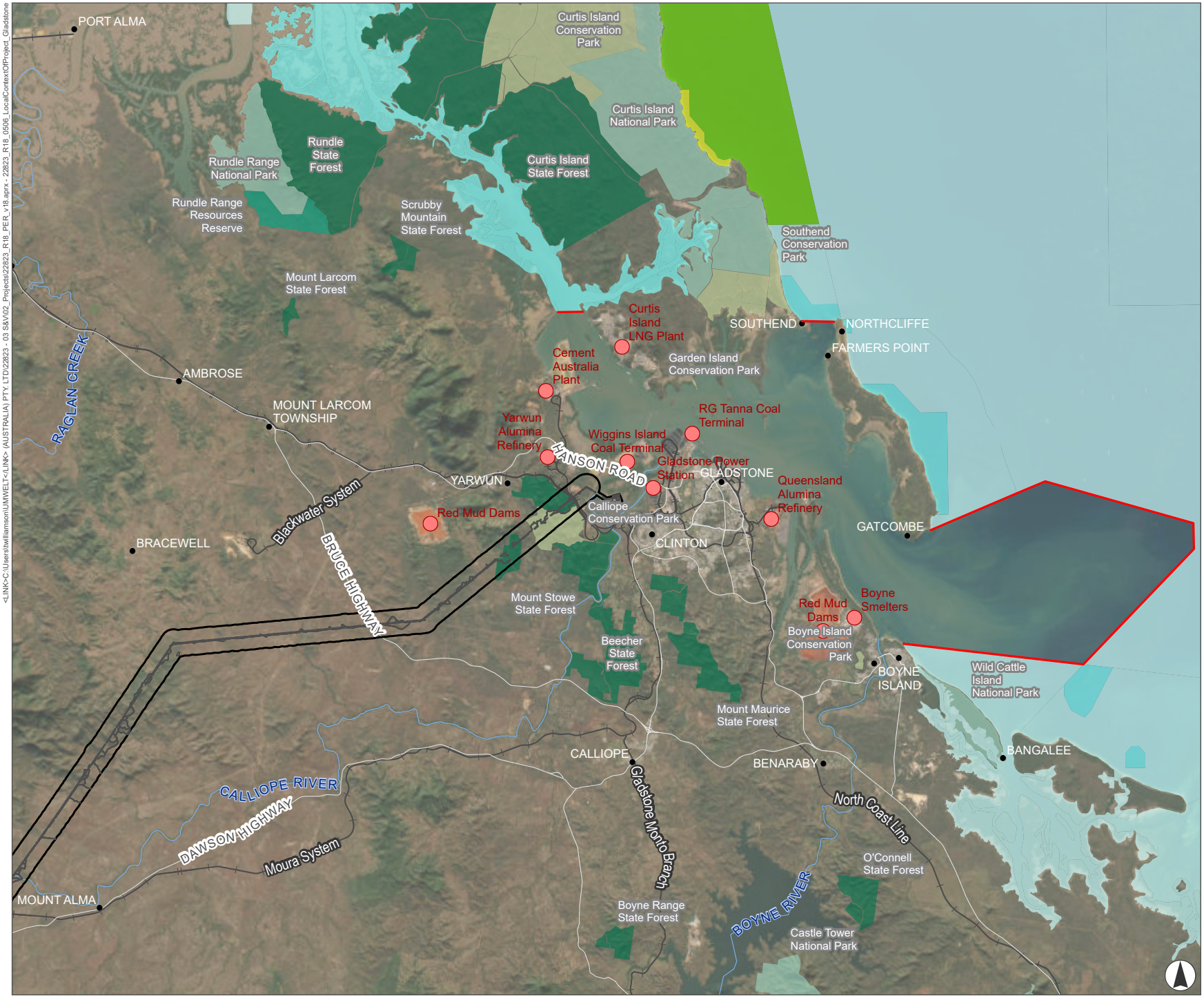


FIGURE 5.6

Local Context of Project - Gladstone

Legend

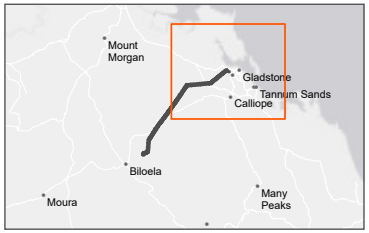
- Places of Interest
- Roads
- Watercourse
- Railway
- Marine Park Boundary
- Disturbance Footprint
- Project Area

Protected Areas

- Conservation Park
- National Park
- Resources Reserve
- State Forest

Great Barrier Reef Coast Marine Park Zones

- General use zone
- Habitat protection zone
- Conservation park zone
- Marine national park zone



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Kilometres

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5.6.2 Land Uses and Activities

Gladstone's natural deepwater harbour, known as the Port of Gladstone, is located between the Project and the GBRMP. The Port of Gladstone has allowed the city to develop from a small port town to a key industrial city. It was first used for trade purposes in 1859 to export horses to India (GPC, 2009). Since this time, the Port of Gladstone has developed into a multi-commodity port with 25 berths handling goods including coal, bauxite, cement and liquified natural gas (LNG) (GPC, 2024). Key industrial and port activities proximate to the Project and the GBRMP include:

- Queensland Alumina Refinery (QAL)
- Boyne Smelters Limited
- three (3) LNG plants–Gladstone LNG, Australia Pacific LNG and Queensland Curtis LNG
- Cement Australia plant
- extensive capital and maintenance dredging–a total of 297,688 m^3 of material was dredged from 10 November 2024 to 13 December 2024 (TMR, 2025)
- Yarwun Alumina Refinery
- Wiggins Island and RG Tanna Coal Terminals
- recreational and tourism uses including the Gladstone Marina, East Shores Playground and Heron Island Boat Transfer Terminal.

The major industrial, port infrastructure, reclamation and dredging activities have been subject to separate Commonwealth and State approval processes to assess downstream impacts on the GBRMP and World Heritage Area. Due to these industrial and dredging activities, the land and waters of the Port of Gladstone, which sits between the Project and the GBRMP, is currently a highly developed industrial and port area. Furthermore, the purpose of the Port of Gladstone Land Use Plan 2012 (Version 2–February 2016) seeks to *'achieve the sustainable expansion of port areas to accommodate future growth'* (GPC, 2016). This future growth is defined by activities such as industrial uses, port infrastructure, reclamation and dredging works.

5.6.3 GBRMP Zoning

As shown in **Figure 5.6**, the GBRMP zones closest to the Project and Port of Gladstone are (GBRMPA, 2019):

- Marine National Park (Green) Zone–This zone is a 'no-take' area and extractive activities like fishing or collecting are not allowed without a permit. The closest extent of this zone is located on the ocean side of Curtis Island approximately 25 km from the Project Area along the Calliope River and Gladstone Harbour.
- Conservation Park (Yellow) Zone–This zone allows for increased protection and conservation of areas of the Marine Park, while providing opportunities for reasonable use and enjoyment including limited extractive use. The closest extent of this zone is located on the ocean side of Curtis Island approximately 27 km from the Project Area along the Calliope River and Gladstone Harbour.

- Habitat Protection (Dark Blue) Zone–This zone provides for the conservation of areas of the Great Barrier Reef Marine Park by protecting and managing sensitive habitats and ensuring they are generally free from potentially damaging activities. The closest extent of this zone is located near The Narrows approximately 16 km from the Project Area along the Calliope River and Gladstone Harbour.
- General Use (Light Blue) Zone–The objective of this zone is to provide opportunities for reasonable use of the Great Barrier Reef Marine Park, while still allowing for the conservation of these areas. The main hydrological connection to the GBRMP is south of Facing Island and the GBRMP is zoned General Use to the east of this area. To the south of Facing Island is where port navigation channel dredging commences and where a dredge material placement area is located. The closest extent of this zone is located near The Narrows approximately 16 km from the Project Area along the Calliope River and Gladstone Harbour.

5.7 World Heritage Properties

5.7.1 Description of World Heritage Values

The Great Barrier Reef (GBR) is a Declared Property on the World Heritage List (WHL). It was inscribed by UNESCO in the WHL on 30 October 1981 for meeting the Outstanding Universal Value (OUV) criterion.

Table 5.15 describes the Official Values of the GBR as described by the Australian Heritage Database (AHD) and the UNESCO Criterion Statement.

Table 5.15 Official Values of the GBR as Described by the AHD (DCCEEW, 2025) (UNESCO, 2025)

WHL Criterion	AHD Statement	UNSECO Criterion Statement
VII–Contains superlative natural phenomena	The Great Barrier Reef provides some of the most spectacular scenery on earth and is of exceptional natural beauty. The World Heritage values include: • the vast extent of the reef and island systems which produces an unparalleled aerial vista; • islands ranging from towering forested continental islands complete with freshwater streams, to small coral cays with rainforest and unvegetated sand cays; • coastal and adjacent islands with mangrove systems of exceptional beauty; • the rich variety of landscapes and seascapes including rugged mountains with dense and diverse vegetation and adjacent fringing reefs; • the abundance and diversity of shape, size and colour of marine fauna and flora in the coral reefs;	The GBR is of superlative natural beauty above and below the water, and provides some of the most spectacular scenery on earth. It is one of a few living structures visible from space, appearing as a complex string of reefal structures along Australia's northeast coast. From the air, the vast mosaic patterns of reefs, islands and coral cays produce an unparalleled aerial panorama of seascapes comprising diverse shapes and sizes. The Whitsunday Islands provide a magnificent vista of green vegetated islands and spectacular sandy beaches spread over azure waters. This contrasts with the vast mangrove forests in Hinchinbrook Channel, and the rugged vegetated mountains and lush rainforest gullies that are periodically cloud-covered on Hinchinbrook Island. On many of the cays there are spectacular and globally important breeding colonies of seabirds and marine turtles, and Raine

WHL Criterion	AHD Statement	UNSECO Criterion Statement
	• spectacular breeding colonies of seabirds and great aggregations of over-wintering butterflies; and • migrating whales, dolphins, dugong, whale sharks, sea turtles, seabirds and concentrations of large fish.	Island is the world's largest green turtle breeding area. On some continental islands, large aggregations of over-wintering butterflies periodically occur. Beneath the ocean surface, there is an abundance and diversity of shapes, sizes and colours; for example, spectacular coral assemblages of hard and soft corals, and thousands of species of reef fish provide a myriad of brilliant colours, shapes and sizes. The internationally renowned Cod Hole near Lizard Island is one of many significant tourist attractions. Other superlative natural phenomena include the annual coral spawning, migrating whales, nesting turtles, and significant spawning aggregations of many fish species.
VIII–Outstanding examples of stages of earth's history	The Great Barrier Reef is by far the largest single collection of coral reefs in the world. The World Heritage values of the property include: • 2904 coral reefs covering approximately 20 055 km^2; • 300 coral cays and 600 continental islands; • reef morphologies reflecting historical and on-going geomorphic and oceanographic processes; • processes of geological evolution linking islands, cays, reefs and changing sea levels, together with sand barriers, deltaic and associated sand dunes; • record of sea level changes and the complete history of the reef's evolution are recorded in the reef structure; • record of climate history, environmental conditions and processes extending back over several hundred years within old massive corals; • formations such as serpentine rocks of South Percy island, intact and active dune systems, undisturbed tidal sediments and "blue holes"; and • record of sea level changes reflected in distribution of continental island flora and fauna.	The GBR, extending 2,000 km along Queensland's coast, is a globally outstanding example of an ecosystem that has evolved over millennia. The area has been exposed and flooded by at least four glacial and interglacial cycles, and over the past 15,000 years reefs have grown on the continental shelf. During glacial periods, sea levels dropped, exposing the reefs as flat-topped hills of eroded limestone. Large rivers meandered between these hills and the coastline extended further east. During interglacial periods, rising sea levels caused the formation of continental islands, coral cays and new phases of coral growth. This environmental history can be seen in cores of old massive corals. Today the GBR forms the world's largest coral reef ecosystem, ranging from inshore fringing reefs to mid-shelf reefs, and exposed outer reefs, including examples of all stages of reef development. The processes of geological and geomorphological evolution are well represented, linking continental islands, coral cays and reefs. The varied seascapes and landscapes that occur today have been moulded by changing climates and sea levels, and the erosive power of wind and water, over long time periods. One-third of the GBR lies beyond the seaward edge of the shallower reefs; this area comprises continental slope and deep oceanic waters and abyssal plains.

WHL Criterion	AHD Statement	UNSECO Criterion Statement
IX–Outstanding examples of on-going evolution	Biologically the Great Barrier Reef supports the most diverse ecosystem known to man and its enormous diversity is thought to reflect the maturity of an ecosystem, which has evolved over millions of years on the northeast Continental Shelf of Australia. The World Heritage values include: • the heterogeneity and interconnectivity of the reef assemblage; • size and morphological diversity (elevation ranging from the sea bed to 1142m at Mt. Bowen and a large cross-shelf extent encompass the fullest possible representation of marine environmental processes); • on going processes of accretion and erosion of coral reefs, sand banks and coral cays, erosion and deposition processes along the coastline, river deltas and estuaries and continental islands; • extensive Halimeda beds representing active calcification and sediment accretion for over 10 000 years; • evidence of the dispersion and evolution of hard corals and associated flora and fauna from the "Indo-West Pacific centre of diversity" along the north-south extent of the reef; • inter-connections with the Wet Tropics via the coastal interface and Lord Howe Island via the East Australia current; • indigenous temperate species derived from tropical species; • living coral colonies (including some of the world's oldest); • inshore coral communities of southern reefs; • five floristic regions identified for continental islands and two for coral cays; • the diversity of flora and fauna, including: ○ Macroalgae (estimated 400-500 species); ○ Porifera (estimated 1500 species, some endemic, mostly undescribed);	The globally significant diversity of reef and island morphologies reflects ongoing geomorphic, oceanographic and environmental processes. The complex cross-shelf, longshore and vertical connectivity is influenced by dynamic oceanic currents and ongoing ecological processes such as upwellings, larval dispersal and migration. Ongoing erosion and accretion of coral reefs, sand banks and coral cays combine with similar processes along the coast and around continental islands. Extensive beds of Halimeda algae represent active calcification and accretion over thousands of years. Biologically the unique diversity of the GBR reflects the maturity of an ecosystem that has evolved over millennia; evidence exists for the evolution of hard corals and other fauna. Globally significant marine faunal groups include over 4,000 species of molluscs, over 1,500 species of fish, plus a great diversity of sponges, anemones, marine worms, crustaceans, and many others. The establishment of vegetation on the cays and continental islands exemplifies the important role of birds, such as the Pied Imperial Pigeon, in processes such as seed dispersal and plant colonisation. Human interaction with the natural environment is illustrated by strong ongoing links between Aboriginal and Torres Strait Islanders and their sea-country, and includes numerous shell deposits (middens) and fish traps, plus the application of story places and marine totems.

WHL Criterion	AHD Statement	UNSECO Criterion Statement
	○ Cnidaria: Corals - part of the global centre of coral diversity and including: ▪ hexacorals (70 genera and 350 species, including 10 endemic species); ▪ octocorals (80 genera, number of species not yet estimated); ▪ Tunicata: Ascidians (at least 330 species); ▪ Bryozoa (an estimated 300-500 species, many undescribed); ▪ Crustacea (at least 1330 species from 3 subclasses); • Worms: ○ Polychaetes (estimated 500 species); ○ Platyhelminthes: include free-living Tubelleria (number of species not yet estimated), polyclad Tubelleria (up to 300 species) and parasitic helminthes (estimated 1000's of species, most undescribed); ○ Phytoplankton (a diverse group existing in two broad communities); ○ Mollusca (between 5000-8000 species); ○ Echinodermata (estimated 800 extant species, including many rare taxa and type specimens); • fishes (between 1200 and 2000 species from 130 families, with high species diversity and heterogeneity; includes the Whale Shark *Rhynchodon typus*); • seabirds (between 1.4 and 1.7 million seabirds breeding on islands); • marine reptiles (including 6 sea turtle species, 17 sea snake species, and 1 species of crocodile); • marine mammals (including 1 species of dugong (Dugong dugon), and 26 species of whales and dolphins); • terrestrial flora: see "Habitats: Islands" and; • terrestrial fauna, including: ○ invertebrates (pseudoscorpions, mites, ticks, spiders, centipedes,	

WHL Criterion	AHD Statement	UNESCO Criterion Statement
	isopods, phalangids, millipedes, collembolans and 109 families of insects from 20 orders, and large over-wintering aggregations of butterflies); and ○ vertebrates (including seabirds (see above), reptiles: crocodiles and turtles, 9 snakes and 31 lizards, mammals); • the integrity of the inter-connections between reef and island networks in terms of dispersion, recruitment, and the subsequent gene flow of many taxa; • processes of dispersal, colonisation and establishment of plant communities within the context of island biogeography (e.g. dispersal of seeds by air, sea and vectors such as birds are examples of dispersion, colonisation and succession); • the isolation of certain island populations (e.g. recent speciation evident in two subspecies of the butterfly Tirumala hamata and the evolution of distinct races of the bird Zosterops spp); • remnant vegetation types (hoop pines) and relic species (sponges) on islands. • evidence of morphological and genetic changes in mangrove and seagrass flora across regional scales; and • feeding and/or breeding grounds for international migratory seabirds, cetaceans and sea turtles.	
X–Important habitats for conservation of biological diversity	The Great Barrier Reef contains many outstanding examples of important and significant natural habitats for in situ conservation of species of conservation significance, particularly resulting from the latitudinal and cross-shelf completeness of the region. The World Heritage values include: • habitats for species of conservation significance within the 77 broadscale bioregional associations that have been identified for the property and which include: ○ over 2,900 coral reefs (covering 20,055 km^2) which are structurally and ecologically complex;	The enormous size and diversity of the GBR means it is one of the richest and most complex natural ecosystems on earth, and one of the most significant for biodiversity conservation. The amazing diversity supports tens of thousands of marine and terrestrial species, many of which are of global conservation significance. As the world's most complex expanse of coral reefs, the reefs contain some 400 species of corals in 60 genera. There are also large ecologically important inter-reefal areas. The shallower marine areas support half the world's diversity of mangroves and many seagrass species.

WHL Criterion	AHD Statement	UNESCO Criterion Statement
	○ large numbers of islands, including: ▪ 600 continental islands supporting 2,195 plant species in 5 distinct floristic regions; ▪ 300 coral cays and sand cays; ▪ seabird and sea turtle rookeries, including breeding populations of green sea turtles and Hawksbill turtles; and ▪ coral cays with 300-350 plant species in 2 distinct floristic regions; ▪ seagrass beds (over 5,000 km^2) comprising 15 species, 2 endemic; ▪ mangroves (over 20,70 km^2) including 37 species; • Halimeda banks in the northern region and the unique deep water bed in the central region; and • large areas of ecologically complex inter-reefal and lagoonal benthos; and • species of plants and animals of conservation significance.	The waters also provide major feeding grounds for one of the world's largest populations of the threatened dugong. At least 30 species of whales and dolphins occur here, and it is a significant area for humpback whale calving. Six of the world's seven species of marine turtle occur in the GBR. As well as the world's largest green turtle breeding site at Raine Island, the GBR also includes many regionally important marine turtle rookeries. Some 242 species of birds have been recorded in the GBR. Twenty-two seabird species breed on cays and some continental islands, and some of these breeding sites are globally significant; other seabird species also utilize the area. The continental islands support thousands of plant species, while the coral cays also have their own distinct flora and fauna.

5.7.1.1 Values that May be Impacted

Potential land-based impacts within the WHA are limited to Calliope River Island and surrounds where there is existing electricity infrastructure within an industrial/port context. Therefore, potential impacts to the broad GBR world heritage landscape, landform and scenic values are unlikely.

Between the Project and the GBRMP is the Port of Gladstone which contains marine world heritage values. GBR values downstream of the Project are represented by the GBRMP zones discussed in **Section 5.6.3**. These zones identify the levels of management required to protect the GBR values in relation to their criticality for conservation.

Potential water quality impacts to GBR world heritage values, if unmanaged, could affect downstream marine biodiversity values, relevant to:

- Criterion (VII) Contains superlative natural phenomena
- Criterion (X) Important habitats for conservation of biological diversity
- Impacts upon the relevant World Heritage values are discussed in **Section 9.0**.

5.8 National Heritage Place

5.8.1 Description of National Heritage Values

The physical description, summary statement of significance and official values of the GBR as described in the National Heritage List (NHL), is described in this section.

5.8.1.1 Physical Description

Includes the world's most extensive stretch of coral reef. The reef system, extending to Papua New Guinea, comprises some 3,400 individual reefs, including 760 fringing reefs, which range in size from under 1ha to over 10,000 ha and vary in shape to provide the most spectacular marine scenery on earth. There are approximately 300 coral cays, including 213 unvegetated cays, 43 vegetated cays and 44 low wooded islands. There are also 618 continental islands which were once part of the mainland (GBRMPA, pers. comm., 1995).

The form and structure of the individual reefs show great variety. Two main classes may be defined: platform or patch reefs, resulting from radial growth; and wall reefs, resulting from elongated growth, often in areas of strong water currents. There are also many fringing reefs where the reef growth is established on subtidal rock of the mainland coast or continental islands (Kelleher et al., 1989).

Capricorn-Bunker Group National Park (Queensland State) encompasses a terrestrial section and consists of four islands: Fairfax Island, a coral cay consisting of two small islands on an egg-shaped reef; Hoskyn Island similar to Fairfax, though not a cay; Heron Island, sand and broken coral on coral and rock formation; and Lady Musgrave Island, a cay surrounded by extensive coral reefs.

Water circulation is very complex, governed by properties of the Coral Sea, land run-off, evaporation, the south-east trade winds, forced upwellings due to strong tidal currents in narrow reef passages and coastal waters including mangroves. Tides are generally semi-diurnal with diurnal inequality towards the north, becoming almost diurnal in Torres Strait. The maximum tidal range is about 3 m along most of the coast, although increasing to 6 m to 9 m in the Broad Sound area between 21 degrees and 23 degrees S. Water is vertically well-mixed for most of the year with stratification occurring due to freshwater input during January to April. Freshwater run-off can be very localised and significant physical and biological effects may be expected (Kelleher et al., 1989).

5.8.1.2 Summary Statement of Significance

The Great Barrier Reef, one of Australia's first World Heritage Areas, was inscribed on the World Heritage List in recognition of its outstanding natural universal values:

- as an outstanding example representing the major stages in the earth's evolutionary history;
- as an outstanding example representing significant ongoing ecological and biological processes;
- as an example of superlative natural phenomena; and
- containing important and significant habitats for in situ conservation of biological diversity.

It is the world's largest World Heritage Area extending 2 000 kilometres and covering an area of 35 million hectares on the north-east continental shelf of Australia. Bigger than the entire area of Italy, it is probably the best known marine protected area in the world. The Great Barrier Reef's great diversity reflects the maturity of the ecosystem, which has evolved over hundreds of thousands of years. It is the world's most extensive coral reef system and is one of the world's richest areas in terms of faunal diversity.

The Great Barrier Reef World Heritage Area contains more than just coral reefs. It also contains extensive areas of seagrass, mangrove, soft bottom communities and island communities. Contrary to popular belief, the reef is not a continuous barrier, but a broken maze of coral reefs and coral cays. It includes some 2 800 individual reefs, of which 760 are fringing reefs. These reefs range in size from less than one hectare to more than 100 000 ha, and in shape from flat platform reefs to elongated ribbon reefs.

The Great Barrier Reef provides habitats for many diverse forms of marine life. There are an estimated 1,500 species of fish and more than 300 species of hard, reef-building corals. More than 4,000 mollusc species and over 400 species of sponges have been identified.

Other well-represented animal groups include anemones, marine worms, crustaceans (prawns, crabs etc.) and echinoderms (starfish, sea urchins etc.).

The extensive seagrass beds are an important feeding ground for the dugong, a mammal species internationally listed as endangered.

The reef also supports a wide variety of fleshy algae that are heavily grazed by turtles, fish, sea urchins and molluscs.

The reef contains nesting grounds of world significance for the endangered green and loggerhead turtles. It is also a breeding area for humpback whales, which come from the Antarctic to give birth to their young in the warm waters.

The islands and cays support several hundred bird species, many of which have breeding colonies there. Reef herons, osprey, pelicans, frigate birds, sea eagles and shearwaters are among the numerous sea birds that have been recorded.

The World Heritage property is also of cultural importance, containing many middens and other archaeological sites of Aboriginal or Torres Strait Islander origin. Some notable examples occur on Lizard and Hinchinbrook Islands, and on Stanley, Cliff and Clack Islands where there are spectacular galleries of rock paintings.

There are over 30 historic shipwrecks in the area, and on the islands are ruins and operating lighthouses that are of cultural and historical significance.

About 98 per cent of the World Heritage Property is within the Great Barrier Reef Marine Park, the remainder being Queensland waters and islands. The Great Barrier Reef Marine Park was declared in 1975 with the purpose of preserving the area's outstanding biodiversity whilst providing for reasonable use. This has been achieved using a spectrum of zones ranging from General Use Zones to Preservation Zones. In very broad terms, these zones allow ecologically sustainable activities, but all have an overriding conservation objective. Most reasonable activities such as tourism, fishing, boating, diving and research are permitted to occur but are controlled through zoning and management planning to minimise impacts and conflicts with areas of high conservation value and other users.

Today, the great majority of the Marine Park is still relatively pristine when compared with coral reef systems elsewhere in the world. An independent report published in 1997 concluded that the Reef is in good condition and is being managed effectively. These are also the findings of two major workshops to which over 100 scientists and management experts contributed. Both these workshops have now been summarised in the report titled State of the Great Barrier Reef World Heritage Area 1998, released in November 1998.

The Australian Government and State Government have a cooperative and integrated approach to management of the Great Barrier Reef World Heritage Area. The Great Barrier Reef Marine Park Authority (GBRMPA) is the Australian Government agency responsible for overall management, and the Queensland Government, particularly the Queensland Parks and Wildlife Service, provides day-to-day management to the Authority. Integrated management is also assisted by:

- a Commonwealth Act specifically for the Marine Park that, if necessary, provides over-riding powers;
- complementary legislation for most adjoining State waters;
- formal agreements with Queensland, and with various government departments, industry, research institutions and universities; and
- strategic zoning plans and site-specific management plans.

GBRMPA's current work program stems from four issues that have been identified as being critical for achieving adequate protection and management of the Reef in the short to medium term:

- water quality and coastal development;
- fisheries;
- tourism and recreation; and
- conservation, biodiversity and world heritage.

5.8.1.3 Official Values

The official values of the Great Barrier Reef in the NHL list are (DCCEEW, 2025):

- **Criterion A–Events, Processes**
  - This place is taken to meet this National Heritage criterion in accordance with subitem 1A(3) of Schedule 3 of the *Environment and Heritage Legislation Amendment Act (No.1) 2003*, as the World Heritage Committee has determined that this place meets World Heritage criteria (vii), (viii), (ix) and (x).
- **Criterion B–Rarity**
  - This place is taken to meet this National Heritage criterion in accordance with subitem 1A(3) of Schedule 3 of the *Environment and Heritage Legislation Amendment Act (No.1) 2003*, as the World Heritage Committee has determined that this place meets World Heritage criterion (x).
- **Criterion C–Research**
  - This place is taken to meet this National Heritage criterion in accordance with subitem 1A(3) of Schedule 3 of the *Environment and Heritage Legislation Amendment Act (No.1) 2003*, as the World Heritage Committee has determined that this place meets World Heritage criteria (viii), (ix) and (x).

- **Criterion D–Principal Characteristics of a Class of Places**
    - This place is taken to meet this National Heritage criterion in accordance with subitem 1A(3) of Schedule 3 of the *Environment and Heritage Legislation Amendment Act (No.1) 2003*, as the World Heritage Committee has determined that this place meets World Heritage criteria (viii), (ix) and (x).
- **Criterion E–Aesthetic Characteristics**
    - This place is taken to meet this National Heritage criterion in accordance with subitem 1A(3) of Schedule 3 of the *Environment and Heritage Legislation Amendment Act (No.1) 2003*, as the World Heritage Committee has determined that this place meets World Heritage criterion (vii).

5.8.1.4 Values that May be Affected

Potential land-based impacts within the National Heritage Listing are limited to Calliope River Island and surrounds where there is existing electricity infrastructure within an industrial/port context. Therefore, potential impacts to the broad GBR National Heritage Listing landscape, landform and scenic values are unlikely.

Between the Project and the GBRMP is the Port of Gladstone which contains marine world heritage values. GBR values downstream of the Project are represented by the GBRMP zones in **Section 5.6.3**. These zones identify the levels of management required to protect the GBR values in relation to their criticality for conservation.

Potential water quality impacts to National Heritage Listing values, if unmanaged, could affect downstream marine biodiversity values, relevant to:

- Criterion B–Rarity
- Criterion D–Principal characteristics of a class of places
- Criterion E–Aesthetic characteristics.

Impacts upon the relevant National Heritage values are discussed in **Section 9.0**.

6.0 Project Impacts

This chapter addresses section 6 of the PER Guidelines and outlines all relevant potential impacts of the action (including direct and indirect impacts) to MNES from all phases of the Project. The significant impacts assessments for MNES relevant to the Project is detailed within **Section 8.0** and **Section 9.0**.

A summary of threatening processes has been provided due to their interaction with Project impacts, which when combined, can influence the condition, viability and long-term persistence of listed TECs, threatened flora, fauna and migratory species across the Project Area.

Management and mitigation measures to manage impacts to MNES are described in **Section 7.0** and **Appendix J**.

6.1 Description of Project Activities

Activities proposed as part of the Project have been categorised into three phases:

- construction
- operations and maintenance
- decommissioning and rehabilitation.

A description of Project related activities, and the duration of their disturbance is provided in **Table 6.1**.

Table 6.1 Description of Activities for Each Project Phase

Work Stage	Description of Activities	Duration of Disturbance[1]	Frequency of Project Activity
Construction			
Site preparation	Vegetation clearing	Permanent	Once (to completion of the construction phase)
	Establishment of permanent washdown facilities	Permanent	
	Topsoil stripping	Medium term / permanent	
	Construction of temporary site compounds, including temporary fencing as required	Short term	
	Treatment of biosecurity matters (e.g. weed spraying)	Short term	
	Establishment of temporary washdown facilities	Short term	
	Installation of offices and hardstands	Short term	
	Stockpiling of materials	Short term	
Civil works	Excavation	Temporary	

Work Stage	Description of Activities	Duration of Disturbance[1]	Frequency of Project Activity
	Trenching	Short term	
	Cutting construction	Permanent	
	Embankment construction using cut to fill or from external borrow sources, where required	Permanent	
	Drainage controls	Permanent	
Road works	Construction of permanent access roads, gates and road upgrades	Permanent	
Tower and line logistics	Delivery and laydown of pole / towers and conductors	Short term	
	Component stockpiling at designated laydown areas	Short term	
Tower and line construction	Ground excavation and installation of footings	Permanent	
	Erection of infrastructure components	Short term	
	Stringing activities (e.g. helicopter and/or drone)	Short term	
Fencing	Establish permanent fencing where required (i.e. substation)	Permanent	
	Establish temporary fauna exclusion fencing around laydown areas and around excavation or trenching areas	Temporary	
Reinstate ground surfaces	Ensure ground surfaces are safe and stable immediately post construction	Short term	
Construction traffic	Heavy and light vehicle movements	Short term	Ongoing during construction
Operation and Maintenance			
Line energisation and operation	Establishing a connection between the disconnected transmission line to electronically live.	Permanent	Ongoing during operation
Operational traffic	Periodic vehicle or helicopter use	Medium term	Ongoing during operation
Rehabilitation	Restoration of disturbed areas, including revegetation where required	Temporary	Intermittently
Operational maintenance	Ongoing vehicle movement along established access tracks, helicopter use for line maintenance / line patrols	Permanent term	

Work Stage	Description of Activities	Duration of Disturbance[1]	Frequency of Project Activity
Vegetation maintenance	Ongoing vegetation maintenance (primarily slashing, pruning and weed management) for safe operation, fire safety and biosecurity control	Permanent	
Decommissioning and Rehabilitation			
Removal of transmission infrastructure	De-energising the line, dismantling and removal of conductors, insulators, poles or towers, ancillary hardware and foundations	Short term	Once (to completion of the decommissioning and rehabilitation phase)
Substation decommissioning	De-energising equipment, removal of transformers and switchgear, draining and disposal of oils and coolants, dismantling of concrete pads, footing and above-ground structures	Short term	
Rehabilitation	Rehabilitation of disturbed areas, including easements and laydown sites, through soil stabilisation, weed control, recontouring, and revegetation with native species, aiming to reinstate habitat connectivity where possible	Temporary	

[1]Duration categorisation: **Temporary** up to six months. | **Short term** from 6 months to 24 months. | **Medium term** from two (2) years to 10 years. | **Long term** from 11 years to 20 years. | **Permanent** indicates more than 21 years.

6.2 Threatening Processes

A range of threatening processes influence the condition, viability and long-term persistence of listed TECs, threatened flora, threatened fauna and migratory species across the Project Area. While the specific threats vary between taxa and communities, there are several broad themes that consistently emerge across relevant documentation including the EPBC Act, species or community specific conservation advice, recovery plans, threat abatement plans and published literature. These threatening processes typically act in combination, compounding impacts on species and communities that are already under threat, fragmented or restricted in distribution.

Table 6.2 provides a summary of the common threatening processes relevant to the ecological communities and species occurring or potentially occurring within the Project Area. The threatening processes are also relevant to the Great Barrier Reef MNES values.

This high-level overview identifies the recurring pressures that underpin declines across multiple taxa. Introduced fauna that have been identified as EPBC Act 'Key Threatening Processes' have been identified in **Section 5.2.5**. Additionally, threats and threatening processes relevant to specific communities or species are outlined in **Section 8.0**.

Table 6.2 Summary of Threatening Processes

Threat	Description	Relevant MNES
Habitat Loss, Fragmentation and Degradation	• Extensive historical and ongoing land clearing for agriculture, grazing, cropping, plantations, urban, coastal and peri-urban development. • Associated fragmentation and reduced connectivity between remnant patches. • Habitat modification through forestry, selective logging, track construction, firebreak maintenance and other mechanical disturbances. • Wetland and riparian degradation through drainage, altered flooding regimes, dam construction and other hydrological modifications. • Ongoing resource development pressures (e.g. mining, infrastructure expansion, residential and industrial growth and aquaculture). • Habitat degradation due to increased edge effects.	SEVT TEC, Eucalypt Floodplain Forest TEC, Saltmarsh TEC, *Atalaya collina, Cossinia australiana, Cycas megacarpa, Bertya opponens, Polianthion minutiflorum, Samadera bidwillii,* Common greenshank, Curlew sandpiper, Eastern curlew, Lesser sand plover, Nunivak bar-tailed godwit, Great knot, Greater sand plover, Red knot, Ruddy turnstone, Sharp-tailed sandpiper, Terek sandpiper, Australian Painted Snipe, Greater Glider (Southern and Central), Loggerhead Turtle, Northern Quoll, Black-breasted Button Quail, Collared Delma, Grey-headed Flying Fox, Latham's Snipe, Painted Honeyeater, Squatter Pigeon (southern), Water Mouse, Koala, Greater glider (Southern and Central), Yellow-bellied Glider, Eastern Osprey, Oriental Cuckoo, Common sandpiper, Whimbrel, Pacific golden plover, Grey-tailed tattler, Marsh sandpiper.
Fire Regimes	• Inappropriate fire regimes (too frequent, too infrequent or high intensity burns) leading to vegetation change, loss of obligate seeders, senescence without regeneration and increased vulnerability to invasive species. • Fire interactions with fuel loads altered by weeds, grazing or land management.	SEVT TEC, *Atalaya collina, Cossinia australiana, Cycas megacarpa, Bertya opponens, Polianthion minutiflorum, Samadera bidwillii,* Northern Quoll, Black-breasted Button Quail, Collared Delma, Grey-headed Flying Fox, Painted Honeyeater, Squatter Pigeon (southern), Koala, Greater glider (Southern and Central), Yellow-bellied Glider, Oriental Cuckoo.

Threat	Description	Relevant MNES
Invasive Species	• Weeds (e.g. *Lantana camara*, Cenchrus ciliaris*, Dolichandra unguis-cati**, and other transformer species) outcompeting native flora, altering habitat structure and increasing fuel loads. • Introduced fauna (feral cats, the red fox, feral pigs, goats, the European rabbit, domesticated cattle) causing predation, grazing pressure, trampling and soil disturbance. • Introduced fauna (cane toads) leading to ingestion of toxins. • Overabundant native species (e.g. noisy miner, macropods) contributing to competition, predation or overgrazing in altered landscapes.	SEVT TEC, Eucalypt Floodplain Forest TEC, *Atalaya collina, Cossinia australiana, Cycas megacarpa, Bertya opponens, Polianthion minutiflorum, Samadera bidwillii*, Common greenshank, Curlew sandpiper, Eastern curlew, Lesser sand plover, Nunivak bar-tailed godwit, Greater sand plover, Red knot, Ruddy turnstone, Sharp-tailed sandpiper, Australian Painted Snipe, Greater Glider (Southern and Central), Northern Quoll, Black-breasted Button Quail, Collared Delma, Flatback Turtle, Green Turtle, Latham's Snipe, Painted Honeyeater, Squatter Pigeon (southern), Water Mouse, Yellow-bellied Glider, Fork-tailed Swift, Oriental Cuckoo, Common sandpiper, Whimbrel, Pacific golden plover, Grey-tailed tattler, Marsh sandpiper.
Hydrological Change and Water Management	• Disruption of natural flow regimes by dams, weirs, levees, irrigation extraction, drainage works and flood mitigation infrastructure. • Tidal restriction and altered salinity in coastal and estuarine systems. • Eutrophication and pollution from agriculture, urban stormwater, litter and mining. • Acid sulfate soil exposure in coastal lowlands.	Common greenshank, Curlew sandpiper, Eastern curlew, Lesser sand plover, Great knot, Greater sand plover, Red knot, Ruddy turnstone, Sharp-tailed sandpiper, Terek sandpiper, Australian Painted Snipe, Flatback Turtle, Green Turtle, Latham's Snipe, Water Mouse, Common sandpiper, Whimbrel, Pacific golden plover, Grey-tailed tattler, Marsh sandpiper. Great Barrier Reef WHA/NHL, Environment of the Great Barrier Reef Marine Park.
Climate Change	• Shifts in rainfall and temperature regimes leading to altered hydrology, prolonged droughts, and heat stress events. • Bushfire intensity and frequency exacerbated by hotter, drier conditions. • Loss of climatically suitable habitat and changing distribution of food and shelter resources. • Sea level rise and coastal squeeze for intertidal ecosystems.	Common greenshank, Curlew sandpiper, Eastern curlew, Nunivak bar-tailed godwit, Great knot, Greater sand plover, Greater Glider (Southern and Central), Koala.

Threat	Description	Relevant MNES
Disease and Pathogens	• Plant pathogens (Phytophthora and myrtle rust) causing dieback. • Animal diseases (chytrid fungus in amphibians, KoRV and chlamydia in koalas, psittacine circoviral disease in birds, toxoplasmosis in mammals). • Increased vulnerability to disease due to small, fragmented populations.	Saltmarsh TEC, Koala.
Human Disturbance or Direct Mortality	• Recreational disturbance (off-road vehicles, jet skis, fishing, unleashed dogs, trampling). • Collision hazards (roads, fences, powerlines, wind turbines, windows, lighthouses). • Entanglement in netting, barbed wire, and marine debris. • Harvesting and collection (legal and illegal, including plant and animal parts). • Noise, vibration, dust, lighting, pollution, erosion and sedimentation and contamination associated with project activities, development and resource extraction. • Direct mortality leading to a loss of individuals.	SEVT TEC, Eucalypt Floodplain Forest TEC , Saltmarsh TEC, *Atalaya collina, Cossinia australiana, Cycas megacarpa, Bertya opponens, Polianthion minutiflorum, Samadera bidwillii,* Common greenshank, Eastern curlew, lesser sand plover, Nunivak bar-tailed godwit, Great knot, Greater sand plover, Red knot, Ruddy turnstone, Sharp-tailed sandpiper, Terek sandpiper, Australian Painted Snipe, Greater Glider (Southern and Central), Koala, Loggerhead Turtle, Northern Quoll, Black-breasted Button Quail, Collared Delma, Flatback Turtle, Green Turtle, Grey-headed Flying Fox, Latham's Snipe, Painted Honeyeater, Squatter Pigeon (southern), Water Mouse, White-throated Needletail, Yellow-bellied Glider, Eastern Osprey, Fork-tailed Swift, Oriental Cuckoo, Common sandpiper, Whimbrel, Pacific golden plover, Grey-tailed tattler, Marsh sandpiper.

6.3 Description of Impacts

MNES have the potential to be impacted during the Project, with varying magnitude, duration and frequency depending on the activity and the MNES. A summary of the Project's impacts specific to MNES is detailed in **Table 6.3** with further details in **Section 6.4.1** to **Section 6.4.2.7**. All impacts are known, and are not unpredictable or irreversible, unless otherwise stated. Impacts on MNES values associated with the decommissioning and rehabilitation phases are expected to be minor and are addressed separately in **Section 6.7**.

Table 6.3 Description of Impacts

Construction Impact	Operational Impact	Relevant Section of PER
Vegetation Clearance and Loss of Habitat		
The 423.7 ha Disturbance Footprint of the Project includes 108.3 ha of remnant vegetation and 47.1 ha of regrowth vegetation. The remaining 268.3 ha (or 63.4 %) of the Disturbance Footprint is non-remnant vegetation. Potential impacts resulting from clearing native vegetation can include: • reduced patch size of vegetation communities potentially compromising the viability of the community and associated habitat • loss of habitat causing a reduction of biological diversity or loss of local populations and genotypes • loss of, or disturbance to, microhabitat features such as tree hollows, leaf litter, ground timber (including hollow logs), surface rocks, and boulder piles • loss of floristic diversity and the food resources this provides such as foliage, flowers, nectar, fruit and seeds • fragmentation of habitats resulting in reduced dispersal opportunities for fauna • destruction of abiotic features necessary to support vegetation communities and species habitat. **Duration**: Permanent. **Frequency**: Once (to completion of Project Phase).	No further vegetation clearing or loss of habitat will occur for the Project once operational except for vegetation maintenance (e.g. slashing, pruning) which will be required for safe operation and fire safety. **Duration**: Nil **Frequency**: Nil	See **Section 6.4.1.1** for further details including the predicted maximum direct impacts on MNES.
Habitat Degradation, Fragmentation and Connectivity		
Potential impacts to habitat connectivity and edge condition resulting from the creation of new edges include: • Modification of microclimate where new edges are created due to greater penetration of light and wind into the vegetation. Temperature extremes are greater, and humidity of air is generally less at the edge than in the interior of vegetation. This effect is known to increase in size if vegetation is dense or cover is high	No further vegetation fragmentation or impacts to connectivity will occur for the Project once operational however, habitat degradation may occur as a result of increased edge effect over time. **Duration**: Ongoing **Frequency**: Nil	See **Section 6.4.1.3** for further details including the predicted maximum direct impacts on MNES.

Construction Impact	Operational Impact	Relevant Section of PER
• Physical disturbance to vegetation at the edge. Ongoing damage to the edge of vegetation may occur due to grading and weed control of road edges and vehicle use • Changes to soil properties including compaction of the soil, less organic matter and increased erodibility • Introduction of weeds and pathogens through mud and dirt which falls off vehicles • Changes to vegetation through the above listed impacts. **Duration**: Permanent. **Frequency**: Ongoing during construction.		
Fauna Injury or Mortality		
Physical trauma to MNES fauna may occur during all phases of the Project, with the highest likelihood during construction activities such as vegetation clearing, earthworks, and trenching. Potential impacts include: • vehicle or machinery strike–greatest risk to ground-dwelling and low-mobility species. Risk is highest during construction and continues at a lower level during operation and maintenance. Species at risk include koala, northern quoll, black-breasted buttonquail, squatter pigeon (southern), and common fauna (mammals, reptiles, amphibians, birds). Volant species such as gliders, bats, and listed migratory birds have lower risk • entrapment in vegetation during removal–risk to tree hollow users during clearing (e.g. greater glider, yellow-bellied glider, northern quoll) • entrapment in trenches or excavations–risk to ground-dwelling fauna, including small mammals and reptiles; arboreal species descending to the ground are also susceptible. Likely short-term and restricted to construction • entanglement in barbed wire fencing–risk to bats, owls, and gliders. New fencing associated with Project infrastructure will be fitted with bat deflectors.	During the operational phase of the Project, the risk of fauna injury or mortality is expected to be low but may persist in specific contexts. Potential impacts include: • risk of collision or entanglement with transmission infrastructure, particularly for volant species such as birds and bats • injury or mortality from vehicle strikes during maintenance activities, particularly along access tracks • disruption to fauna behaviour from ongoing human presence and noise during maintenance. **Duration**: Permanent. **Frequency**: Ongoing during operation and maintenance activities.	See **Section 6.4.1.4** for further details including the predicted maximum direct impacts on MNES.

Construction Impact	Operational Impact	Relevant Section of PER
Duration: Permanent. **Frequency**: Ongoing during construction.		
Invasive Plants and Animals		
With increased movement of vehicles, equipment, machinery and materials into and out of the area, construction activities have the potential to increase the extent and distribution of invasive species across the Project Area. Potential impacts include: • displacement of native species, particularly where invasive species outcompete native flora, suppress germination, or reduce forage and breeding resources • use of native habitat resources by invasive species, reducing the area of occupancy for native fauna • alteration of fire regimes through the establishment of high-biomass, flammable species such as buffel grass (*Cenchrus ciliaris*) • compromised habitat integrity and reduced resilience of native vegetation and threatened species habitat. Weed species are common within cleared and regrowth areas and occur sporadically throughout remnant vegetation. Species of concern include those listed as Weeds of National Significance (WoNS), such as *Lantana camara* and *Cryptostegia grandiflora*, as well as high-biomass grasses including *Megathyrsus maximus* var. *maximus* and *Cenchrus ciliaris*. Invasive fauna species recorded during field surveys include cane toad, feral cat, feral pig, house mouse, common myna and European rabbit. Invasive species may use roads, tracks and cleared infrastructure easements to access areas previously undisturbed, and may be introduced via vehicles, equipment or materials used during construction. **Duration**: Permanent. **Frequency**: Ongoing during construction.	There is a potential for the ongoing spread or establishment of invasive plant and animal species during the operational phase of the Project. This may occur through maintenance activities, vehicle movement, and the use of access tracks and easements. Potential impacts include: • continued displacement of native species due to competition with invasive flora and fauna • ongoing degradation of habitat quality and resilience, particularly in areas where invasive species are already established • increased fire risk associated with high-biomass invasive grasses such as buffel grass (*Cenchrus ciliaris*) • use of cleared easements and access tracks by invasive fauna to move into previously undisturbed areas. **Duration**: Permanent. **Frequency**: Ongoing during operation.	See **Section 6.4.2.1** for further details including the predicted maximum direct impacts on MNES.

Construction Impact	Operational Impact	Relevant Section of PER
Changed Fire Regimes		
The Project is located within a bushfire-prone area as identified by the Queensland SPP Bushfire Prone Area mapping. Existing fire ignition risks within the Project Area include: • surrounding agricultural land use, including the operation of equipment, machinery and hot works • existing transmission lines, which are susceptible to flashover • lightning strike. Additional fire ignition risks during construction may include: • Electrical or mechanical fires associated with plant and equipment. Gradual changes to the landscape during construction may result in corresponding changes to fire regimes. While some changes are anticipated, they are expected to be temporary and medium-term in nature. **Duration**: Temporary to short-term. **Frequency**: Ongoing during construction.	During the operational phase of the Project, the presence of transmission infrastructure may contribute to ongoing fire ignition risks. These risks include: • flashover events associated with transmission lines • maintenance activities involving machinery or hot works • increased fuel loads from invasive high-biomass grasses such as buffel grass (*Cenchrus ciliaris*) These factors may alter fire behaviour and frequency, particularly in areas where vegetation has been modified or invasive species are present. **Duration**: Permanent. **Frequency**: Ongoing during operation.	See **Section 6.4.2.2**
Soil Erosion, Sedimentation and Contamination		
Construction activities such as vegetation clearing, earthworks, and vehicle movement have the potential to disturb soil profiles and increase the risk of erosion and sedimentation. Potential impacts include: • increased erosion on exposed soils, particularly on slopes and in areas with shallow or texture contrast soils • sediment runoff into adjacent watercourses, wetlands or drainage lines, potentially affecting aquatic ecosystems • soil compaction from machinery and vehicle movement, reducing infiltration and root penetration	During the operational phase of the Project, soil erosion and sedimentation risks may persist, particularly in areas where ground cover has not fully re-established or where maintenance activities disturb soil surfaces. Potential impacts include: • ongoing erosion along access tracks, easements and disturbed slopes • sediment movement into adjacent watercourses or drainage lines during rainfall events	See **Section 6.4.2.3**

Construction Impact	Operational Impact	Relevant Section of PER
• loss of topsoil and soil structure, affecting vegetation recovery and regeneration • potential contamination from fuel, oil, or chemical spills associated with construction equipment and materials. These impacts may be exacerbated during periods of heavy rainfall or in areas with limited ground cover. **Duration**: Temporary to short-term depending on rehabilitation success. **Frequency**: Ongoing during construction in a staged manner.	• soil compaction and contamination from maintenance vehicles and equipment • reduced soil stability and vegetation recovery in areas with poor rehabilitation outcomes. **Duration**: Permanent. **Frequency**: Ongoing during operation and maintenance activities.	
Dust Impact		
Construction activities, particularly those involving vegetation clearing, earthworks and vehicle movement along unsealed access tracks, may generate dust that settles on adjacent vegetation. Potential impacts include: • reduced light penetration on leaf surfaces due to dust deposition • physical blockage and damage to stomata, affecting gas exchange and water loss • decreased photosynthetic capacity, potentially leading to reduced growth rates, floral vigour and overall vegetation health • localised impacts to vegetation directly adjacent to disturbed areas, particularly where dust loads are sustained over extended periods. These impacts are expected to be physical in nature, as dust generated during construction is chemically inert. The severity of impact will depend on vegetation type, dust grain size and total dust load. **Duration**: Temporary **Frequency:** Ongoing during construction	During the operational phase of the Project, dust generation is expected to be minimal and largely restricted to maintenance activities. Potential impacts include: • localised dust generation from vehicle movement along unsealed access tracks, particularly during dry conditions • physical impacts to vegetation adjacent to unrehabilitated or frequently disturbed areas, including reduced photosynthetic capacity due to dust deposition on leaf surfaces • minor reduction in vegetation health and vigour in areas where dust accumulation is sustained over time. **Duration**: Long-term in unrehabilitated areas. **Frequency**: Ongoing during maintenance activities.	See **Section 6.4.2.4** and EMP
Edge Effect		
Clearing of vegetation for access tracks, tower pads and easements will create new ecological edges, which are transitional zones between habitat	During the operational phase of the Project, edge effects may continue to influence ecological	See **Section 6.4.2.5**

Construction Impact	Operational Impact	Relevant Section of PER
types where environmental conditions and species interactions can differ significantly from interior habitats. Potential impacts include: • Modification of microclimates at newly created edges due to increased light and wind exposure, resulting in greater temperature extremes and lower humidity compared to interior vegetation • Changes to soil properties, including increased compaction, erosion, and reduced organic matter • Introduction of weeds and pathogens via vehicle movement and maintenance activities • Physical disturbance to edge vegetation from grading, weed control and ongoing access track maintenance • Shifts in vegetation community composition due to altered abiotic conditions and increased edge permeability. The extent of edge effects will vary depending on vegetation type, land use intensity, and local environmental conditions. **Duration**: Permanent **Frequency**: Ongoing during construction	processes along newly created boundaries such as easements and access tracks. Potential impacts include: • ongoing modification of microclimates at edge zones, including increased light, wind exposure, and temperature fluctuations • continued changes in vegetation structure and species composition due to altered abiotic conditions • persistence of soil degradation at edges, including compaction and erosion, particularly in areas subject to maintenance activities • facilitation of weed and pathogen spread along disturbed edges and access routes • reduced habitat quality and connectivity for edge-sensitive fauna species. **Duration**: Permanent. **Frequency**: Ongoing during operation and maintenance activities.	
Noise, Activity and Light		
During the construction phase, there will be an increase in noise, light and human activity across the Disturbance Footprint as machinery undertakes vegetation clearing, excavation and other works. Potential impacts include: • reduced foraging ability for auditory predators due to elevated background noise • increased risk of predation by visual predators due to masking of auditory cues	During the operational phase of the Project, indirect impacts associated with ongoing noise, activity, and light (from substation works only) may continue to influence ecological values within and adjacent to the easement. These impacts are primarily linked to the persistent acoustic emissions from transmission infrastructure (e.g. powerline buzzing), intermittent maintenance activities, and artificial	See **Section 6.4.2.6**

Construction Impact	Operational Impact	Relevant Section of PER
• temporary avoidance of habitat by sensitive fauna due to disturbance from noise and human presence • increased risk of fauna-vehicle collisions during periods of high activity • disruption to breeding or foraging behaviour, particularly in areas adjoining retained habitat. These impacts are expected to affect fauna using habitats both within and adjacent to the easement. Species such as the water mouse and migratory shorebirds may temporarily avoid habitat near the Calliope River substation during peak construction activity. However, this area is already subject to disturbance from existing infrastructure, including transmission lines and roads. **Duration**: Temporary. **Frequency**: Ongoing during construction.	lighting at substations. Key potential impacts include: • chronic noise disturbance from powerline buzzing, potentially affecting fauna communication and habitat use • disruption of nocturnal fauna behaviour and habitat avoidance due to artificial lighting at substations where lighting has been installed **Duration**: Permanent. **Frequency**: Ongoing (infrastructure-related); intermittent (maintenance-related).	

6.4 Construction Impacts

During construction, the most significant direct impact is the clearing of native vegetation, which can lead to the loss and fragmentation of habitat for flora and fauna. This may disrupt ecological corridors and reduce biodiversity in the local area. In addition to habitat loss, fauna may be injured or killed during vegetation clearing, earthworks, or other construction activities, particularly if appropriate fauna management protocols are not in place. Construction activities also increase the risk of vehicle strikes, particularly for slow-moving or ground-dwelling species, as a result of elevated traffic volumes and machinery movement.

6.4.1 Direct Impacts

6.4.1.1 Vegetation Clearance and Loss of Habitat

Vegetation clearing required for construction will result in direct impacts to native vegetation and associated MNES habitat values across the Disturbance Footprint, which is approximately 423.7 ha. This includes 108.3 ha of remnant vegetation, 47.1 ha of regrowth vegetation, and 268.3 ha of non-remnant vegetation that has been previously modified by clearing and grazing. minor portion of the vegetation clearance and loss of habitat described in this section will occur within the Great Barrier Reef WHA/NHL primarily on Calliope River Island.

The Project has been strategically sited to maximise the use of previously cleared areas, with approximately 74.4 % of infrastructure located within non-remnant or regrowth vegetation, thereby reducing the extent of impact to intact habitat. In addition, vegetation clearing has also been subdivided to areas fully cleared and selectively cleared. In this instance areas selectively cleared will retain the shrub and ground layer of the vegetation with only the canopy removed, retaining habitat linkages for species utilising this space or strata of vegetation.

Potential impacts resulting from clearing native vegetation can include:

- Reduced patch size of vegetation communities potentially compromising the viability of the community and associated habitat.
- Loss of habitat causing a reduction of biological diversity or loss of local populations and genotypes.
- Loss of, or disturbance to, microhabitat features such as tree hollows, leaf litter, ground timber, rocks and dense shrubs.
- Loss of floristic diversity and the food resources this provides such as foliage, flowers, nectar, fruit and seeds.
- Fragmentation of habitats resulting in reduced dispersal opportunities for fauna.

Vegetation clearing will be staged throughout the construction phase, limiting disturbance to smaller areas at any one time. For example, tower pads are typically 50 x 50 m and mid span sectional clearance is variable from 30 to 60 m in width and will be cleared as needed to progress the Project. This approach allows mobile fauna species to temporarily relocate away from active works areas, although species with restricted home ranges or limited dispersal capacity may experience localised population declines. Where clearing cannot be avoided, particularly in areas supporting critical habitat features (e.g. breeding or denning sites), permanent impacts to threatened biodiversity values are expected.

The maximum extent of direct impacts to threatened communities and species (those which are known to occur or for which there is a moderate or high likelihood of occurring within the Project Area) as a result of vegetation clearing are detailed in **Table 6.4**. These calculations represent a worst-case scenario and are inclusive of potential direct impact to habitat during all Project phases. For the threatened communities and species values identified as unlikely to occur or having a low likelihood of occurring, no direct impacts are anticipated due to the unlikely presence of these values within the Project Area and associated habitat.

Table 6.4 Direct Impacts to Threatened Communities and Species

MNES	Likelihood of Occurrence	Habitat Utilisation	Direct Impact to Habitat Utilisation Area (ha)	Maximum Direct Impact Area (ha), Disturbance Footprint	Total Habitat in the Project Area (ha)	% of Habitat Loss in the Project Area
Threatened Ecological Communities						
SEVT TEC	Known	Suitable vegetation communities	2.2	2.2	149.1	1.5
Eucalypt Floodplain Forest (TEC)[#]	Known	Suitable vegetation communities	13.4	13.4	51.3	26.1
Threatened Flora						
Cossinia australiana	Known	Suitable habitat	2.4	2.4	277.6	0.9
Cycas megacarpa	Known	Known habitat confirmed	53.0	53.5	645.8	1.3
		Known habitat suspected	0.5		3,397.8	
Samadera bidwillii	Known	Known habitat	0.2	115.9	1.8	1.8
		Suitable habitat	115.7		6,503	
Atalaya collina	Known	Suitable habitat	1.6	1.6	81.9	2.0
Bertya opponens	High	Suitable habitat	77.7	77.7	5,354.1	1.5
Polianthion minutiflorum	High	Suitable habitat	8.1	8.1	440.3	1.8
Threatened Fauna						
collared delma	Known	Suitable habitat	49.0	49.0	5,044.2	1.0
grey-headed flying-fox	Known	Foraging and dispersal	125.3	125.3	5,539.9	2.3
		Roosting	-		-	

MNES	Likelihood of Occurrence	Habitat Utilisation	Direct Impact to Habitat Utilisation Area (ha)	Maximum Direct Impact Area (ha), Disturbance Footprint	Total Habitat in the Project Area (ha)	% of Habitat Loss in the Project Area
koala	Known	Breeding, foraging and shelter	131.0	421.7	5,858.8	3.0
		Climate refugia	22.8		561.4	
		Dispersal	267.9		7,580.1	
squatter pigeon (southern)	Known	Breeding	14.4	152.3	238.9	2.6
		Foraging	0.9		13.8	
		Dispersal	137.0		5,592.0	
greater glider (southern and central)	High	Likely or current denning	31.5	141.5	3,430.5	2.4
		Potential or future denning	105.7		2,271.9	
		Foraging and dispersal	4.3		89.0	
northern quoll	High	Denning and refuge	38.4	92.2	2,475.4	1.8
		Foraging and dispersal	53.8		2,550.9	
yellow-bellied glider (south-eastern)	High	Denning, foraging and dispersal	20.9	20.9	3,195.2	0.7
water mouse	High	Breeding, foraging and dispersal	0.5	0.5	36.6	1.4
white-throated needletail	High	Roosting and foraging	84.6	154.9	3,459.5	2.3
		Foraging and dispersal	70.3		3,235.5	
ruddy turnstone	Moderate	Roosting and foraging	1.1	1.1	107.8	1.0
sharp-tailed sandpiper	Moderate	Roosting and foraging	1.1	1.1	107.8	1.0
red knot	Moderate	Roosting and foraging	1.1	1.1	107.8	1.0

MNES	Likelihood of Occurrence	Habitat Utilisation	Direct Impact to Habitat Utilisation Area (ha)	Maximum Direct Impact Area (ha), Disturbance Footprint	Total Habitat in the Project Area (ha)	% of Habitat Loss in the Project Area
curlew sandpiper	Moderate	Roosting and foraging	1.1	1.1	107.8	1.0
great knot	Moderate	Roosting and foraging	1.1	1.1	107.8	1.0
greater plover	Moderate	Roosting and foraging	1.1	1.1	107.8	1.0
greater sand plover	Moderate	Roosting and foraging	1.1	1.1	107.8	1.0
Latham's snipe	Moderate	Foraging and dispersal	0.6	0.6	32.2	1.9
painted honeyeater	Moderate	Foraging and dispersal	9.0	9.0	1,778.7	0.6
Nunivak bar-tailed godwit	Moderate	Roosting and foraging	1.1	1.1	107.8	1.0
green turtle	Moderate	Nesting	-	-	-	-
		Foraging	-		12.8	
loggerhead turtle	Moderate	Nesting	-	-	-	-
		Foraging	-		12.8	
flatback turtle	Moderate	Nesting	-	-	-	-
		Foraging	-		12.8	
eastern curlew	Moderate	Roosting and foraging	1.1	1.1	107.8	1.0
Australian painted snipe	Moderate	Seasonal breeding, foraging and dispersal	0.6	0.6	80.2	0.8
common greenshank	Moderate	Roosting and foraging	1.1	1.1	107.8	1.0
black-breasted button-quail	Moderate	Nesting and foraging	3.7	3.7	264.8	1.4

MNES	Likelihood of Occurrence	Habitat Utilisation	Direct Impact to Habitat Utilisation Area (ha)	Maximum Direct Impact Area (ha), Disturbance Footprint	Total Habitat in the Project Area (ha)	% of Habitat Loss in the Project Area
terek sandpiper	Moderate	Roosting and foraging	1.1	1.1	107.8	1.0
Migratory Fauna						
fork-tailed swift	Known	Foraging and dispersal	417.6	417.6	14,315.2	2.9
eastern osprey	Known	Breeding and dispersal	0.2	0.2	1.8	2.0
		Foraging	-		8.2	
Oriental cuckoo	Moderate	Foraging and dispersal	155.0	155.0	6,662.9	2.3
common sandpiper bar-tailed godwit whimbrel Pacific golden plover grey-tailed tattler marsh sandpiper	Moderate	Roosting and foraging	1.1	1.1	107.8	1.0

Two patches of Eucalypt forest floodplain TEC will be reduced below the area thresholds due to Project construction, but are not contained within the direct impact area. The two areas total 3.24 ha.

6.4.1.2 Changing Resource Availability

Vegetation clearing and associated disturbance from the Project has the potential to alter the availability of key resources that support fauna populations within the Project Area, including MNES fauna. The removal of mature trees, understorey vegetation and groundcover reduce structural elements that provide shelter, foraging opportunities and breeding habitat for a range of species. For arboreal mammals such as gliders (e.g. greater glider (southern and central) and yellow-bellied glider (south-eastern)), the reduction in hollow-bearing trees may influence the number of suitable roosting and denning sites. Similarly, the loss of coarse woody debris, rock piles and dense groundcover can reduce shelter opportunities for ground-dwelling mammals (e.g. northern quoll) and reptiles (e.g. collared delma) and semi-aquatic species (e.g. water mouse).

In addition to the removal of physical habitat features, vegetation clearing can reduce the abundance and diversity of food resources. This includes the loss of nectar, pollen and fruit sources for fauna reliant on seasonal or patchy resources (e.g. grey-headed flying-fox), as well as a reduction in invertebrate abundance associated with changes to canopy and understorey vegetation. These shifts may influence the availability of foraging opportunities for insectivorous species specifically for reptiles such as the collared delma.

Project-related changes to shading and groundcover can also alter local soil moisture regimes and microclimatic conditions, which may in turn influence the persistence of ephemeral food, water sources and influence the occurrence of listed threatened flora species (e.g. *Cossinia australiana* and *Samadera bidwillii*). While some mobile species may adapt by shifting their ranges to access alternative resources, less mobile or territorial species are more likely to experience reduced local habitat suitability where resources are diminished or fragmented.

6.4.1.3 Habitat Degradation, Fragmentation and Connectivity

As the Disturbance Footprint has been co-located adjacent to existing transmission lines and many existing access tracks are present, habitat within the Project Area has already been subject to fragmentation. Despite this, further vegetation clearing will be required for the construction of the Project. Clearing has the potential to further dissect vegetation communities, reducing patch size and, in some cases, creating isolated patches of habitat. Patch isolation can restrict the ability of species to move between suitable habitat areas, limiting opportunities for dispersal, recolonisation and gene flow.

Where patches become isolated beyond the movement capacity of species, the likelihood of localised decline increases due to reduced recruitment and limited resource exchange. This can also influence ecological processes such as pollination and seed dispersal, which depend on the movement of fauna across the landscape. Reduced connectivity between patches may therefore affect both flora and fauna populations over the longer term.

MNES species considered most susceptible to fragmentation and isolation impacts include threatened flora (e.g. *Cycas megacarpa* and *Samadera bidwillii*), greater glider (southern and central), yellow-bellied glider (south-eastern), collared delma and water mouse. These species rely on continuous or connected habitat for shelter, foraging or dispersal and may be less able to utilise modified areas to move between patches.

The maximum clearing width for the transmission line is between 30–60 m for the mid span and average 50 m x 50 m for tower pads and as such, fragmentation and isolation impacts to koala, threatened birds and bats are considered low. These species are generally more mobile, adapted to fragmented landscapes or known to traverse cleared or modified areas without significant constraint. Infrastructure siting has maximised the use of existing cleared areas to minimise the extent of new fragmentation and patch isolation.

6.4.1.4 Fauna Injury or Mortality

Fauna mortality is another direct impact that may occur to all species including threatened and migratory fauna species during the construction phase. Fauna may be injured or killed during construction principally through:

- Strike from moving vehicles/machinery–key issue for ground dwelling species, particularly those with poor mobility.
- Entrapment in habitat during removal–key issue during tree felling for species that use tree hollows or hollow logs for roosting and denning.
- Entrapment in trenches/holes–key issue for ground dwelling species (reptiles and small mammals), particularly those that are active at night and cannot detect trenches/excavations to avoid, however the risk is low as excavations are to be covered or fenced.

The use of heavy machinery during vegetation clearing presents a significant risk of direct fauna mortality, particularly to species that have poorly developed dispersal mechanisms, shelter in vegetation or underground, or are otherwise difficult to detect. Species that are fossorial, or cryptic such as reptiles (e.g. collared delma), small mammals, and ground-nesting birds (i.e. squatter pigeon (southern)) are especially vulnerable to being killed or injured during activities such as grading, trenching, and clearing. Larger species with defined territories and movement patterns such as the koala are less likely to be at risk of direct mortality where appropriate mitigation measures are applied (i.e. utilising a fauna spotter-catcher (FSC) to undertake ecological pre-clearance surveys). The rapid pace and scale of mechanical clearing can outstrip the ability of fauna to naturally disperse, particularly in fragmented or degraded areas of the Project Area where escape routes are limited. This reinforces the necessity for a staged clearing approach which will be implemented during vegetation clearing.

Vehicle collision may result in fauna injury or mortality during all phases of the Project, but such risk is greatest when high volumes of vehicle activity (including light and heavy vehicles) occur during the construction phase. During vegetation removal there is an elevated risk of injury or mortality from vehicle strike or from clearing activities. This impact of vehicle strike will be most prevalent in the construction phase when clearing activities are being undertaken and internal traffic is at its peak (K. N. Youngentob et al., 2021).

The construction of the Project infrastructure, as well as the general use of access tracks and roads across the Project Area will result in increased vehicle movements and an elevated risk of injury or death to fauna by vehicle strike. During the operation and maintenance phase, vehicle movements will be dramatically reduced, however some risk of collision will remain. Mammals, reptiles, amphibians and birds are all at risk of vehicle strike, particularly those species that may utilise roads for thermoregulation, movement pathways or the disturbed edges for foraging habitat (e.g. MNES such as koala, squatter pigeon (southern) and common species such as macropods). Vehicle collision risk is also associated with species behaviour e.g. crepuscular and nocturnal species are most at risk from vehicle strike in the early morning and late afternoon.

During the construction phase, there is a risk of fauna becoming trapped in habitat features that are disturbed or altered as part of construction activities. Mobile fauna, such as birds, are likely to relocate away from areas being disturbed and are less likely to be trapped, unless nesting or roosting However, species such as reptiles, small mammals, amphibians, and ground-nesting birds may seek refuge in hollow logs, rock piles, burrows, and tree hollows, all of which may be removed, crushed, or temporarily exposed during vegetation clearing, earthworks, or excavation. For example, species like the collared delma, may shelter under rocks or in rock crevices and are at risk of entrapment or injury if these features are moved or destroyed without pre-inspection. Nocturnal species may have challenges moving away from shelter or active breeding sites during daytime construction activities. Species such as the greater glider (southern and central) and yellow-bellied glider (south-eastern) may be at risk if shelter sites (e.g. tree hollows) are removed without adequate pre-clearance surveys.

Open trenches, culverts, and soil stockpiles created during construction can unintentionally act as traps for fauna, particularly at night or during rainfall, leading to injury, dehydration, or mortality. This is a key issue for ground-dwelling species (e.g. black-breasted button-quail, northern quoll) particularly those that are active at night and that are capable of moving across modified areas and cannot detect trenches or other excavations to avoid them. Arboreal fauna which descend to the ground to disperse (e.g. koala) are also susceptible to this risk.

6.4.2 Indirect Impacts

6.4.2.1 Invasive Plants and Animals

Invasive Plants

The introduction and/or spread of weeds is a potential indirect impact that can compromise the integrity of the remaining vegetation, increase the intensity and/or frequency of fires, as well as threaten the long-term survival of threatened species. Within the Project Area, weed species are common within the cleared and regrowth vegetation communities as well as sporadically throughout remnant vegetation.

The weed species that pose the greatest threat to flora and vegetation values are those identified as WoNS including *Cryptostegia grandiflora** (rubber vine), *Dolichandra unguis-cati** (cat's claw creeper), *Lantana camara**, and *Opuntia tomentosa**. These species are highly effective colonisers they can severely displace native flora and fauna, degrade existing habitat and have the potential to alter fire regimes. Invasive plants are an inherent threat to all threatened flora discussed (*Atalaya collina*, *Cossinia australiana*, *Cycas megacarpa*, *Bertya opponens*, *Polianthion minutiflorum* and *Samadera bidwillii*).

The introduction or proliferation of high biomass grass species such as *Cenchrus ciliaris** and *Hyparrhenia rufa**can also have substantive impacts to ecosystems by out-competing native vegetation, reducing the germination of native species, and increasing fire intensity and/or frequency.

Pests

Introduced fauna, including species known to the Project Area (e.g. wild dog, feral cat, feral pig, cane toad, red fox and European rabbit) pose significant threats to native biodiversity through predation, competition, habitat disturbance, and disease transmission. The presence and movement of these species can lead to declines in native fauna populations, degradation of ecological communities and habitat within the wider Project Area.

Introduced Carnivores

The pests of particular concern in the context of the Project are wild dog, red fox, and feral cat, which are effective predators capable of impacting small to medium-sized native mammals, birds, and reptiles including a number of MNES known or potentially occurring within the Project Area. Clearing between habitat patches may increase predator-prey interactions for dispersing individuals including koala for which predation by wild dog is a key recognised threat. Predation and competitive interactions between northern quoll, feral cats and red fox are also likely occurring via competition for food or direct predation, and may be suppressing northern quoll populations within its distribution (Hill & Ward, 2010b). Although the effects are not well studied, predation by feral cats and the red fox is also listed as a potential threat to collared delma and squatter pigeon (southern).

Feral cats have been recorded in the Project Area. Predation by feral cat has been implicated in subpopulation declines of the northern quoll and the squatter pigeon (southern). The northern quoll is listed as having a 'High' susceptibility to predation by feral cat whereas squatter pigeon (southern) is listed as having a 'Moderate' susceptibility in the *Threat Abatement Plan for Predation by Feral Cats 2024* (Department of Climate Change, Energy, the Environment and Water, 2024g). Other threatened birds may be susceptible to predation by feral cat and red fox like the black-breasted button-quail. However, this species is listed as being 'Low or Not Susceptible' to predation by feral cat in the plan. Other MNES known or potentially occurring within the Project Area are either categorised as 'Low or Not Susceptible' to predation by feral cat or are not listed in the plan.

The *Threat Abatement Plan for Predation by Feral Cats 2024* (Department of Climate Change, Energy, the Environment and Water, 2024g) states that options for feral cat management (aside from lethal management) include managing fire and grazing to maintain a complex ground vegetation layer (to reduce feral cats' hunting success, which would also be applicable to dingo/wild dog and red fox) and manipulating species interactions, for example by reducing rabbit (also relevant to red fox and wild dog/dingo management) and introduced rodent populations.

Whilst these predators are known to occur in the Project Area, any exacerbation of populations or increase in interactions could exert further pressure on the aforementioned MNES. The Project may assist with the control works where landholders are undertaking integrated pest management control measures. Any pest animal control measures need to consider the broader landscape context and the ability of pest species to transit to and from the Project Area.

Introduced Herbivores and Feral Pigs

Pest herbivore species such as the European rabbit and pest omnivores (e.g. feral pigs) are all known to the Project Area and are capable of imposing significant ecological threats. These species can contribute to the degradation of native vegetation through overgrazing, trampling, and soil disturbance, which can lead to erosion, reduced regeneration of native flora, and altered habitat structure. The presence of these pest species may also exacerbate the spread of invasive weeds and reduce the habitat quality for native wildlife. As well as pest herbivores, domesticated stock (e.g. cattle) are present throughout the Project Area which would be currently exerting similar ecological pressures. Following the construction of the Project, grazing would continue at a similar magnitude to existing levels.

Feral pigs are known to disturb soil and water sources, impacting both terrestrial and aquatic ecosystems. Feral pigs can act as reservoirs for endemic animal diseases such as leptospirosis and brucellosis, both of which can lead to birth defects, abortions, and infertility in mammals. Additionally, feral pigs can contribute to the spread of exotic plant pathogens, including *Phytophthora cinnamomi*, which causes plant dieback and is therefore a threat to arboreal fauna such as koala and greater glider (southern and central).

Pathogen spread can occur through the movement of contaminated soil on their feet and fur, as well as through the dispersal of viable spores in their faeces (Department of the Environment and Energy, 2015). Improper management of organic waste, food scraps, or construction-related materials can attract feral pigs and contribute to increased local population densities.

European rabbits were recorded during the survey program. According to the *Threat abatement plan for competition and land degradation by rabbits* (Department of the Environment and Energy, 2016) European rabbits pose a number of direct and indirect impacts to environmental assets including:

- overgrazing and general damage to plant species
- reversing the normal processes of plant succession competition with native wildlife for resources (food and shelter)
- competition with native wildlife for resources (food and shelter)
- preventing plant regeneration
- altering ecological communities and changing soil structure and nutrient cycling, leading to significant erosion
- removal of critical habitat for arboreal mammals and birds, leading to increased predation and reduced reproduction
- supporting elevated population densities of pest predators such as the red fox, feral cats and wild dogs
- promoting growth of introduced and unpalatable species such as weeds.

Construction activities involving land clearing for roads and infrastructure would create bare ground and have the potential to increase early successional vegetation types that favour European rabbit foraging and burrowing. Fragmentation and the development of edge habitats can also benefit the European rabbit, which often utilise transitional zones between open and covered areas for feeding and shelter. Although bare ground would be created for tracks and Project infrastructure, these environments would largely include compacted soils unsuitable for burrowing and would be completely cleared of vegetation including palatable ground cover.

Introduced Rodents and Cane Toads

The black rat, house mouse and cane toad are known to the Project Area and may pose ongoing ecological risks. The black rat is an opportunistic omnivore that preys on native birds, reptiles, and invertebrates, particularly impacting ground-nesting species through egg predation. It also competes with native mammals for food and shelter, potentially threatening the viability of vulnerable fauna species. The house mouse can also contribute to the degradation of native vegetation by feeding on seeds and seedlings, which may hinder the regeneration of threatened plant species. Moreover, their high reproductive rate allows populations to rapidly expand under favourable conditions, potentially exacerbating these impacts. While generally less destructive than some larger pest species, house mice can indirectly affect threatened fauna and flora by altering habitat quality and food availability.

The cane toad poses significant ecological threats due to its toxic secretions, which can cause mortality in native predators such as snakes, goannas, and quolls, and is a recognised threat to northern quoll. Death by ingestion of cane toad toxin is considered the most immediate threat to northern quolls throughout their range (Hill & Ward, 2010b). Cane toads are poisonous at all stages of their life cycle and the northern quoll may be killed when ingesting toxin while attempting to eat the cane toad.

The black rat and house mouse are known to compete with native small mammals and may also facilitate the spread of diseases. Given that black rat, house mouse and cane toad are already well-established within the Project Area, the incremental impact of the Project on their populations is expected to be minimal.

6.4.2.2 Changed Fire Regimes

Construction activities can increase the risk of bushfire, particularly in bushfire-prone regions. The use of heavy machinery, power tools, and hot works such as welding or grinding can inadvertently spark fires, especially during periods of high fire danger or total fire bans. Site clearance, vegetation removal, and accumulation of combustibles like building materials or waste further heighten risk by creating or amplifying fuel loads. The movement of vehicles and equipment can also facilitate the spread of embers or ignitable debris.

6.4.2.3 Soil Erosion, Sedimentation and Contamination

Removal of vegetation and disturbance to the soil profile through clearing and construction activities can lead to soil erosion, and result in an increased input of sediment into waterways. This can lead to siltation of watercourses and a reduction in water quality of creeks and rivers near the Project Area. Erosion can also lead to the loss of important topsoil resources, leading to the exposure of subsoil often with poor physical and chemical properties.

Water quality impacts from erosion and sediment runoff are a concern during the construction phase due to vegetation clearing, earthworks and altered surface runoff. Clearing vegetation and disturbing soil exposes land to erosion, increasing sediment transport into nearby waterways, which can degrade aquatic habitats by increasing turbidity and smothering biota. Elevated sediment levels often carry nutrients such as nitrogen and phosphorus, as well as pesticides, fertilizers, and organic litter from disturbed soils or residual agricultural use, leading to nutrient enrichment that promotes algal blooms and disrupts aquatic ecosystems (Millidine et al., 2015). Additionally, the movement of heavy machinery and earthworks can cause localised changes to surface runoff patterns, exacerbating erosion and pollutant transport, particularly in steep areas where runoff velocities increase. The introduction of contaminants such as oils, fuels, and chemicals during construction further threatens water quality, aquatic life and riparian habitats if spills reach waterways.

Potential impacts of erosion and sedimentation runoff on MNES could include reduced foraging and den resources such as (e.g. tree hollows) and reduced connectivity within and outside of the Project Area for species that disperse along riparian corridors, such as koala, greater glider (southern and central), yellow-bellied glider and northern quoll. Reduced water quality could also impact any fauna which is dependent on the affected water source for drinking, for example squatter pigeon which drinks daily. Contaminated water would also present a potential poisoning risk to flora and fauna, depending on the nature of the pollutant. Contaminated soils can degrade the biological variability of soils, impairing plant growth and establishment.

6.4.2.4 Dust Impact

Deposition of dust, sand and soil resulting from construction may have potential impacts on vegetation if excessive levels are sustained over extended periods. When dust settles on plant foliage it can reduce the amount of light penetration on the leaf surface, block and damage stomata, and slow rates of gas exchange and water loss (Farmer, 1993). Reduction in the ability to photosynthesize due to physical effects may result in reduced growth rates of vegetation and decreases in floral vigour and overall community health. These impacts are dependent on the type of vegetation, type of dust (chemical properties, grain size) and total dust load setting on the vegetation.

Dust impacts from the Project are expected to be localised, predominantly affecting vegetation directly adjacent to access tracks, brake and winch sites, pull up bays, and laydown areas where soil disturbance from vehicle movement and construction will be greatest. In eucalypt woodland and forest environments, dust particles are intercepted progressively as they move through vegetation layers, reducing concentrations further inside the woodland beyond around 15 m from the source edge (Doley, 2013). Local access roads, anticipated to experience high traffic, are likely to see the greatest dust impacts on surrounding roadside vegetation.

As the dust is chemically inert, its effects are expected to be physical rather than chemical, potentially reducing the health and vigour of vegetation near roadsides and diminishing the palatability of forage for herbivorous species.

6.4.2.5 Edge Effect

Ecological edges are transitional zones between adjoining habitat patches where ecological parameters can differ (Porensky & Young, 2013). Such parameters can be biological (e.g. changes in species distributions and interactions) and abiotic (e.g. changes in gradients of air and soil temperature, moisture and sunlight levels) and this may drive changes in fauna and flora communities able to persist in such environments and create population sinks (Porensky & Young, 2013; Willmer et al., 2022).

Edges and their effects can be created through clearing of vegetation, such as new edges created by roads and transmission line corridors. The distance the effect spreads from the edge, known as edge permeability, can be highly variable and depends upon many factors such as vulnerability of the ecosystems, degree of change in land use, intensity of this use and chance events (Murcia, 1995).

The main environmental impacts of new edges which would be created by the Project are likely to include:

- The modification of microclimates where new edges are created due to a greater penetration of light and wind into the remaining vegetation. Microclimate changes should be expected in the creation of new edges as greater temperature extremes and lower air humidity are generally observed at edge communities, with this effect known to increase if vegetation is dense or cover is high. Studies show that increased light penetrates up to 10 m within woodlands and open forests (Pocock & Lawrence, 2005), and changes to temperature, humidity and airflow can occur up to 14 m (Goosem, 2007).
- Changes to soil properties including greater compaction and erosion, and less organic matter.
- The introduction of weeds and pathogens through mud and dirt falling off vehicles.
- The physical disturbance of edge vegetation. Ongoing impacts on newly created edge vegetation may occur through the upkeep of access tracks (e.g. weed control, grading).
- Changes in vegetation community composition (e.g. higher shrub densities and acacia regrowth at the fringes of clearings).

6.4.2.6 Noise

During construction, noise will be emitted from temporary activities such as vehicle movements, vegetation clearing, trenching and operation of construction machinery. These impacts are generally localised and short term, associated with the presence and movement of personnel, vehicles and equipment within the Project Area.

Noise impacts can occur over an acute or chronic timescale, representing both sub-lethal and lethal impacts that have the potential to cause permanent damage; a factor that is influenced by acoustic duration, intensity, and the biology and ecology of the specific species (Lawrence et al., 2015).

The potential effects of these types of noises on wildlife may include:

- Reduced foraging ability by auditory predators due to increased background noise.
- Increased risk of predation by visual predators due to increased background noise.
- Masking signals used by animals to communicate between conspecifics or recognise biological signals to reduce the distance signals can be detected.
- Decreasing hearing sensitivity temporarily or permanently; and/or increasing stress and altering reproductive and other hormone levels (Lawrence et al., 2015).
- Increased potential for collisions with vehicles.
- Human visitation causing disturbance to foraging or breeding behaviours.

Sudden loud, impulsive or impact noises can cause birds and other fauna to become startled, which if occurring over the longer term, may affect feeding and breeding behaviour in some species. These impacts are expected to occur to the fauna using the habitats both within and adjacent to the Project Area.

It is expected that excavation, construction and earthmoving associated with the Project will potentially cause disturbance to all groups of fauna. In particular the water mouse and shorebirds, which have potential habitat adjacent to the existing Calliope River Substation. This may result in the temporary avoidance of the area for the duration of these activities. However, it is important to note that the habitat for the water mouse and shorebirds is located in an already severely degraded area, with existing transmission lines, roads and the Calliope River substation. Therefore, noise, light and activity are already present.

Current research indicates that there are no government policies or other widely accepted guidelines in respect to the noise levels which may be acceptable to wildlife. The levels or character of noise that may “startle” or otherwise affect the feeding or breeding pattern of birds or other wild animals are also not firmly established in the technical literature.

The hearing sensitivities of various wildlife groups have been summarised as follows (Kaseloo & Tyson, 2004):

- **Mammals:** <10 hertz (Hz) to 150 kilohertz (kHz)
- **Birds:** 100 Hz to 8-10 kHz
- **Reptiles:** 50 Hz to 2 kHz
- **Amphibians:** 100 Hz to 2 kHz.

The varying responses to noise disturbance across species groups where scientific data is available is summarised in **Table 6.5**.

Table 6.5 Summary of Responses to Noise Disturbance per Species Groups

Species Group	Response
Reptiles	Snakes lack external ears and a tympanic middle ear (‘ear drum’). Scientific studies have quantified hearing sensitivity loss in snakes as being reduced by about 40 dB or more compared to species with a tympanic ear. The absence of the tympanic membrane means snakes are functionally "deaf" to many airborne

Species Group	Response
	sounds humans and other animals can hear, but they remain acutely tuned to substrate vibrations through their jawbone (Christensen et al., 2012).
	In studies on the eastern blue-tongued lizard (*Tiliqua scincoides scincoides*), behavioural stress responses, including prolonged freezing, were triggered primarily by mining machinery noise at amplitudes of 70–75 dB(A), especially when combined with high-frequency sounds above 2 kHz. Lower amplitude noise at 60–65 dB(A) had less pronounced effects (Mancera et al., 2017).
	At ~85 dB, Australian brown snakes were observed to move away from a sound source, indicating a strong avoidance or defensive response. Hissing and jaw drops, as well as freezing and periscoping (raising the front body), were recorded as typical reactions in controlled experiments (Zdenek et al., 2023).
	Studies in Western Australia found that delmas have a remarkably high hearing limit up to 75 dB of 12-14 kHz, which is equivalent to avian species and far exceeds hearing frequencies reported for other lizard groups (Manley & Kraus, 2010). The study also noted that body temperature is an important consideration in the delmas frequency response, with the frequency sensitivity response increasing with body temperature.
Invertebrates	Studies indicate that noise such as highway traffic can elevate heart rates and stress responses in monarch larvae exposed to noise levels in the 40–90 dB range, which may impact migration and development (Davis et al., 2018).
Mammals	In the absence of national guidelines, and based on the findings of the applied research literature, a threshold level of 65 dB(A) LAeq (a-weighted equivalent continuous sound level) should be considered as a screening tool for ecological noise impacts (Department of Health, 2018).
	Below 65 dB(A), many species show fewer or no significant behavioural disruptions (Department of Health, 2018).
	Sound levels above about 90 dB are likely to be adverse to mammals and are associated with a number of behaviours such as retreat from the sound source, freezing, or a strong startle response (Tougaard, 2025).
Birds	Traffic noise exceeding 55 dB(A) in some wetland sites has been linked to lower bird diversity, potentially due to noise masking and habitat avoidance (Phoenix Environmental Sciences, 2011).
	Passerine birds are usually sensitive to noise masking. Masking effects become ecologically significant at sound pressure levels between 50-60 dB(A). Passerine birds are usually sensitive to noise masking. Masking effects become ecologically significant at sound pressure levels between 50-60 dB(A) (Phoenix Environmental Sciences, 2011).
	Noise disturbance below 65.5 dB(A) was less likely to elicit strong behavioural responses for birds (Goudie & Jones, 2004).
	Noise-induced temporary hearing loss in birds has been documented at continuous noise levels between 93 and 110 dB(A) with potential for permanent damage at higher levels (Department of Transport and Main Roads, 2024).
	Anthropogenic noise can also trigger flight and alert responses in birds and altered behaviour after the noise disturbance, which can lead to reduced breeding success, at noise levels ranging from 65-85 dB(A). Complete habituation to such disturbances does not always occur, even in less noise-sensitive species (Dawe & Goosem, 2008).

As previously noted, the scientific and published literature does not provide definitive thresholds or criteria for terrestrial fauna. However, available research suggests that moderate impacts on habitat use may occur at noise levels exceeding 60 dB(A) to 65 dB(A), while fauna are likely to vacate the area when noise levels reach approximately 80 dB(A) or higher.

The potential effects of construction noise from the Project depend on how far the sound travels before it diminishes to levels with negligible impact. Although construction noise without mitigation is quite loud near its origin, it typically decreases to around 65 dB(A) within a distance of 100 to 200 m.

Potential Noise Impacts to Wildlife from Project Activities

Based on the information in **Table 6.5**, several species group within 100 m of construction activities will likely be negatively impacted by construction noise. Wildlife situated close to the construction area may temporarily leave due to the disturbance, including noise. In contrast, animals located more than 100 m away are anticipated to experience only slight, short-term disturbance, resulting in minimal overall effect.

Species groups in vegetated areas within the Project Area will be at highest risk of noise impacts, including small riparian areas and patches of small woodlands, as these areas provide higher quality and a larger quantity of habitat compared to areas of agricultural land or non-remnant areas. However, sound is also likely to travel shorter distances within vegetated areas. This is due to the noise reduction effect associated with the extant vegetation and structurally complex environments. Outside of these areas, the landscape is heavily disturbed (through agriculture and grazing impacts) and the presence of fauna is expected to be limited to species tolerant of disturbance. However, it is noted that some threatened species can inhabit areas outside of the structurally complex vegetated areas, including koala and squatter pigeon (southern).

A study conducted by (Landon et al., 2003) observed that animals responded to noise disturbances by leaving the affected area. Since most construction activities will take place in sequential stages along the Disturbance Footprint and will be temporary, it is anticipated that wildlife will return to these areas once construction is completed.

Responses are likely to range from moderate disturbance to abandonment of the area, however, due to a lack of scientific research it is difficult to determine how the MNES relevant to this Project will react. Collared delma is active during the day, which will coincide with construction hours. Studies on other delma species showed that this group of reptiles have unusually high hearing thresholds (Manley & Kraus, 2010), so there is potential for construction noise to interfere with collared delma foraging activity. However, the species occupies microhabitat underneath thick leaf litter, surface rocks and woody debris, so it is expected there would be some level of noise attenuation. The collared delma is unlikely to abandon habitat in response to noise as the species exhibit high site fidelity and rely on shelter for camouflage and protection, rather than an escape response from a perceived threat.

The noise response from reptiles would be influenced by season. In winter reptiles, being ectothermic, are less active and may be more inclined to seek shelter rather than expend energy to disperse away from noise. Reptile body temperature is also associated with sensitivity to frequency increasing as body temperature increases (Manley & Kraus, 2010), therefore noise response in winter may be relatively lower than during summer.

Greater glider (southern and central), yellow-bellied glider (south-eastern) and northern quoll are nocturnal, and their nightly activities will not coincide with construction noise. During the day, these species occupy sites that would be expected to muffle construction noise to some degree, however, it is expected that individuals occupying shelter adjacent to the clearing area would be subject to noise disturbance during the day, which would likely interrupt sleep patterns. Greater glider (southern and central), yellow-bellied glider (south-eastern) and northern quoll utilise numerous shelter sites, for example, greater glider (southern and central) occupies up to 20 tree hollows in its home range (Department of Climate Change, Energy, the Environment and Water, 2022b) and northern quoll is known to shelter in rocky outcrops, tree hollows, hollow logs, termite mounds, goanna burrows and human dwellings (Hill & Ward, 2010b) across its distribution. Therefore, it is expected that all species could find suitable shelter away from the clearing area as an avoidance response to construction noise.

Grey-headed flying-fox is also nocturnal and there are no flying-fox roosts in the Project Area, so this species is unlikely to be impacted by construction noise.

Construction noise may impact avian species in the Project Area through noise masking and triggering an avoidance response. Passerine birds are sensitive to noise masking as outlined in **Table 6.5** and could be expected to vacate an area in response to loud noise. The black-breasted button-quail may be affected by elevated noise levels given the cryptic and shy nature of the species. It is currently not a listed known threat to the species. More mobile species such as painted honeyeater would be expected to more easily disperse away from clearing activities as an avoidance response to construction noise.

For all birds close to the construction area, heightened alert and flight responses and avoidance of the clearing area could interrupt foraging behaviour and impact breeding activities, including abandonment of nests. Squatter pigeon (southern) is often recorded on active construction sites and relies on camouflage rather than a flight response to threats, so is not expected to exhibit an avoidance response to construction noise. However, its foraging patterns could be sporadically interrupted by a squatting response to loud noise if it feels threatened.

Construction noise adjacent to the Calliope River may influence marine species such as marine turtles and migratory shorebirds. Marine turtles, particularly during nesting and hatching phases, are sensitive to low-frequency airborne and substrate-borne sounds (100–800 Hz), which overlap with typical construction noise profiles. Chronic exposure to such noise can lead to temporary threshold shifts (TTS) in auditory sensitivity, disorientation during nesting, and increased stress responses, ultimately reducing nesting success and hatchling survival (Piniak, 2012). Whilst the Project Area is noted to be close to marine turtle breeding areas on the ocean side of Curtis Island, Piniak (2012) also noted that marine turtles exhibited a mild, aversive response to these sounds.

Migratory shorebirds, which rely on coastal habitats for foraging and roosting, are similarly affected by noise pollution. Studies have shown that persistent noise can alter their vigilance behaviour, reduce feeding efficiency, and cause habitat avoidance, especially in species that depend on acoustic cues for predator detection and social communication (Buxton et al., 2017).

As clearing works will be staged, noise impacts will be localised and temporary. Normal faunal activity would be expected to resume once the clearing front has moved further along the alignment.

6.4.2.7 Increased Lighting

Artificial lighting has the potential to disrupt local flora and fauna during the construction phase. Construction activities are proposed to occur during daylight hours with nighttime activities unlikely to occur or rarely in exceptional circumstances. Although lighting usage is unlikely to occur, the impact has been included for the one-off or rare instance additional lighting maybe required or occurs during construction.

Such lighting can alter natural light-dark cycles, thereby affecting behaviours such as reproduction, feeding, and migration, as well as inducing physiological stress or contributing to population decline.

Nocturnal species, such as greater glider (southern and central), koala and northern quoll, are particularly susceptible to artificial light, which can interfere with their foraging and mating activities, increase predation risk due to enhanced visibility, delay roost or den emergence, and increase the attraction of habitats by invasive species (e.g. cane toads, feral cats) that exploit artificially lit environments (González-Bernal et al., 2016).

Some bat species need to travel or commute between roost sites and foraging areas. Artificial light in commuting areas, particularly for light-avoidant bats, can fragment habitat, which may cause longer flight times and increase energy expenditure. Where bats are forced to use suboptimal flight paths they may be exposed to greater predation risk. Where there are no alternative flight paths, bats may be isolated from key food or water sources. For light-avoidant species, the habitat is considered degraded or lost where artificial light spills onto habitat (Azam et al., 2018). Where light intrusion occurs in foraging habitats, bats may avoid the best foraging areas, instead utilising suboptimal habitat (Polak et al., 2011). Alternatively, artificial light may affect the abundance of food resources. In both situations, bats' ability to obtain necessary resources may be compromised.

Since nocturnal mammals have evolved to be active in naturally dark environments, they are likely vulnerable to the impacts of artificial light at night. The daily cycles of light and dark influence the behaviour of terrestrial mammals including emergence from and return to refuge sites, foraging and commuting behaviours. The onset of darkness cues activity for nocturnal mammals. As a result, artificial light can delay the onset of activity in nocturnal species and can reduce the time they have available for critical behaviours such as finding food and commuting. Artificial light can also make nocturnal species more vulnerable to predators and may even allow diurnal predators to continue hunting into the night, resulting in increased predation pressure (Department of Climate Change, Energy, the Environment and Water, 2023g).

Bright artificial light can fragment habitat for nocturnal fauna that consistently use one commuting path to move around their habitat. Populations of light-sensitive fauna could become locally extinct if light spill fragments areas which are essential for life processes, for example, if shelter habitat was fragmented from forging or water resources. Light spill fragmentation could fragment and isolate populations of light-sensitive fauna (Department of Climate Change, Energy, the Environment and Water, 2023g), thereby reducing geneflow and overall resilience of local populations.

Artificial lighting can also disorient nocturnal and migratory birds, which rely on natural light cues for navigation during flight. According to the Department's National Light Pollution Guidelines for Wildlife 2023 (Department of Climate Change, Energy, the Environment and Water, 2023g), artificial lighting can cause birds to deviate from migratory routes, increase collision risks with infrastructure, and lead to exhaustion or starvation if disoriented for extended periods. Migratory/aerial species that undertake long distance movements, such as white-throated needletail, fork-tailed swift, Latham's snipe are particularly vulnerable during these phases as they often fly at night and rely on dark, unobstructed skies. Other species, such as grey-headed flying-fox, may be more resilient to the effects of artificial lighting as they move around in response to food resources rather than following a particular movement pathway and are well known to occupy urban environments where artificial light is constant.

Nocturnal reptiles may extend their hours of activity under artificial light but may suffer impaired sleep as a consequence (Kolbe et al., 2021). Like other vertebrates, reptiles have circadian rhythms and melatonin cycles, although the effect of artificial light on these is largely unknown unknown (Grubisic et al., 2019). For nocturnal reptiles, artificial light may alter their movement in the landscape in a similar way to other wildlife, depending on whether a given species is light-attracted or light-avoidant, which in turn is affected by whether the species is predator, prey, or both.

Research on free-living songbirds has found that exposure to white artificial light can elevate circulating corticosterone levels compared with green or red light. Individuals with higher stress hormone concentrations subsequently produce fewer young (Ouyang et al., 2015). Artificial illumination can also influence plant function, altering growth patterns, flowering phenology, and how resources are distributed within the plant (Bennie et al., 2018). Changes of light can interrupt periods of plant repair and growth, affecting the overall health of plants and potentially resulting in mistimed seasonal cues (Department of Climate Change, Energy, the Environment and Water, 2023g).

Vulnerabilities to the effects of artificial light for each species group, as per (Department of Climate Change, Energy, the Environment and Water, 2023g) is summarised in **Table 6.6**.

Table 6.6 Species Groups and Corresponding Direct and Indirect Vulnerabilities to the Effects of Artificial Light

Species Group	Direct Effects	Indirect Effects
Terrestrial Plants	• Artificial lighting (including both cool white and amber lighting) may mask seasonal lighting cues, leading to mistimed seasonal changes in growth and reproduction • Night-time photosynthesis may undermine water status and tree health	• Loss of invertebrate and vertebrate pollinators and seed transporters may affect reproduction • Loss of digging mammals and large terrestrial birds may reduce nutrient cycling in soil
Insects and Other Invertebrates	• Artificial lighting traps many flying and ground-dwelling insects, increasing mortality and reducing dispersal, foraging and breeding • Other invertebrates avoid illuminated areas, or become less active under lights, reducing dispersal, foraging and breeding	• Diurnal birds can extend foraging activity into the night-time, increasing predation pressure on nocturnal invertebrates • Decreased plant growth due to artificial light may reduce food resources and breeding sites available to herbivorous insects
Reptiles	• Light patches or barriers (roads, paths) may reduce dispersal of juveniles across the landscape and limit the breeding options for light-sensitive species	• Artificial light sources may assist invasive cane toads by aggregating invertebrate prey and making them easier to capture
Nocturnal Birds	• Lights may cause smaller nocturnal birds (for example, owlet nightjars) to reduce foraging due to predation risk • Spatial distribution of some nocturnal birds (for example, owls and frogmouths) may be altered by artificial light to take advantage of	• Artificial light may reduce invertebrate abundance with impacts on food resource of nocturnal birds including nightjars, owls and frogmouths

Species Group	Direct Effects	Indirect Effects
	prey aggregations (insects, bats) around light sources • Artificial light may disrupt seasonal physiological and behavioural cues, undermining reproduction	
Diurnal Birds	• Artificial light may disrupt seasonal physiological and behavioural cues, undermining reproduction • Artificial light may extend foraging behaviour into the night-time • Artificial light may assist visual predators (including exotic species such as feral cats and the red fox), leading to increased predation at roosting and nesting sites	• Artificial light may reduce invertebrate abundance with impacts on birds' food resource
Migratory Shorebirds	• Artificial light at foraging sites may increase susceptibility to predation • Migrating birds may be disoriented or killed by artificially lit structures on migration routes	
Bats	• Artificial light may delay nightly departure from roost, and disrupt foraging and commuting behaviour • Rows of lighting may present a barrier to landscape connectivity	• Artificial light may reduce invertebrate abundance with impacts on bats' food resource • Aggregations of insects at light sources may assist some (light-tolerant) bat species in the short term and disadvantage others
Terrestrial Mammals	• Artificial lighting can restrict movement in the landscape and increase predation risk • Vehicle headlights can disorient and temporarily blind native mammals • Artificial light masks natural seasonal cues (daylength), causing mistimed reproduction	• Artificial light may reduce invertebrate abundance with impacts on insectivorous mammal's food resource
Marine Turtles	• Artificial lighting along coasts can deter female turtles from coming ashore to nest or cause them to abandon attempts, leading to a reduction in successful nests. • Effects on hatchlings include disorientation, incorrect heading and increase mortality	

6.5 Operation and Maintenance

6.5.1 Direct Impacts

6.5.1.1 Fauna Injury or Mortality

Vehicle Strike

During operation, temporary periods of increased vehicle activity are expected to occur. These activities will involve the use of light vehicles, large trucks, and maintenance equipment to support routine inspections, vegetation management and reactive maintenance of the transmission line infrastructure.

The risk of vehicle strike will occur along internal access tracks and public road corridors that are used to access the transmission line easement. This risk is expected to be highest during peak periods of wildlife activity, particularly at dawn and dusk. Although the frequency of vehicle movements during operations is expected to be low, there remains a risk of vehicle strike to native fauna. Species that may be affected include medium to large mammals, woodland birds that forage on the ground, and reptiles.

Of the MNES known or potentially occurring within the Project Area, three species are considered to be particularly vulnerable to vehicle strike. These species are:

- Koala, which is known to move between habitat patches on the ground and is present in eucalypt woodland areas intersected by access tracks.
- Squatter pigeon (southern), which is a ground-dwelling bird that forages in open woodland and grassland habitats, often adjacent to access tracks where these intersect water courses or drainage features.
- Northern quoll, which is a nocturnal, ground-active species that may use linear infrastructure corridors for movement or foraging.

It is noted that nightworks are generally not proposed, therefore, vehicle strike for the koala and northern quoll is considered very low to unlikely. Further information on these species and their potential exposure to operational impacts is provided in **Section 8.0**.

Infrastructure Collision

Certain bird and bat species are known, or have the potential, to collide with overhead infrastructure associated with transmission lines. This includes conductors, earth wires, poles or towers, and guy wires where present. While the risk of collision is generally lower than that associated with wind turbines, it remains a recognised impact pathway, particularly for species that fly at heights intersecting with the transmission line alignment or that exhibit low manoeuvrability or poor obstacle avoidance.

A range of factors influence the likelihood of collision with transmission infrastructure, including:

- physical attributes of the infrastructure, such as the height and span of conductors, the presence of guy wires, and the visibility of wires against the background environment
- species-specific traits, including flight height, manoeuvrability, visual acuity, and behavioural responses to linear infrastructure

- biophysical characteristics of the landscape, such as topography, vegetation structure, and proximity to key habitat features including wetlands, ridgelines, and roosting or nesting sites.

These factors are often interrelated and can vary significantly across space and time. For example, proximity to migratory pathways, roost locations, foraging areas, or breeding habitat may increase the likelihood of species interacting with the infrastructure. Weather conditions, including wind speed, fog, and low light levels, can also reduce visibility and increase collision risk.

Species considered most susceptible to collision with transmission infrastructure include:

- large-bodied or fast-flying birds, such as raptors, waterbirds, and pigeons
- migratory birds, particularly those that travel long distances at high altitudes or in large flocks
- flying-foxes and microbats, especially those that forage or commute at canopy height or above.

Of the MNES known or potentially occurring within the Project Area, several species may be vulnerable to infrastructure collision. These include:

- squatter pigeon (southern)
- grey-headed flying-fox
- white-throated needletail
- fork-tailed swift.

Further information on these species and their potential exposure to operational impacts is provided in the **Section 8.0**.

Although the overall risk of collision is considered to be low for most species, the consequences of mortality may be significant for species with small or declining populations, low reproductive rates or restricted distributions.

In addition to direct mortality, infrastructure collisions may result in indirect ecological impacts through the creation of carrion. Bird or bat carcasses resulting from collisions with overhead wires or structures may attract scavenging fauna, including both native and introduced predators. This can lead to increased predator activity along cleared easements and access tracks, which may in turn elevate predation pressure on native ground-dwelling species. For example, increased foraging by native predators such as the northern quoll may lead to greater spatial overlap and competition with invasive species such as the feral cat and red fox, both of which are recognised as key threatening processes under the EPBC Act. These interactions may compound existing pressures on threatened fauna and contribute to broader ecosystem-level impacts.

6.5.1.2 Habitat Fragmentation and Loss of Habitat

Site Alienation and Barrier Effects

During the operational phase of the Project, no further vegetation clearing will occur, however site alienation may result in fauna avoiding habitat within or adjacent to the transmission line easement. Site alienation refers to changes in behaviour where fauna no longer utilise areas of otherwise suitable habitat due to disturbance, changes in vegetation structure, or perceived risk. While the transmission line easement does not form a hard physical barrier like a road, the combination of open ground, ongoing disturbance and periodic human presence may function as a behavioural barrier, reducing fauna use and movement opportunities across the landscape.

Key mechanisms through which site alienation and behavioural barrier effects may occur include:

- Temporary human activity and disturbance associated with vehicle access or maintenance works which may cause short term displacement of fauna, with some disturbance sensitive species avoiding areas of higher activity even after works are complete.
- Noise generated by high voltage transmission line infrastructure such as the constant background hum, may influence the behaviour of noise sensitive fauna and could result in some species avoiding areas in close proximity to the alignment.
- Changes in vegetation structure within the maintained easement altering the suitability of habitat, with species reliant on dense canopy, shrub cover or continuous groundcover less likely to use these areas despite their availability.
- Increased exposure risk may occur where fauna crossing the easement are more vulnerable to predation and heat stress due to reduced shelter, leading some species to avoid open sections of the corridor.
- Cumulative disturbance over the life of the Project, including repeated maintenance, vegetation management and presence of infrastructure, may reinforce avoidance behaviour and reduce the functional value of habitat patches adjacent to the easement.

6.5.2 Indirect Impacts

6.5.2.1 Changed Fire Regimes

The transmission easement may function as a linear fire break that could limit fire spread across some sections of the Project Area. However, existing bushfire risk and fire regimes within retained vegetated areas are expected to remain broadly consistent with current conditions. Fuel loads within cleared areas may vary with seasonal response to weed abundance. Management of weeds and continuous grazing pressure within certain extents of the Project Area is likely to limit additional fuel load within cleared areas.

The predominant land use within cleared areas in the Project Area is cattle grazing. Following construction, grazing is expected to continue across most cleared areas at a similar intensity to present. Grazing will contribute to the management of fuel loads within the ground layer by reducing grass fuel load. On this basis, it is considered unlikely that the Project will result in a substantial change to existing fire regimes.

6.5.2.2 Noise

Operational noise is primarily associated with the transmission line infrastructure itself. High voltage lines may generate a constant hum that could influence the behaviour of noise-sensitive fauna, particularly species that rely on acoustic cues, such as some microbat species or other fauna with low tolerance to background noise. The magnitude of such effects is expected to be limited given the linear nature of the infrastructure and the existing landscape context, including the presence of existing transmission lines and other anthropogenic noise sources.

6.6 Water and Hydrology Impacts

6.6.1 Water Quality and Hydrology

A Surface Water Impact Assessment has been undertaken for the Project, as detailed in **Appendix D**. The Surface Water Impact Assessment identified the following potential impacts to MNES.

- Risk of increased sediment and erosion run-off:
  - During the construction and decommissioning of components of the Project, soils will be disturbed, potentially leading to sediments and/or pollutants being entrained in rainfall runoff and entering local waterways during vegetation removal, excavation, and material stockpiling. Discharge of sediment-laden runoff from the Project has the potential to result in the deterioration of the downstream receiving water quality, for instance:
    - The Project may disrupt soils, leading to the generation of sediments, which in turn will bind with oils/grease and other nutrients
    - Works within or near a watercourse are a risk to downstream water quality due to the disturbance and the mobilisation of sediments and pollutants. Work occurring outside watercourse networks may also indirectly mobilise sediment and pollutants via wind and rainfall. Construction of the Project would not require controlled discharges to watercourses
    - Mobilised sediments, including high concentrations of nutrients (fertilisers), may trigger algal blooms that result in anoxic conditions within any fish habitat. Mobilised sediments containing heavy metals and other contaminants can degrade aquatic habitats
    - Soils within the Project Area may contain residual herbicides/pesticides from historical or present-day farming practices
    - Loss of topsoil resources on the land and ongoing erosion may reduce the area of arable land and/or damage private property
    - Erosion and sediment mobilisation may lead to degradation of water quality in lakes, estuaries and dams. This, in turn, will impact the health of the ecosystem and impact aquatic fauna and flora, as well as increasing turbidity and decreasing water quality in downstream watercourses.
- Risk of impacts on stream stability and riparian health:
  - Without undertaking progressive and effective rehabilitation, the Project may affect stream stability and the hydrologic regime. Peak stormwater discharges from the Project Area for impervious areas may increase slightly through the creation of compacted gravel roads and some small hardstands. Exposing large areas will increase water volumes and runoff rates. This, in turn, increases the risk from higher flow rates impacting the downstream watercourses. Over time, these higher flows will alter the stream's geomorphology, leading to bank slumping and erosion.
- Risk to receiving water quality aspects:
  - The Project Area traverses several watercourses and drainage features. The potential impacts of the Project may include changes in water quality characteristics, including temperature, which in turn may adversely affect biodiversity, ecological health, or aquatic ecosystems

- Other potential impacts of the Project may include:
  - The release or mobilisation of persistent organic chemicals, heavy metals, or other potentially harmful chemicals that accumulate in the aquatic or marine environment, leading to adverse outcomes for biodiversity, ecological and aquatic health
  - Stormwater runoff from impervious surfaces results in localised erosion
  - Accidental spills or discharge through the use and storage of chemicals such as fuel.

- Risk of increased sediment and erosion due to future climate scenario:
  - The Project has an expected operational life of 50 years and so will be influenced by future climate rainfall and flooding. The analysis has implemented the latest Australian Rainfall and Runoff (AR&R) v4.2 Guideline, which instructs that rising global temperatures are linked to estimates of design rainfall and flood magnitude. Over the long term, the Project will be subject to an increasing frequency of storm events, and so any soil disturbance and erosion could be expected to occur more frequently. This change is unrelated to the Project, so observed changes cannot necessarily be attributed to it.
  - The potential impacts of future climate scenarios range from SSP1 (very-low emissions) to SSP5 (high emissions). Noting the wide uncertainty for each pathway, the future climate (2090) flood modelling used the SSP3 scenario. The modelling indicates that flood flows will increase, and this has the potential to lead to more sediments and/or pollutants entering waterways. The Project is likely to require ongoing maintenance and vegetation clearance activities; this, coupled with predicted increases in rainfall event severity, may compound the potential impacts on erosion and sediment generation.
- Risk of increased impacts on stream stability due to future climate scenario:
  - Future climate is predicted to lead to an increase in storm event magnitude, and thus, the potential impacts on downstream watercourses and their stability are significant. An increase in the frequency and magnitude of stream flows will compound the impact on downstream watercourses.
  - The potential impacts of flood modelling were assessed using the SSP3 scenario. The modelling of flows shows that regional flood flows will rise throughout. This will lead to higher stream power and bed shear stress within the downstream watercourses. The Project also extends to the tidal and coastal margins, so sea level rise will influence storm surge and peak water levels at the downstream limit of the watercourse.

6.6.2 Groundwater

The Project is not expected to directly extract, intercept, or significantly alter groundwater flows within the Project Area. Groundwater resources in the region are generally shallow and localised, and existing powerline infrastructure and access tracks have already modified some local hydrology.

The potential for contamination from fuels, lubricants, or other chemicals is low, and any incidental exposure is expected to be short-term and confined to the immediate area of construction activities.

Groundwater-dependent vegetation and habitat features may be sensitive to changes in local groundwater availability or quality. However, given the minor and highly localised nature of potential drawdown or disturbance, impacts to flora and fauna relying on shallow groundwater are expected to be negligible. Vegetation reliant on localised groundwater sources is likely to remain largely unaffected, and fauna using these areas for foraging, roosting, or breeding are expected to experience minimal disruption.

No permanent impacts to aquifers or groundwater-dependent ecosystems are anticipated, and groundwater levels and quality are expected to remain within natural variability following Project completion.

6.7 Decommissioning Impacts

Decommissioning of the Project will involve the removal of transmission line infrastructure, ancillary facilities, and associated access tracks, along with the rehabilitation of disturbed areas. These activities are expected to be undertaken once the operational life of the Project has concluded and will involve temporary construction-like activities similar to the construction phase but generally confined to previously disturbed areas.

Vegetation removal required during the decommissioning phase will be minimised. This includes areas which occur within the Disturbance Footprint as the ecological value of these areas to MNES may change during Project operation. Impacts to remnant vegetation are not anticipated, and any disturbance to regrowth or previously cleared areas will be minimised where practicable. Microhabitat features such as logs or shrubs may be affected where vegetation clearing for infrastructure removal is necessary, and fauna that have utilised the infrastructure for roosting or nesting, including raptors or smaller vertebrates using artificial habitat, may be temporarily displaced.

Fauna movement and behaviour may be temporarily altered during decommissioning, with species avoiding areas subject to vehicle or machinery activity. This may result in short-term disruptions to local movement corridors and access to foraging or nesting sites.

Indirect ecological impacts may also arise from temporary soil compaction, minor erosion, or the potential introduction or spread of weeds and pathogens through vehicle and machinery movement. Edge effects may occur locally where vegetation is disturbed, although impacts are expected to be confined to areas previously cleared.

Decommissioning impacts can be minimised through careful planning, including the restriction of vehicle and machinery access to defined tracks and previously disturbed areas, progressive rehabilitation of disturbed areas, and measures to maintain habitat connectivity wherever possible.

Overall, decommissioning activities are expected to result in temporary, localised ecological impacts that are largely reversible through rehabilitation and revegetation. Long-term impacts on remnant vegetation, fauna populations, or habitat connectivity are not anticipated where appropriate management measures are applied.

6.8 Facilitated Impacts

The Project may give rise to facilitated impacts to MNES, which occur indirectly as a result of the presence, operation, or maintenance of transmission line infrastructure. These impacts differ from direct impacts, as they generally result from changes in habitat structure, access, or resource availability rather than the immediate removal of vegetation.

The establishment of a transmission line can alter the accessibility and functionality of habitats, potentially facilitating increased human activity, vehicle access, and predator movement into previously undisturbed areas. For example, maintenance tracks and easements may provide pathways for invasive flora and fauna to colonise adjacent habitat, leading to increased competition, predation, or habitat degradation. Edge effects associated with ongoing vegetation management (e.g. slashing, weed control, or firebreak maintenance) can further modify microhabitats and reduce the suitability of remnant vegetation for species of conservation significance.

The transmission line may also facilitate altered fire regimes through the creation of access routes or accumulation of fine fuels beneath the easement, potentially increasing the frequency or intensity of fire events in surrounding vegetation communities. These processes can reduce habitat quality and connectivity for threatened species and ecological communities listed under the EPBC Act.

The Project may indirectly facilitate future development in the region by providing improved access and connection opportunities for other infrastructure, particularly future generation energy projects such as wind, solar, and energy storage facilities. Transmission lines support the viability of renewable developments, and by expanding network capacity, the Project may make surrounding areas more attractive to future generation energy developers. This could lead to an increase in associated infrastructure including substations, internal access roads, laydown areas, and additional transmission lines, each contributing to further vegetation clearing, habitat disturbance and downstream water quality impacts.

The co-location of multiple future generation and linear projects along the same corridor may intensify edge effects, reduce landscape connectivity, and place cumulative pressure on habitats that support MNES. In addition, the Project may encourage ancillary developments such as road upgrades, communication lines, and pipelines, further modifying the surrounding landscape. While these outcomes support regional energy generation expansion, they also present incremental MNES impacts including habitat loss and fragmentation, and erosion and sedimentation.

6.9 Summary of Impacts to MNES

As described in **Section 6.4** to **Section 6.8** the Project is likely to result in a number of direct and indirect impacts to MNES. A summary of the potential impacts relevant to each MNES is provided in **Table 6.7**.

Table 6.7 Summary of Potential Impacts to MNES

MNES	Direct Impacts	Indirect Impacts
Threatened Ecological Communities		
SEVT TEC	• Vegetation clearing leading to reductions in the total area of the TEC	• Weed and pest incursion • Increased edge effects • Elevated dust • Contamination (chemical spills)
Coastal Saltmarsh TEC	• Vegetation clearing leading to reductions in the total area of the TEC	• Weed and pest incursion • Increased edge effects • Elevated dust • Contamination (chemical spills) • Pollution (rubbish)
Eucalypt Floodplain Forest (TEC)	• Vegetation clearing leading to reductions in the total area of the TEC	• Weed and pest incursion • Increased edge effects • Elevated dust • Contamination (chemical spills) • Pollution (rubbish)
Threatened Flora Habitat		
Atalaya collina	• Vegetation clearing causing habitat loss and fragmentation • Mortality	• Reduced habitat quality due to edge effects • Reduced habitat quality or individual health due to erosion and sedimentation • Exotic flora species colonisation and encroachment • Reduced habitat quality due to dust emissions • Alterations to fire regimes including uncontrolled fires
Cossinia australiana	• Vegetation clearing causing habitat loss and fragmentation • Mortality	• Reduced habitat quality or individual health due to edge effects • Reduced habitat quality or individual health due to erosion and sedimentation • Exotic flora species colonisation and encroachment • Reduced habitat quality or individual health due to dust emissions • Alterations to fire regimes including uncontrolled fires

MNES	Direct Impacts	Indirect Impacts
Cycas megacarpa	• Vegetation clearing causing habitat loss and fragmentation • Mortality • Loss of mature adults • Illegal harvesting	• Reduced habitat quality or individual health due to edge effects • Reduced habitat quality or individual health due to erosion and sedimentation • Exotic flora species colonisation and encroachment • Spread of insects which predate on the species • Reduced habitat quality or individual health due to dust emissions • Alterations to fire regimes including uncontrolled fires
Bertya opponens	• Vegetation clearing causing habitat loss and fragmentation • Mortality	• Reduced habitat quality or individual health due to edge effects • Reduced habitat quality or individual health due to erosion and sedimentation • Exotic flora species colonisation and encroachment • Reduced habitat quality or individual health due to dust emissions • Alterations to fire regimes including uncontrolled fires
Polianthion minutiflorum	• Vegetation clearing causing habitat loss and fragmentation • Mortality	• Reduced habitat quality or individual health due to edge effects • Reduced habitat quality or individual health due to erosion and sedimentation • Exotic flora species colonisation and encroachment • Reduced habitat quality or individual health due to dust emissions • Alterations to fire regimes including uncontrolled fires
Samadera bidwillii	• Vegetation clearing causing habitat loss and fragmentation • Mortality • Interruption to reproduction	• Reduced habitat quality or individual health due to edge effects • Reduced habitat quality or individual health due to erosion and sedimentation • Exotic flora species colonisation and encroachment • Reduced habitat quality or individual health due to dust emissions • Alterations to fire regimes including uncontrolled fires
Threatened and Migratory Fauna Habitat		
Australian painted snipe	• Vegetation clearing causing habitat loss and fragmentation • Direct injury or mortality • Disturbance to foraging behaviours due to increased noise and activity during construction	• Soil exposure resulting in an increased risk of erosion and sedimentation of water bodies, reducing water quality and degrading aquatic habitats • Increased risk of contamination associated with activities such as refuelling or storage of chemicals • Temporary changes in hydrology from installation of infrastructure creating a barrier to surface flow and increasing stormwater run-off

MNES	Direct Impacts	Indirect Impacts
	• Degradation of habitat adjacent to the Project Area	• Removal of water from existing constructed wetlands and farm dams leading to changes in hydrology / habitat extent and water quality. Increased activity at these locations resulting in avoidance and potentially altered foraging and breeding behaviour • Periodic burst of elevated noise levels may startle and disorientate individuals within proximity • Increased pest levels, notably those which may predate upon individuals
black-breasted button-quail	• Clearing of vegetation and removal of habitat • Injury or direct mortality • Increased risk of vehicle or plant collision resulting in mortality	• Reduced or lost habitat connectivity • Incursion of weeds may alter the presence, quality and structure of microhabitat features for use by the species • Increased accessibility and incursion of feral species • Noise, activity and vibration generated during construction and operation may temporarily or permanently displace individual • Alterations to fire regimes and potential for increased accidental bushfire that may result from construction and/or operation
collared delma	• Vegetation clearing causing habitat loss and fragmentation • Injury or direct mortality • Changes to habitat quality (degradation) • Loss of key habitat resources	• Alterations to fire regimes including uncontrolled fires • Increased incidence of feral predators • Noise, artificial lighting, activity and vibration generated during construction and operation interrupting foraging, breeding or dispersal behaviours • Dust generated during construction activities disturbing behaviours or health/palatability of foraging resources
common greenshank	• Vegetation clearing causing habitat loss and fragmentation • Direct injury or mortality • Disturbance to foraging behaviours due to increased noise and activity during construction • Degradation of habitat adjacent to the Project Area	• Soil exposure resulting in an increased risk of erosion and sedimentation of water bodies, reducing water quality and degrading aquatic habitats • Increased risk of contamination associated with activities such as refuelling or storage of chemicals • Temporary changes in hydrology from installation of infrastructure creating a barrier to surface flow and increasing stormwater run-off • Removal of water from existing constructed wetlands and farm dams leading to changes in hydrology / habitat extent and water quality. Increased activity at these

MNES	Direct Impacts	Indirect Impacts
		locations resulting in avoidance and potentially altered foraging and breeding behaviour • Periodic burst of elevated noise levels may startle and disorientate individuals within proximity • Increased pest levels, notably those which may predate upon individuals • Minor increases in the noise and light levels at the Calliope River substation during the operational phase due to the substation upgrade
curlew sandpiper	• Vegetation clearing causing habitat loss and fragmentation • Direct injury or mortality • Disturbance to foraging behaviours due to increased noise and activity during construction • Degradation of habitat adjacent to the Project Area	• Soil exposure resulting in an increased risk of erosion and sedimentation of water bodies, reducing water quality and degrading aquatic habitats • Increased risk of contamination associated with activities such as refuelling or storage of chemicals • Temporary changes in hydrology from installation of infrastructure creating a barrier to surface flow and increasing stormwater run-off • Removal of water from existing constructed wetlands and farm dams leading to changes in hydrology / habitat extent and water quality. Increased activity at these locations resulting in avoidance and potentially altered foraging and breeding behaviour • Periodic burst of elevated noise levels may startle and disorientate individuals within proximity • Increased pest levels, notably those which may predate upon individuals • Minor increases in the noise and light levels at the Calliope River substation during the operational phase due to the substation upgrade
eastern curlew	• Vegetation clearing causing habitat loss and fragmentation • Direct injury or mortality • Disturbance to foraging behaviours due to increased noise and activity during construction • Degradation of habitat adjacent to the Project Area	• Soil exposure resulting in an increased risk of erosion and sedimentation of water bodies, reducing water quality and degrading aquatic habitats • Increased risk of contamination associated with activities such as refuelling or storage of chemicals • Temporary changes in hydrology from installation of infrastructure creating a barrier to surface flow and increasing stormwater run-off • Removal of water from existing constructed wetlands and farm dams leading to changes in hydrology / habitat extent and water quality. Increased activity at these

MNES	Direct Impacts	Indirect Impacts
		locations resulting in avoidance and potentially altered foraging and breeding behaviour • Periodic burst of elevated noise levels may startle and disorientate individuals within proximity • Increased pest levels, notably those which may predate upon individuals • Minor increases in the noise and light levels at the Calliope River substation during the operational phase due to the substation upgrade
eastern osprey	• Vegetation clearing causing habitat loss and fragmentation • Injury or direct mortality • Changes to habitat quality (degradation) • Loss of key habitat resources	• Noise, activity and vibration generated during construction and operation interrupting foraging, breeding or dispersal behaviours
flatback turtle	• no direct impacts anticipated	• Soil exposure resulting in an increased risk of erosion and sedimentation of water bodies, reducing water quality and degrading aquatic habitats • Increased risk of contamination associated with activities such as refuelling or storage of chemicals • Temporary changes in hydrology from installation of infrastructure creating a barrier to surface flow and increasing stormwater run-off
fork-tailed swift	• Injury or direct mortality • Habitat loss or degradation	• Increased pest levels which may predate upon individuals
great knot	• Vegetation clearing causing habitat loss and fragmentation • Direct injury or mortality • Disturbance to foraging behaviours due to increased noise and activity during construction • Degradation of habitat adjacent to the Project Area	• Soil exposure resulting in an increased risk of erosion and sedimentation of water bodies, reducing water quality and degrading aquatic habitats • Increased risk of contamination associated with activities such as refuelling or storage of chemicals • Temporary changes in hydrology from installation of infrastructure creating a barrier to surface flow and increasing stormwater run-off • Removal of water from existing constructed wetlands and farm dams leading to changes in hydrology / habitat extent and water quality. Increased activity at these

MNES	Direct Impacts	Indirect Impacts
		locations resulting in avoidance and potentially altered foraging and breeding behaviour • Periodic burst of elevated noise levels may startle and disorientate individuals within proximity • Increased pest levels, notably those which may predate upon individuals • Minor increases in the noise and light levels at the Calliope River substation during the operational phase due to the substation upgrade
greater glider (southern and central)	• Habitat loss • Injury or mortality	• Habitat degradation and fragmentation • Indirect injury or mortality • Disorientation and disruption of breeding, foraging and dispersal behaviours
greater plover	• Vegetation clearing causing habitat loss and fragmentation • Direct injury or mortality • Disturbance to foraging behaviours due to increased noise and activity during construction • Degradation of habitat adjacent to the Project Area	• Soil exposure resulting in an increased risk of erosion and sedimentation of water bodies, reducing water quality and degrading aquatic habitats • Increased risk of contamination associated with activities such as refuelling or storage of chemicals • Temporary changes in hydrology from installation of infrastructure creating a barrier to surface flow and increasing stormwater run-off • Removal of water from existing constructed wetlands and farm dams leading to changes in hydrology / habitat extent and water quality. Increased activity at these locations resulting in avoidance and potentially altered foraging and breeding behaviour • Periodic burst of elevated noise levels may startle and disorientate individuals within proximity • Increased pest levels, notably those which may predate upon individuals • Minor increases in the noise and light levels at the Calliope River substation during the operational phase due to the substation upgrade
greater sand plover	• Vegetation clearing causing habitat loss and fragmentation • Direct injury or mortality	• Soil exposure resulting in an increased risk of erosion and sedimentation of water bodies, reducing water quality and degrading aquatic habitats • Increased risk of contamination associated with activities such as refuelling or storage of chemicals

MNES	Direct Impacts	Indirect Impacts
	• Disturbance to foraging behaviours due to increased noise and activity during construction • Degradation of habitat adjacent to the Project Area	• Temporary changes in hydrology from installation of infrastructure creating a barrier to surface flow and increasing stormwater run-off • Removal of water from existing constructed wetlands and farm dams leading to changes in hydrology / habitat extent and water quality. Increased activity at these locations resulting in avoidance and potentially altered foraging and breeding behaviour • Periodic burst of elevated noise levels may startle and disorientate individuals within proximity • Increased pest levels, notably those which may predate upon individuals • Minor increases in the noise and light levels at the Calliope River substation during the operational phase due to the substation upgrade
green turtle	• No direct impacts anticipated	• Soil exposure resulting in an increased risk of erosion and sedimentation of water bodies, reducing water quality and degrading aquatic habitats • Increased risk of contamination associated with activities such as refuelling or storage of chemicals • Temporary changes in hydrology from installation of infrastructure creating a barrier to surface flow and increasing stormwater run-off
grey-headed flying-fox	• Vegetation clearing causing habitat loss and fragmentation • Injury or direct mortality • Changes to habitat quality (degradation) and loss of key habitat resources	• Alterations to fire regimes including uncontrolled fires that may result from construction and/or operation • Entanglement or electrocution • Noise, activity, artificial lighting and vibration generated during construction and operation interrupting foraging, breeding or dispersal behaviours • Dust generated during construction activities disturbing behaviours or health/palatability of foraging resources

MNES	Direct Impacts	Indirect Impacts
koala	• Vegetation clearing causing habitat loss and fragmentation • Injury or direct mortality	• Alterations to fire regimes including uncontrolled fires • Noise activity and vibration generated during construction and operation interrupting foraging, breeding or dispersal behaviours • Dust generated during construction activities disturbing behaviours or health/palatability of foraging resources • Loss of movement opportunities, barrier created within suitable habitat • Increased susceptibility to predation by dogs, feral cats and/or red fox
Latham's snipe	• Vegetation clearing causing habitat loss and fragmentation • Direct injury or mortality • Disturbance to foraging behaviours due to increased noise and activity during construction • Degradation of habitat adjacent to the Project Area	• Soil exposure resulting in an increased risk of erosion and sedimentation of water bodies, reducing water quality and degrading aquatic habitats • Increased risk of contamination associated with activities such as refuelling or storage of chemicals • Temporary changes in hydrology from installation of infrastructure creating a barrier to surface flow and increasing stormwater run-off • Removal of water from existing constructed wetlands and farm dams leading to changes in hydrology / habitat extent and water quality. Increased activity at these locations resulting in avoidance and potentially altered foraging and breeding behaviour • Periodic burst of elevated noise levels may startle and disorientate individuals within proximity • Increased pest levels, notably those which may predate upon individuals
loggerhead turtle	• no direct impacts anticipated	• Introduction or proliferation of pest and weed species resulting in degradation of habitat • Soil exposure resulting in an increased risk of erosion and sedimentation of water bodies, reducing water quality and degrading aquatic habitats • Increased risk of contamination associated with activities such as refuelling or storage of chemicals • Temporary changes in hydrology from installation of infrastructure creating a barrier to surface flow and increasing stormwater run-off

MNES	Direct Impacts	Indirect Impacts
northern quoll	• Vegetation clearing causing habitat loss and fragmentation • Direct mortality	• Alterations to fire regimes including uncontrolled fires • Increased incidence of feral predators and cane toads • Noise, artificial light and vibration generated during construction and operation interrupting foraging, breeding or dispersal behaviours
Nunivak bar-tailed godwit	• Vegetation clearing causing habitat loss and fragmentation • Direct injury or mortality • Disturbance to foraging behaviours due to increased noise and activity during construction • Degradation of habitat adjacent to the Project Area	• Soil exposure resulting in an increased risk of erosion and sedimentation of water bodies, reducing water quality and degrading aquatic habitats • Increased risk of contamination associated with activities such as refuelling or storage of chemicals • Temporary changes in hydrology from installation of infrastructure creating a barrier to surface flow and increasing stormwater run-off • Removal of water from existing constructed wetlands and farm dams leading to changes in hydrology / habitat extent and water quality. Increased activity at these locations resulting in avoidance and potentially altered foraging and breeding behaviour • Periodic burst of elevated noise levels may startle and disorientate individuals within proximity • Increased pest levels, notably those which may predate upon individuals • Minor increases in the noise and light levels at the Calliope River substation during the operational phase due to the substation upgrade
oriental cuckoo	• Clearing of vegetation and removal of habitat • Injury or direct mortality • Increased risk of vehicle or plant collision resulting in mortality	• Reduced or lost habitat connectivity • Incursion of weeds may alter the presence, quality and structure of microhabitat features for use by the species • Increased accessibility and incursion of feral species • Noise, activity and vibration generated during construction and operation may temporarily or permanently displace individual • Alterations to fire regimes and potential for increased accidental bushfire that may result from construction and/or operation

MNES	Direct Impacts	Indirect Impacts
painted honeyeater	• Vegetation clearing causing habitat loss and fragmentation • Injury or direct mortality • Changes to habitat quality (degradation) and loss of key habitat resources • Increased risk of vehicle or plant collision resulting in mortality	• Alterations to fire regimes including uncontrolled fires • Increased incidence of predators • Noise, activity, artificial light and vibration generated during construction and operation interrupting foraging, breeding or dispersal behaviours • Dust generated during construction activities disturbing behaviours or health/palatability of foraging resources
red knot	• Vegetation clearing causing habitat loss and fragmentation • Direct injury or mortality • Disturbance to foraging behaviours due to increased noise and activity during construction • Degradation of habitat adjacent to the Project Area	• Soil exposure resulting in an increased risk of erosion and sedimentation of water bodies, reducing water quality and degrading aquatic habitats • Increased risk of contamination associated with activities such as refuelling or storage of chemicals • Temporary changes in hydrology from installation of infrastructure creating a barrier to surface flow and increasing stormwater run-off • Removal of water from existing constructed wetlands and farm dams leading to changes in hydrology / habitat extent and water quality. Increased activity at these locations resulting in avoidance and potentially altered foraging and breeding behaviour • Periodic burst of elevated noise levels may startle and disorientate individuals within proximity • Increased pest levels, notably those which may predate upon individuals • Minor increases in the noise and light levels at the Calliope River substation during the operational phase due to the substation upgrade
ruddy turnstone	• Vegetation clearing causing habitat loss and fragmentation • Direct injury or mortality • Disturbance to foraging behaviours due to increased noise and activity during construction	• Soil exposure resulting in an increased risk of erosion and sedimentation of water bodies, reducing water quality and degrading aquatic habitats • Increased risk of contamination associated with activities such as refuelling or storage of chemicals • Temporary changes in hydrology from installation of infrastructure creating a barrier to surface flow and increasing stormwater run-off

MNES	Direct Impacts	Indirect Impacts
	• Degradation of habitat adjacent to the Project Area	• Removal of water from existing constructed wetlands and farm dams leading to changes in hydrology / habitat extent and water quality. Increased activity at these locations resulting in avoidance and potentially altered foraging and breeding behaviour • Periodic burst of elevated noise levels may startle and disorientate individuals within proximity • Increased pest levels, notably those which may predate upon individuals • Minor increases in the noise and light levels at the Calliope River substation during the operational phase due to the substation upgrade
sharp-tailed sandpiper	• Vegetation clearing causing habitat loss and fragmentation • Direct injury or mortality • Disturbance to foraging behaviours due to increased noise and activity during construction • Degradation of habitat adjacent to the Project Area	• Soil exposure resulting in an increased risk of erosion and sedimentation of water bodies, reducing water quality and degrading aquatic habitats • Increased risk of contamination associated with activities such as refuelling or storage of chemicals • Temporary changes in hydrology from installation of infrastructure creating a barrier to surface flow and increasing stormwater run-off • Removal of water from existing constructed wetlands and farm dams leading to changes in hydrology / habitat extent and water quality. Increased activity at these locations resulting in avoidance and potentially altered foraging and breeding behaviour • Periodic burst of elevated noise levels may startle and disorientate individuals within proximity • Increased pest levels, notably those which may predate upon individuals • Minor increases in the noise and light levels at the Calliope River substation during the operational phase due to the substation upgrade
squatter pigeon (southern)	• Clearing of vegetation and removal of habitat • Injury or direct mortality • Increased risk of vehicle or plant collision resulting in mortality	• Reduced or lost habitat connectivity • Incursion of weeds may alter the presence, quality and structure of microhabitat features for use by the species • Increased accessibility and incursion of feral species • Noise, activity and vibration generated during construction and operation may temporarily or permanently displace individual

MNES	Direct Impacts	Indirect Impacts
		• Alterations to fire regimes and potential for increased accidental bushfire that may result from construction and/or operation
terek sandpiper	• Vegetation clearing causing habitat loss and fragmentation • Direct injury or mortality • Disturbance to foraging behaviours due to increased noise and activity during construction • Degradation of habitat adjacent to the Project Area	• Soil exposure resulting in an increased risk of erosion and sedimentation of water bodies, reducing water quality and degrading aquatic habitats • Increased risk of contamination associated with activities such as refuelling or storage of chemicals • Temporary changes in hydrology from installation of infrastructure creating a barrier to surface flow and increasing stormwater run-off • Removal of water from existing constructed wetlands and farm dams leading to changes in hydrology / habitat extent and water quality. Increased activity at these locations resulting in avoidance and potentially altered foraging and breeding behaviour • Periodic burst of elevated noise levels may startle and disorientate individuals within proximity • Increased pest levels, notably those which may predate upon individuals • Minor increases in the noise and light levels at the Calliope River substation during the operational phase due to the substation upgrade
water mouse	• Habitat loss • Injury or mortality	• Habitat degradation and fragmentation • Indirect injury or mortality • Disorientation and disruption of breeding, foraging and dispersal behaviours
white-throated needletail	• Vegetation clearing causing habitat loss and fragmentation • Injury or direct mortality • Changes to habitat quality (degradation)	• Noise, activity and vibration generated during construction and operation interrupting foraging, breeding or dispersal behaviours
yellow-bellied glider (south-eastern)	• Vegetation clearing causing habitat loss and fragmentation • Injury or direct mortality from clearing impacts	• Alterations to fire regimes and potential for increased accidental bushfire that may result from construction and/or operation • Loss of movement opportunities, barriers created within suitable habitat • Increased incidence of feral predators such as feral cats and foxes

MNES	Direct Impacts	Indirect Impacts
		• Noise, activity and vibration generated during construction and operation interrupting foraging, breeding or dispersal behaviours • Dust generated during construction activities disturbing behaviours or health/palatability of foraging resources
Great Barrier Reef		
WHA/NHL	• Land based impacts to relevant ecological MNES described in preceding rows	• Land based indirect impacts to relevant MNES described in preceding rows • Soil exposure resulting in an increased risk of erosion and sedimentation of water bodies, reducing water quality and degrading aquatic habitats • Increased risk of contamination associated with activities such as refuelling or storage of chemicals • Temporary changes in hydrology from installation of infrastructure creating a barrier to surface flow and increasing stormwater run-off
Environment of the GBRMP		• Soil exposure resulting in an increased risk of erosion and sedimentation of water bodies, reducing water quality and degrading aquatic habitats • Increased risk of contamination associated with activities such as refuelling or storage of chemicals • Temporary changes in hydrology from installation of infrastructure creating a barrier to surface flow and increasing stormwater run-off

6.10 International Conventions and Guidelines

This section addresses Section 6.2.2 of the PER Guidelines by describing how the Project will not be inconsistent with the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Convention on Conservation of Nature in the South Pacific (Apia Convention) and other relevant recovery and threat abatement plans or agreements. **Table 6.8** summarises how the Project is not inconsistent with the relevant recovery and threat abatement plans and agreements.

Table 6.8 Summary of how the Project is Not Inconsistent with Relevant Recovery and Threat Abatement Plans and Agreements

Relevant Plan / Agreement	Assessment
Convention on Biological Diversity	**Project not inconsistent** The avoidance, minimisation and mitigation measures demonstrated by this Project are consistent with the conservation of biological diversity. Refer to **Section 6.10.1.1** for more information.
Convention on Conservation of Nature in the South Pacific (Apia Convention)	**Project not inconsistent** The Project Area is not within a national park or protected area. The Project will result in impacts to indigenous fauna and flora, however extensive survey effort has been conducted to quantify impacts and inform suitable avoidance, minimisation and mitigation measures. Therefore, the Project is not inconsistent with Australia's obligations under the Apia Convention. Refer to **Section 6.10.1.2** for more information.
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	**Project not inconsistent** The Project will not result in any species sold or traded and therefore does not contravene this convention. Refer to **Section 6.10.1.3** for more information.
Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)	**Project not inconsistent** Extensive survey effort has been conducted to identify migratory species, notably migratory birds, which may be impacted as a result of the Project. Suitable avoidance, minimisation and mitigation measures to address impacts to migratory species have been developed. The Project has also been assessed as having no significant residual impact on any migratory species; therefore, this Project is consistent with Australia's obligations under the Bonn Convention. Refer to **Section 6.10.1.4** for more information
Japan-Australia Migratory Bird Agreement **China-Australia Migratory Bird Agreement** **Republic of Korea-Australia Migratory Bird Agreement**	**Project not inconsistent** Suitable avoidance, minimisation and mitigation measures to address impacts to the species listed these agreements have been developed. The Project has also been assessed as having no significant residual impact on any migratory species; therefore, this Project is consistent with Australia's obligations under these agreements. Refer to **Section 6.10.1.5** for more information.

6.10.1.1 Convention on Biological Diversity

The Convention on Biological Diversity (CBD) is the first global agreement to cover all aspects of biological diversity: the conservation of biological diversity, the sustainable use of the components of biological diversity, and the fair and equitable sharing of benefits arising from genetic resources (CBD Secretariat, 2024).

Under article 14, Impact Assessment and Minimizing Adverse Impacts, each contracting party as far as possible and as appropriate, shall:

- Introduce appropriate procedures requiring environmental impact assessment of its proposed projects that are likely to have significant adverse effects on biological diversity with a view to avoiding or minimizing such effects and, where appropriate, allow for public participation in such procedures.
- Introduce appropriate arrangements to ensure that the environmental consequences of its programmes and policies that are likely to have significant adverse impacts on biological diversity are duly taken into account.
- Promote, on the basis of reciprocity, notification, exchange of information and consultation on activities under their jurisdiction or control which are likely to significantly affect adversely the biological diversity of other States or areas beyond the limits of national jurisdiction, by encouraging the conclusion of bilateral, regional or multilateral arrangements, as appropriate.
- In the case of imminent or grave danger or damage, originating under its jurisdiction or control, to biological diversity within the area under jurisdiction of other States or in areas beyond the limits of national jurisdiction, notify immediately the potentially affected States of such danger or damage, as well as initiate action to prevent or minimize such danger or damage.
- Promote national arrangements for emergency responses to activities or events, whether caused naturally or otherwise, which present a grave and imminent danger to biological diversity and encourage international cooperation to supplement such national efforts and, where appropriate and agreed by the States or regional economic integration organizations concerned, to establish joint contingency plans.

The avoidance, minimisation and mitigation measures demonstrated by this Project are consistent with the conservation of biological diversity and, therefore, the CBD's obligations. These measures are outlined in the MNES Management Plan attached as **Appendix J**.

6.10.1.2 Convention on Conservation of Nature in the South Pacific

The Convention on Conservation of Nature in the South Pacific (Apia Convention) is a multilateral environmental agreement that commits the signed Parties to take action for the conservation, utilisation and development of the natural resources of the South Pacific region through careful planning and management for the benefit of present and future generations (SPREP, 2025).

In order to pursue the objectives of the convention, the Parties:

- undertake to create protected areas to safeguard representative samples of natural ecosystems, superlative scenery, striking geological formations and regions and objects of aesthetic, historic, cultural or scientific value (art.2);
- commit to not alter national parks so as to reduce their area except after the fullest investigation; their resources are not to be subject to commercial exploitation; hunting and collection of species are to be prohibited and provision is to be made for visitors (art. 3);

- agree to maintain lists of indigenous fauna and flora in danger of extinction and to give such species as complete protection as possible (art. 5); and
- provision may be made as appropriate for customary use of areas and species in accordance with traditional cultural practices (art. 6).

The Project Area is not within a national park or protected area. As outlined in **Section 6.0,** the Project will result in impacts to indigenous fauna and flora, however extensive survey effort (**Section 4.0**) has been conducted to quantify impacts and inform suitable avoidance, minimisation and mitigation measures. Therefore, the Project is not inconsistent with Australia's obligations under the Apia Convention.

6.10.1.3 Convention on International Trade in Endangered Species of Wild Fauna and Flora

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is an international agreement between governments with the aim to ensure that international trade in specimens of wild animals and plants does not threaten the survival of the species (CITES, 2025). The Project will not result in any species sold or traded, therefore does not contravene this convention.

6.10.1.4 Convention on the Conservation of Migratory Species of Wild Animals

The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) is an environmental treaty of the United Nations that provides a global platform for the conservation sustainable use of migratory animals and their habitats (CMS Secretariat, 2025). Parties under this convention must strive towards strictly protecting migratory animals threatened with extinction, conserving or restoring the places where they live, mitigating obstacles to migration and controlling other factors that might endanger them.

Extensive survey effort has been conducted (**Section 4.0**) to identify migratory species, notably migratory birds, which may be impacted as a result of the Project. Suitable avoidance, minimisation and mitigation measures to address impacts to migratory species have been developed. The Project has also been assessed as having no significant residual impact on any migratory species; therefore, this Project is consistent with Australia's obligations under the Bonn Convention.

6.10.1.5 Japan-Australia Migratory Bird Agreement, China-Australia Migratory Bird Agreement, and Republic of Korea-Australia Migratory Bird Agreement

The Australian Government has fostered international cooperation through a range of important agreements, including bilateral migratory bird agreements with Japan (JAMBA), China (CAMBA) and the Republic of Korea (ROKAMBA). These agreements provide an important mechanism for pursuing conservation outcomes for migratory birds, including migratory waterbirds. Each of these agreements provides for the protection and conservation of migratory birds and their important habitats, protection from take or trade except under limited circumstances, the exchange of information, and building cooperative relationships (DCCEEW, 2025b).

Birds listed on the annexes to these three agreements must also be placed on the migratory species list under the EPBC Act. Species listed under these agreements that are known or likely to occur and may be impacted by the Project include:

- JAMBA: fork-tailed swift, Latham's snipe
- CAMBA: fork-tailed swift, Latham's snipe, white-throated needletail

- ROKAMBA: fork-tailed swift, Latham's snipe, white-throated needletail.

Suitable avoidance, minimisation and mitigation measures to address impacts to the above species have been developed. The Project has also been assessed as having no significant residual impact on any migratory species; therefore, this Project is consistent with Australia's obligations under JAMBA, CAMBA and ROKAMBA.

6.11 Reef 2050

The Reef 2050 Water Quality Improvement Plan 2017-2022 (Reef 2050 WQIP) aims to demonstrate the link between broader reef health and improving water quality, as well as the human factors that are key in influencing Reef health (State of Queensland, 2024). These objectives demonstrate the nesting of the Reef 2050 WQIP within the Broader 2050 Plan. The Reef 2050 WQIP guides the achievement of the Reef 2050 Long-Term Sustainability Plan (Reef 2050 Plan) water quality themes for managing the Great Barrier Reef WHA(DCCEEW, 2024).

The Reef 2050 Plan outlines objectives and goals with respect to water quality management for the GBR WHA. WRM undertook a comprehensive assessment of the Project against the objectives and goals of the Reef 2050 Plan (WRM, 2025). As demonstrated in **Table 6.9**, the Project complies with the Reef 2050 Plan objectives and goals where the mitigations measures are implemented.

Table 6.9 The Project's Compliance with the Reef 2050 Plan Objectives and Goals

Potential Impacts to Surface Water	Report Section	Mitigation Measures
Coral reef habitats maintain good condition and resilience	***Reef 2050 Objectives and Goals 2021–2025 Objective 1***	Supported by the use of upstream ESCP guidelines and ensuring mitigation of water quality risks upstream.
No loss of the extent of natural wetlands	***Reef 2050 Objectives and Goals 2021–2025 Objective 3***	Alterations of landforms caused by Project works will be performed to minimise alteration and ensure stabilisation in line with best practice ESCP guidelines. This will cause no loss of extent to natural wetlands downstream.
Wetland condition is improved	***Reef 2050 Objectives and Goals 2021–2025 Objective 4***	By reducing sediment loads from the Project and pollutants leaving the Project, downstream wetland conditions will be improved.
Populations of bioculturally important fish and invertebrate species are healthy	***Reef 2050 Objectives and Goals 2021–2025 Objective 9***	Supported by the use of upstream ESCP guidelines and ensuring mitigation of water quality risks upstream.
Populations of fish and invertebrate species that are important for recreational, commercial and culturally based fisheries are healthy	***Reef 2050 Objectives and Goals 2021–2025 Objective 10***	Supported by the use of upstream ESCP guidelines and ensuring mitigation of water quality risks upstream.
Uses of the Reef are ecologically sustainable as the system changes, in turn sustaining economic and social benefits	***Reef 2050 Objectives and Goals 2021–2025 Objective 16***	Mitigation practices ensure downstream water outcomes will be ecologically sustainable, for economic and social benefits.
The quality of water is improved through increased effective land management practices in catchments	***Reef 2050 Objectives and Goals 2021–2025 Goal 4***	By reducing sediment loads from the project and pollutants leaving the Project, the downstream quality of water is improved.
Integrated catchment-to-Reef management reduces cumulative impacts	***Reef 2050 Objectives and Goals 2021–2025 Goal 5***	Supported by the use of upstream mitigations using ESCP guidelines, ensuring stream stability and mitigation of water quality risks upstream.
Biodiversity and heritage protection are enhanced, and ecosystem resilience is supported through strengthened efforts to ensure water-based activities are sustainable	***Reef 2050 Objectives and Goals 2021–2025 Goal 7***	Supported by mitigation of impacts on downstream biodiversity and heritage by ensuring the use of upstream ESCP guidelines and ensuring mitigation of water quality risks upstream.
Marine debris, rubbish pollution and at-sea disposal of waste is reduced	***Reef 2050 Objectives and Goals 2021–2025 Goal 12***	Supported by the use of upstream ESCP guidelines and ensuring mitigation of water quality risks upstream.
Comprehensive monitoring, evaluation and reporting support informed and agile management responses	***Reef 2050 Objectives and Goals 2021–2025 Goal 21***	Comprehensive monitoring of erosion run-off, stream stability and riparian health, and water quality impacts.

6.12 Fitzroy Region–Calliope Catchment Water Quality Target

Under the Reef 2050 WQIP, water quality targets have been set for each catchment that drains to the GBR. These targets account for land use and pollutant loads in each catchment. The Fitzroy Region–Calliope Catchment is the relevant catchment for the catchment. A Water Quality Management Plan (WQMP) will be implemented for the Project to monitor and comply with the targets shown in **Figure 6.1**, **Figure 6.2** and **Figure 6.3**.

Region	Dissolved inorganic nitrogen		Fine sediment		Particulate nutrients			
					Particulate phosphorus		Particulate nitrogen	
	tonnes	% reduction	kilotonnes	% reduction	tonnes	% reduction	tonnes	% reduction
Cape York	MCL	MCL	23	5	14	5	48	5
Wet Tropics	1700	60	240	25	360	30	850	25
Burdekin	820	60	890	30	490	25	800	25
Mackay Whitsunday	630	70	130	20	150	20	310	20
Fitzroy	MCL	MCL	410	25	430	20	760	15
Burnett Mary	470	55	240	20	210	20	590	20

Figure 6.1 **Regional Water Quality Targets (State of Queensland, 2024)**

Region	Catchment/ Basin	Area (ha)	Targets								Pesticide target to protect min 99% of aquatic species at end-of-catchment
			Dissolved inorganic nitrogen		Fine sediment		Particulate phosphorus		Particulate nitrogen		
			tonnes	% reduction	kilo-tonnes	% reduction	tonnes	% reduction	tonnes	% reduction	
Fitzroy	Styx River	301,340	MCL	MCL	MCL	MCL	MCL	MCL	MCL	MCL	
	Shoalwater Creek	360,180	MCL	MCL	MCL	MCL	MCL	MCL	MCL	MCL	
	Waterpark Creek	183,650	MCL	MCL	MCL	MCL	MCL	MCL	MCL	MCL	
	Fitzroy River	14,254,470	MCL	MCL	390	30	380	30	640	30	
	Calliope River	224,060	MCL	MCL	15	30	54	30	107	30	
	Boyne River	249,630	MCL	MCL	6	40	5	40	9	40	
Burnett Mary	Baffle Creek	408,470	16	50	11	20	15	20	33	20	
	Kolan River	290,450	34	50	6	20	5	20	14	20	
	Burnett River	3,319,540	150	70	85	20	29	20	68	20	
	Burrum River	337,170	93	50	3	20	3	20	8	20	
	Mary River	946,580	180	50	130	20	160	20	470	20	

Figure 6.2 **End-of-catchment Anthropogenic Water Quality Targets for the Reef Catchments by 2025 And Relative Priorities for Water Quality Improvement (State of Queensland, 2024)**

Objectives	Report Section
Meet water quality Targets for the Fitzroy Region	Reef 2050 Water Quality Improvement Plan (2017-2022) - Table 1. Regional Water Quality Targets
Meet water quality targets for the Calliope River Catchment within the Fitzroy Region	Reef 2050 Water Quality Improvement Plan (2017-2022) - Table 2. End-of-catchment anthropogenic water quality targets for the Reef catchments by 2025 and relative priorities for water quality improvement

Figure 6.3 Reef 20250 Objectives and Compliance

6.13 Climate Change

The climate of the region where the Project is situated is sub-tropical, characterised by hot and humid summers with mild and drier winters (Bureau of Meteorology, 2025). Based on current climate data taken from the Gladstone Airport weather station (039326), the mean annual rainfall is 866.5 mm. Rainfall is seasonal, with the months December, January, February and March consistently recording the highest rainfall for the year. The mean minimum temperature ranges from 17.2 °C to 18.9°C, while mean maximum temperature ranges from 26.4°C to 28.4°C.

The Climate Analogues Explorer Tool (v1.1) (Climate Change in Australia, 2020) was used to project future climate scenarios for the Gladstone region by identifying areas currently experiencing comparable conditions. Under a Representative Concentration Pathway (RCP) of 8.5, the most conservative future scenario to 2030, assuming limited reduction in emissions and applied here in accordance with the precautionary principle under the EPBC Act, the climate of Gladstone is expected to resemble that of the following localities:

- Mount Morgan (90 km west of Gladstone)
- Bowen (525 km northwest of Gladstone)
- Greenvale (82 km northwest of Gladstone)
- Ayr (618 km northwest of Gladstone)
- Rockhampton (91 km northwest of Gladstone)
- Gayndah (197 km south of Gladstone)
- Springsure (320 km west of Gladstone)
- Home Hill (610 km northwest of Gladstone).

This is illustrated in **Figure 6.4**. The average climate future for the Gladstone area under a maximum consensus is for temperatures to increase by 1°C and for rainfall to change by -4% (ranging from -15% to 5%).

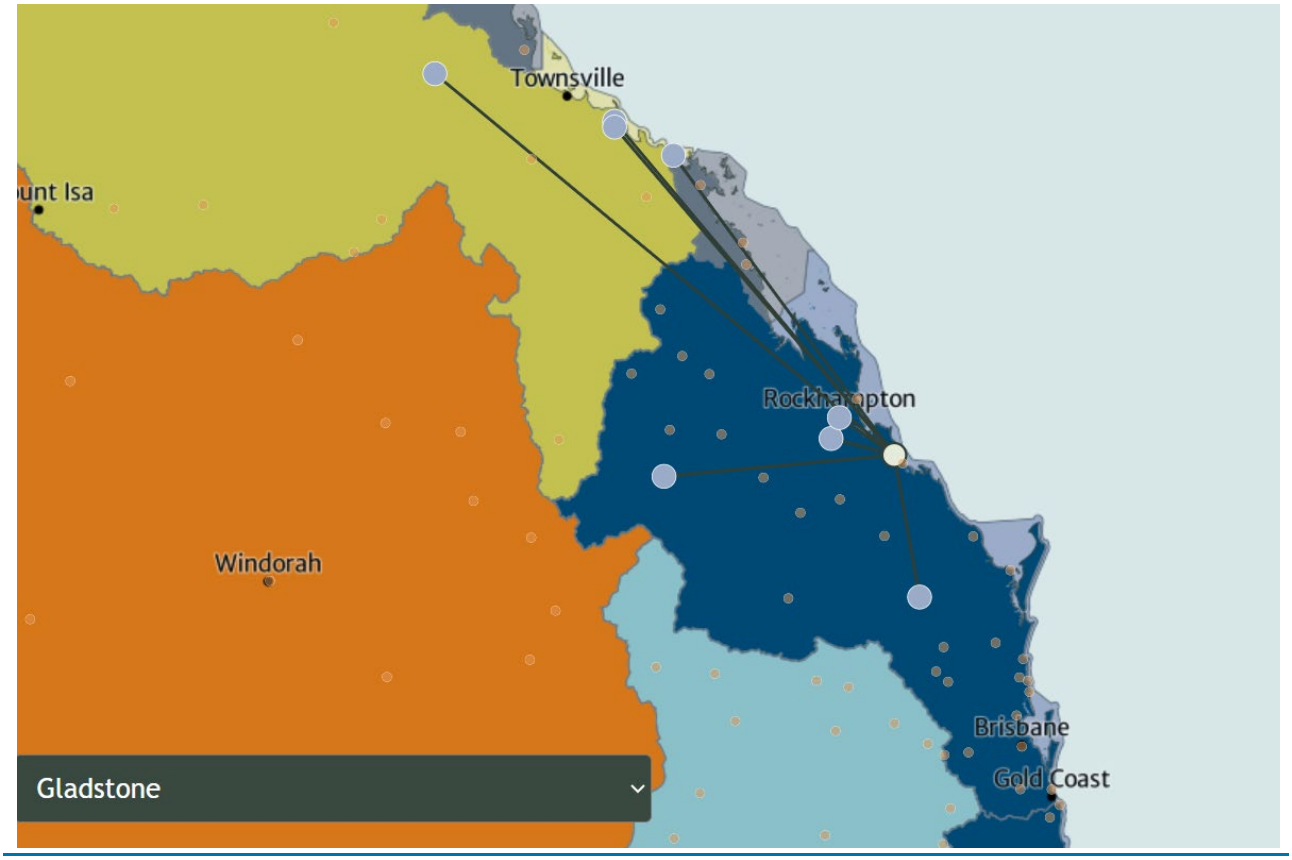


Figure 6.4 **Climate Analogue for Gladstone Under RCP 8.5 Climate Change Scenario for the Time Period 2030**

Gladstone (and the Project Area) fall within the East Coast cluster as part of the Climate Change in Australia projection tool (Climate Change in Australia, 2020). It is anticipated that the follow climatic changes will likely occur within this region:

- Average temperatures will continue to increase in all seasons (very high confidence).
- More hot days and warm spells are projected with very high confidence. Fewer frosts are projected with high confidence.
- Decreases in winter rainfall is projected for East Coast South with medium confidence. Other changes are possible but unclear.
- Increased intensity of extreme rainfall events is projected, with high confidence.
- Mean sea level will continue to rise, and height of extreme sea-level events will also increase (very high confidence).
- A harsher fire-weather climate in the future (high confidence).
- On annual and decadal basis, natural variability in the climate system can act to either mask or enhance any long-term human induced trend, particularly in the next 20 years and for rainfall.

6.13.1 Anticipated Climate Change Impacts on MNES

It is anticipated that with these changes in climatic conditions there will be associated responses from MNES, which are likely to vary substantially based on the specific value's ecology. Broadly, potential responses may include increased dispersal to find suitable habitat or mates (less individuals within the Project Area at one time or shorter occupation periods), a reduction in the availability of suitable habitat and/or habitat quality leading to distribution contractions (Project Area habitat becoming unsuitable or closer to the species range limit) and possibly range shifts or extensions, where previously unsuitable areas become suitable (potentially introducing new MNES to the Project Area). It is also possible that climatic changes may increase or decrease the severity or nature of the impacts of the Project on MNES.

To determine the likely change in impacts to MNES under an RCP 8.5 climate change scenario (time period 2030), we have reviewed the MNES that are known or have a moderate to high likelihood of occurrence and reviewed the Listing Advice, Conservation Advice and/or Recovery Plan (where available), to determine whether climatic changes are likely to affect the species. Inferences regarding potential vulnerabilities to climate change scenarios have also been made based on the value's ecological characteristics, where appropriate.

Broadly, MNES listed Critically Endangered or Endangered under the EPBC Act are considered most vulnerable to exacerbation or synergistic impacts associated with climate change, given they are likely to comprise small populations less resilient to stochastic events. Critically Endangered and Endangered communities and species are likely to be subject to several threatening processes and environmental stressors, which may interact and compound.

The Critically Endangered MNES relevant to the Project Area (known or moderate to high likelihood of occurrence) include:

- curlew sandpiper
- eastern curlew.

Endangered MNES relevant to the Project Area (known or moderate to high likelihood of occurrence) include:

- SEVT TEC
- SEFFW TEC
- *Atalaya collina*
- *Cossinia australiana*
- *Cycas megacarpa*
- Australian painted snipe
- black-tailed godwit
- common greenshank
- lesser sand plover
- nunivak bar-tailed godwit
- greater gilder (southern and central)
- koala

- northern quoll
- loggerhead turtle
- olive ridley turtle.

These species, as well as “vulnerable” and “migratory” EPBC listed species are presented in **Table 6.10** with their associated potential impacts from climate change.

Table 6.10 Potential Impacts of Climate Change on MNES

MNES	Anticipated Climate Change Impacts

SEVT TEC	The Conservation Advice for the community notes that climate change is an emerging threat to the SEVT TEC (Department of Climate Change, Energy, the Environment and Water, 2023), based on the following:
	• The TEC is sensitive to changes in temperature and rainfall patterns. Increased temperatures and more erratic rainfall may exacerbate existing threats such as fire, weed invasion, and pest pressure.
	• Fire is historically rare in this community due to its closed canopy and moist microclimate. However, climate change may increase the risk of unplanned, high-intensity fires, particularly during extended dry periods (McDonald, 2010).
	• The ecological community’s fragmented nature may reduce its resilience and adaptability to rapid climate shifts. Fragmentation limits gene flow and species migration, which are critical for adaptation.
	• Some characteristic species, such as *Brachychiton spp.* and *Acacia harpophylla*, may tolerate a range of climatic conditions, but:
	  ○ The rate of climate change may exceed historical variability
	  ○ Future climate conditions may differ significantly from those previously experienced
	  ○ Fragmentation and reduced connectivity may hinder adaptive responses (McDonald, 2010).
	• Climate change may slow the recovery of degraded patches and reduce regeneration success, especially in areas affected by drought or altered fire regimes.
	• The community occurs within a rainfall belt of approximately 500–900 mm annually, with most rainfall in summer. While this range suggests some resilience, prolonged droughts or shifts in seasonal rainfall could pose significant stress (McDonald, 2010).

SEFFW TEC	The Conservation Advice for the community notes that climate change is an emerging threat to the SEFFW TEC (Department of Climate Change, Energy, the Environment and Water, 2022h), based on the following: • The community is vulnerable to changes in rainfall patterns and temperature, which may alter hydrological regimes critical to its persistence. Increased variability in rainfall and more frequent droughts could reduce water availability and affect species composition and structure. • Fire is not a dominant natural disturbance in this TEC due to its typically moist conditions. However, climate change may increase fire risk through drying of soils and vegetation, especially during prolonged dry periods.

MNES	Anticipated Climate Change Impacts

	• The ecological community is highly fragmented and often occurs in narrow riparian zones, which limits its ability to adapt to rapid climate shifts. Fragmentation reduces connectivity and gene flow, hindering species migration and resilience.
	• Some dominant species such as *Eucalyptus tereticornis* and *Melaleuca spp*. may tolerate a range of conditions, but:
	  ○ The rate of climate change may exceed historical variability
	  ○ Future climate conditions may differ significantly from those previously experienced
	  ○ Fragmentation and altered hydrology may reduce the community's adaptive capacity.
	• Climate change may slow recovery of degraded patches and reduce regeneration success, particularly in areas affected by altered flooding regimes or increased fire frequency.
	• The community typically occurs in areas with annual rainfall between 700–1500 mm. While this range suggests some resilience, extended droughts or shifts in seasonal rainfall could pose significant stress.

Saltmarsh TEC	Climate change is identified as an emerging threat to the Coastal Saltmarsh TEC (Department of Sustainability Environment Water Population and Communities, 2013), based on the following:
	• The community is highly sensitive to sea level rise, which may lead to habitat loss through inundation, erosion, and saltwater intrusion into adjacent freshwater systems.
	• Increased temperatures and altered rainfall patterns may affect the hydrological balance of saltmarsh areas, potentially leading to shifts in species composition and reduced ecological function.
	• Changes in tidal regimes and storm intensity associated with climate change may increase physical disturbance and stress on saltmarsh vegetation.
	• Fragmentation and limited connectivity of saltmarsh patches may reduce the community's ability to adapt to climate change, especially in urbanised and developed coastal areas.
	• Some saltmarsh species may tolerate a range of salinity and inundation conditions, but:
	  ○ The rate of climate change may exceed historical variability
	  ○ Future conditions may differ significantly from those previously experienced
	  ○ Fragmentation and land-use pressures may hinder adaptive responses.
	• Climate change may slow recovery of degraded saltmarsh areas and reduce regeneration success, particularly where hydrological regimes are altered or where invasive species gain a competitive advantage.
	• The community typically occurs in low-lying coastal zones subject to tidal influence. These areas are particularly vulnerable to sea level rise and extreme weather events, which may pose significant long-term threats.

MNES	Anticipated Climate Change Impacts
Atalaya collina	Although not explicitly listed in the Conservation Advice, climate change may exacerbate existing threats to *Atalaya collina*, such as altered fire regimes and habitat disturbance (Department of the Environment, Water, Heritage and the Arts, 2008a). Increased temperatures and changing rainfall patterns could impact the shallow, rocky habitats the species depends on, potentially reducing its resilience and recovery.
Bertya opponens	Although not explicitly identified in the Conservation Advice, climate change may exacerbate existing threats to *Bertya opponens*, such as altered fire regimes and habitat degradation (Threatened Species Scientific Committee, 2016a). The species' fragmented distribution and reliance on specific habitat conditions may reduce its resilience to increased temperatures, changing rainfall patterns, and more frequent extreme weather events.
Cossinia australiana	Although not explicitly identified in the Conservation Advice, climate change may exacerbate existing threats to *Cossinia australiana*, such as fire and weed invasion. Increased temperatures and altered rainfall patterns could affect the vine forest habitats the species relies on, potentially reducing its resilience and regeneration capacity.
Cycas megacarpa	Although not explicitly identified in the Conservation Advice, climate change may exacerbate existing threats to *Cycas megacarpa,* such as high intensity fire, drought and changing temperatures. Specifically: • Fire may be beneficial for promoting coning events in mature adults, however, high intensity fire is thought to destroy soil seed banks, result in high loses of seed if it occurs during coning, and kills small cycad seedlings. Cumulative fire loss from too hot and/or too frequent fires will result in a decline of the number of individuals within a population (Queensland Herbarium, 2007a). • The effect of drought on *C. megacarpa* is unclear, however it has been identified that small cycad seedlings disappeared in Qld after the drought in the early 2000's, although it is not established if this was due to water deficit, predation or other factors, and there is circumstantial evidence that drought may effect coning cycles in some species (Queensland Herbarium, 2007a). • Cycads have a limited geographical range, occurring in areas with a generally warm climate, low levels of frost and long growing summers (Norstog & Nicholls 1997). It is possible that previous world temperatures allowed cycads to disperse further from the equator (Norstog & Nicholls 1997). Hyslop and Haskard (2005) refer to cycads as climate change indicator species due to their sensitivity to climatic conditions. Along with changes to temperature, Hyslop and Haskard (2005) suggest that climate change effects could include interruption of reproduction due to increased carbon dioxide, the spread of pests and diseases, changes in canopy cover and shifting rainfall patterns. These effects are likely to impact on long lived species such as cycads (Department of Climate Change, Energy, the Environment and Water, 2024a).

MNES	Anticipated Climate Change Impacts
Polianthion minutiflorum	Although not explicitly identified in the Conservation Advice, climate change may exacerbate existing threats to *Polianthion minutiflorum*, particularly through altered fire regimes and rainfall variability (Department of the Environment, Water, Heritage and the Art, 2008). The species' occurrence on skeletal soils in sandstone gullies may make it vulnerable to shifts in moisture availability and increased disturbance from extreme weather events.
Samadera bidwillii	The main potential threat to the species is inappropriate fire regimes (Department of the Environment, Water, Heritage and the Arts, 2008c). Changes in climate may impact fire frequency.
Squatter pigeon (southern)	Inappropriate fire regimes is noted as a current threat to the species (Threatened Species Scientific Committee, 2015c). Drought and bushfires may exacerbate other threatening processes, such as habitat clearing, fragmentation, habitat degradation from feral animals and domestic livestock, and predation by feral animals.
Painted honeyeater	The Painted Honeyeater is considered vulnerable to climate change due to its reliance on mistletoe-bearing woodlands, which may be affected by increased drought, fire frequency, and altered flowering or fruiting phenology (Department of Agriculture, Water and the Environment, 2021b). Specifically: • These changes can lead to habitat degradation and reduced food availability. Climate modelling suggests a south-east shift in the species' climatic niche, with potential range contraction due to geographic limits. • Protecting and enhancing drought refugia, particularly in southern parts of its range, and implementing appropriate fire management (e.g. cool burns to protect mistletoe) are key adaptation strategies. • Long-term monitoring is recommended to better understand the species' sensitivity to climate variability and inform adaptive management.
White throated needletail	There is no reference to climate-related impacts or threats on SPRAT, the Conservation Advice or the Referral Guidelines for the species. As the species is known to utilise storm fronts to move and forage, an increase in storm frequency could in turn increase the number of large movement events that are unpredictable and may intercept wind farms and other barriers. Regular movement patterns within Australia north and south may become less predictable. Increased fire and drought conditions may lead to a reduction in invertebrate density, which would reduce the species foraging availability.

MNES	Anticipated Climate Change Impacts
Black breasted button quail	Although not explicitly identified in the Conservation Advice, climate change may exacerbate existing threats to black-breasted button quail. Specifically: • Habitat degradation from increased frequency and intensity of fires. • Fire poses a significant threat to the species and is likely to be exacerbated by edge effects and associated weed invasion, as well as drought and elevated temperatures. Inappropriate fire regimes may increase weed invasion, reduce woody debris, reduce leaf litter and reduce invertebrate abundance, thereby reducing forage opportunities for the species. • Drought may irreversibly alter suitable habitat if overstorey trees are killed, exposing and drying surface litter and reducing invertebrate density. • Both a changing fire regime and an increase in drought are considered to be likely threats with major consequences for the species (very high priority).
Seabirds and migratory shorebirds	Climate change is recognised as a significant and emerging threat to both migratory and non-migratory shorebirds in Australia (Department of the Environment, 2015e). Specifically: • Sea level rise and increased storm intensity threaten intertidal habitats, including feeding and roosting areas critical to shorebird survival. • Altered rainfall patterns and increased drought frequency may reduce the availability and quality of inland wetlands, affecting both migratory and resident species. • Temperature changes can disrupt migration timing, breeding success, and prey availability, particularly for species dependent on seasonal cues. • Migratory shorebirds are especially vulnerable due to their reliance on a network of habitats across the East Asian–Australasian Flyway. Habitat loss at staging areas, particularly in the Yellow Sea region, compounds climate-related pressures. • Non-migratory shorebirds, such as stilts and oystercatchers, face similar threats from habitat degradation, but their limited range may reduce their ability to adapt to rapid environmental changes (Department of Sustainability, Environment, Water, Population and Communities, 2012).
Migratory terrestrial birds	Climate change is recognised as a growing threat to migratory terrestrial birds, particularly those dependent on woodland, savanna, and inland wetland habitats (Steffan et al., 2009). Specifically: • Altered rainfall patterns and increased drought frequency may reduce the availability of food and water resources along migratory routes and in breeding areas, affecting survival and reproductive success 2. • Temperature shifts can disrupt migration timing and breeding cycles, especially for species that rely on seasonal cues for movement and reproduction. • Habitat degradation from land clearing, invasive species, and inappropriate fire regimes is already a major threat to terrestrial birds and may be intensified by climate change.

MNES	Anticipated Climate Change Impacts
	• Many migratory terrestrial birds are already experiencing population declines due to habitat fragmentation and loss. Climate change may further reduce their resilience and adaptability. • The vulnerability of these species is compounded by their reliance on specific habitat types and long-distance movements, which require a network of intact ecosystems across regions.
Grey headed flying fox	Climate change has the potential to affect food availability and heat-related mortality in grey-headed flying-foxes. Climate change may put further pressure on alternative food sources, commercial fruit crops and urban and botanical gardens (Department of Environment and Water, 2021a). The species suitable habitat range has contracted southwards, and the Project Area may longer be suitable for the species.
Greater glider (southern and central) **Yellow-bellied glider (south-eastern)**	Climate change has been recognised as a key threat in the Conservation Advice documents for these species. Specifically: • Increases in the severity and intensity of fires is likely to decrease the availability of hollow-bearing trees in the landscape and change the floristic composition and nutritional profile of glider habitat (Department of Climate Change Energy the Environment and Water, 2022). • A unique physiology and strict diets make gliders vulnerable to high temperatures and low water availability, which are both likely to occur more regularly in association with climate change (Department of Climate Change Energy the Environment and Water, 2022). • Climate change is listed as catastrophic threat within the greater glider (northern) (*Petauroides minor*) Conservation Advice (DCCEEW, 2022). Whilst different species, both greater gliders are similar in physiology and therefore inferences between the species responses to climate change can be made. Above temperatures of 35℃, greater gliders need to dissipate >100% of metabolic heat production by evaporative means (Rübasamen 1984; DCCEEW, 2022). This is described to lead to death of both young and adult gliders, or if less severe, can reduce growth rates in milk-fed young and reduce overall health of adult gliders (Youngentob et al. 2021).
Koala	Climate change driven processes and drivers are a key threatening process likely to impact koala (Department of Agriculture Water and the Environment, 2022b). • Climate change predictions indicate drier, warmer conditions across the koala's range. • Current and future climate change projections indicate a progressive eastward and southwards contraction in the koala's suitable climate envelope and consequent suitable habitat. • The effects of climate change may play out through increased mortality associated with heat wave events and droughts, declines in reproduction rates associated with changes in food quality and availability, changes to movement patterns, exposure to diseases and other factors, as well as effects of climate change on fire regimes.

MNES	Anticipated Climate Change Impacts
Northern quoll	More extensive and frequent fires in northern Australia are considered a key threat to northern quoll populations (Hill & Ward, 2010; Threatened Species Scientific Committee, 2005). Changes in vegetation structure have contributed to a decline in numbers of the species (Threatened Species Scientific Committee, 2005).
Ghost bat	No reference to climate-related impacts or threats on SPRAT, the Conservation Advice or the Referral Guidelines for the species. As the species is reliant on a stable temperature within maternity roosts, increased temperatures may impact roost suitability.
Water mouse	Climate change is identified as a significant emerging threat to the Water Mouse (Department of Agriculture, Water and the Environment, 2021a). Rising sea levels are expected to intensify habitat loss and fragmentation, particularly along the central and southern Queensland coast. The species is also vulnerable to extreme weather events such as cyclone tidal surges and seasonal flooding, which may become more frequent and severe under climate change. These impacts compound existing threats including altered hydrology, saltwater intrusion, mangrove dieback, and damage to critical shelters (Department of Agriculture, Water and the Environment, 2021a).
Collared delma	Although climate change is not explicitly listed as a direct threat to the Collared Delma, it may exacerbate existing pressures such as habitat degradation, inappropriate fire regimes, and weed invasion. Increased temperatures and altered rainfall patterns could affect the microhabitats this species relies on—particularly leaf litter, surface rocks, and logs in dry sclerophyll woodlands (Department of the Environment, Water, Heritage and the Arts, 2008b). As a sedentary species with small home ranges, the species may have limited capacity to adapt to rapid environmental changes, making it vulnerable to shifts in fire frequency and intensity, which are expected to increase under climate change.
Marine turtles	Climate change is considered the greatest risk to marine turtle recovery in Australia (Department of the Environment and Energy, 2017b). Specifically: • Rising sea levels threaten nesting beaches through inundation, leading to the loss of critical habitat and increased nest "drowning". • Increasing sand temperatures at nesting sites are skewing hatchling sex ratios toward females, which may affect long-term population viability. • Extreme weather events, such as cyclones and storm surges, are expected to become more frequent and severe, further threatening nesting success and juvenile survival. • Changes to coral reefs, seagrass beds, and mangrove forests—key foraging habitats—are also linked to climate-driven ocean warming and acidification (Department of the Environment and Energy, 2017b).

MNES	Anticipated Climate Change Impacts
Great Barrier Reef	Climate change is the biggest threat to the future of coral reefs through: • Coral bleaching from marine heatwaves. • Ocean acidification through the absorption of carbon dioxide. • Severe weather events causing damage. • Habitat changes due to water temperature rising (Great Barrier Reef Foundation, 2025).

6.13.2 Project Consideration of Climate Change

Predicted future climatic conditions within the Project Area have been considered in assessing potential project impacts on MNES. While the Project is not expected to contribute significantly to climate change, several MNES known or potentially occurring in the region may be susceptible to climate-related pressures that could compound project-related impacts.

Of the MNES identified, the greater glider (southern and central) is considered the most susceptible to exacerbation of impacts associated with climate change. This is due to its unique physiology, strict eucalypt diet influencing their sensitivity to high temperatures and low water availability, reliance on tree hollows that take over 100 years to form, and low dispersal capacity. These factors make the species particularly vulnerable to increased temperatures, prolonged droughts, and more frequent or intense fire events. In consideration of anticipated climate impacts, measures such as glide poles, nest boxes, and relocation protocols to support greater glider populations and mitigate habitat loss have been incorporated in project planning.

Other MNES such as *Atalaya collina*, *Cossinia australiana*, collared delma, migratory shorebirds, and marine turtles may also be impacted by climate change due to sensitivity to altered fire regimes, habitat degradation, sea level rise, and increased storm activity. In consideration of these risks, the following measures have been incorporated into project planning:

- Avoidance and minimisation of impacts to riparian zones and intact vegetation that may function as climate refugia.
- Maintenance of habitat connectivity to support species movement and resilience in response to climate-driven changes.
- Adaptive management principles to respond to emerging climate-related threats.

These measures aim to ensure that the Project does not exacerbate climate-related impacts on MNES and supports long-term ecological resilience in the region.

7.0 Avoidance, Mitigation and Management

This chapter addresses section 7.1 of the PER Guidelines with respect to the measures proposed to be undertaken by the proponent to avoid, minimise, mitigate and manage relevant impacts of the Project on MNES. The Project has implemented the hierarchy of management principles in the planning and development of the Project. These principles and the order in which they have been applied is as follows:

- **Avoid**: locating activities to avoid direct and indirect impacts on MNES.
- **Minimise**: minimising direct and indirect impacts where they cannot be completely avoided.
- **Mitigate**: implementing mitigation and management measures to reduce direct, indirect and cumulative impacts.
- **Remediate** and **Rehabilitate:** actively remediate and rehabilitate impacted areas to promote long-term recovery.
- **Offset** (where necessary): provide suitable offsets for activities that result in an unavoidable significant residual impact to MNES even with the implementation of the above principles.

Section 7.1 and **Section 7.2** describe how impacts on MNES have and will be avoided and impacts minimised for the Project. **Section 7.3** details the proposed mitigation and management measures– these mitigation measures have been considered in the relevant Significant Impact Assessments detailed in Chapter 8 and Chapter 9.

This chapter should be read in conjunction with the MNES Management Plan included in **Appendix J**.

7.1 Avoidance

Avoidance of MNES values has been demonstrated through both selection of the Project corridor and the development of the Disturbance Footprint. Revisions to both have occurred throughout the progressive and iterative design and development of the Project, informed by community and landholder consultation, corridor selection process, substation locations and an understanding of on-ground constraints including the presence and distribution of MNES and habitat to support MNES.

7.1.1 General Principles

The siting of permanent infrastructure components within the Project Area has been carefully considered in the context of environmentally sensitive areas including known habitat of MNES. The process followed was undertaken to maximise opportunities to avoid the clearing of vegetation and direct impacts on habitat for MNES.

The process that was undertaken includes:

1. The preliminary line design was created which showed tower locations, tower heights, centre line and conductor location (offset 6 m either side of centreline). Transmission line design software (PLSS-CADD) modelled the maximum sag of the conductor under maximum capacity on the hottest day of the year. Next, the plan and profile of this design was created. Vegetation violations were modelled using LIDAR, identifying where trees and vegetation intercepted the clearance zones.
2. Following the preliminary design, a detailed review is undertaken to review the following:
    - MNES habitat
    - cultural heritage restrictions
    - bushfire risk
    - vegetation status (remnant, regrowth and non-remnant)
    - accessibility (existing access tracks, contours)
    - property constraints.
3. A mitigation workshop was held with internal stakeholders (environment, cultural heritage, indigenous partnerships, design, construction, operations, landholder relations) to review the proposed alignment and tower placement. Where sensitive areas were identified, changes were made to the design and the PLSS-CADD model was re-run to determine whether the changes resulted in avoidance of impacts on relevant values (environmental, cultural, landholder constraints, design constraints). Parameters changed included increasing tower height, moving tower location, reducing span length, adding towers and changing tower type from suspension to tension tower.
4. Following the workshop, the line design was revised and circulated for subsequent review by internal stakeholders. Further field verification was undertaken to identify areas where clearing can be further reduced.
5. A second phase of modelling was completed, to determine where there was sufficient distance between the bottom of the conductor and the top of the vegetation to overspan and avoid the need to clear. This assessment accounts for potential future growth of vegetation that would need to be removed through the operational phase (e.g. Regrowth vegetation that may not be within exclusion zones at the time of construction but will be within the operation phase cannot be overspanned).
6. Following the determination of clearing footprint within the easement, ancillary infrastructure clearing requirements were finalised (such as brake and winch sites, access tracks, laydown sites).

Additional avoidance practices were used to further reduce the impact to MNES as described in **Section 7.1.2** to **Section 7.1.3**.

7.1.2 Co-location with Existing Overhead Transmission Line

The Project has been designed to maximise the use of previously cleared areas, thereby reducing additional impacts to MNES. The Project has been co-located alongside an existing mostly cleared corridor which supports the Powerlink Existing Feeder: F871, an overhead transmission line spanning the entire length of the Project. This approach ensures that the disturbance resulting from the Project is confined to the edge of areas that have already been subject to vegetation clearance and ongoing maintenance activities, thereby reducing impacts to intact habitat areas (**Photo 7.1**).



Photo 7.1 Indicative extent of disturbance required (in yellow) to accommodate the new transmission line co-located with the existing corridor (Not to scale)

The design also incorporates the necessary clearance between Project transmission lines and the adjacent woody vegetation to accommodate conductor blow-out. By locating the Project adjacent to previously cleared areas, the Project avoids the need for additional vegetation removal within native woody vegetation along the full extent of its border with the existing infrastructure. This targeted avoidance measure reduces the overall Project footprint within intact remnant vegetation and prevents additional fragmentation of habitat critical to the survival of MNES species.

The siting of the Project along existing transmission line infrastructure also reduces the scale of potential indirect impacts commonly associated with new linear infrastructure corridors. By maintaining a continuous interface with already cleared land, the Project design reduces the impact of edge effects that could otherwise contribute to habitat fragmentation, increased impact of feral predators and disturbance. The reduction in clearing within intact vegetation reduces opportunities for weed incursion and pest establishment, which are often facilitated by soil disturbance and increased light penetration along newly created edges.

The transmission tower structures used for the Project will be taller than the existing tower structures along F871. The taller structures afford the Project to overspan areas of vegetation due to increased clearance distances required between the conductors and vegetation below. This in turn provides opportunities to overspan and retain areas of vegetation adjacent to the existing cleared corridors therefore decreasing the impacts of edge effects.

7.1.3 Pull-up Bays

To support construction and operational activities within Section B of the Project Area, an existing access track will be utilised to transport machinery, vehicles, and transmission line components to and from work areas. Rather than widening this track to accommodate two-way vehicle movement, which would require substantial additional clearing of native vegetation, the Project has adopted a targeted approach by establishing small, strategically located pull-up bays along the route (**Photo 7.2**). This design modification represents an important avoidance measure, reducing the extent of vegetation removal and disturbance to MNES and other environmental values.

By retaining the existing single-lane configuration, the Project significantly reduces the clearing footprint within an area that supports remnant vegetation and potential habitat for listed threatened species. This approach avoids the linear expansion of the corridor and the creation of additional edges, which can lead to long-term degradation of habitat quality through processes such as weed incursion, increased susceptibility to fire and erosion.

In addition to reducing direct habitat loss, this method also maintains greater connectivity between remnant vegetation patches, supporting the movement of fauna and the persistence of ecological processes across the landscape. By limiting new disturbance and maintaining the natural vegetation structure along the majority of the track, the Project helps preserve the integrity of adjacent MNES habitats and reduces the risk of secondary impacts associated with wider access corridors. Overall, the use of pull-up bays in lieu of track widening demonstrates a considered and practical design response that achieves construction efficiency while avoiding and minimising impacts to biodiversity values within the Project Area.



Photo 7.2 Pull Up Bays within Section B (red section denotes pull up bays)

7.2 Minimise

Where impacts on MNES cannot be avoided, all reasonable efforts have been made to minimise Project impacts. The width of clearing for tracks has been minimised to that which can safely transport infrastructure components. Vegetation clearing and the subsequent construction of the Project will occur progressively and in stages. By doing this, only a small subset of the Disturbance Footprint will be impacted at one time, thereby minimising disturbance activities and allowing opportunity for fauna relocate to adjacent areas that are not subject to disturbance. This will also minimise barrier effects associated with construction such as temporary noise and lighting.

The following measures will be implemented to minimise the loss of vegetation and habitats:

- Vegetation clearing will be restricted to the minimal amount necessary for the construction of the Project activities. Micro-siting of infrastructure such as tower footprints will be undertaken during the detailed design phase to further reduce impacts and to ensure areas of high ecological significance are avoided as a priority. In addition, tower pad footprints will be reduced to as small as possible and co-located with temporary or other infrastructure components.

- Construction of the Project will occur progressively and in phases. By doing this, only a small subset of the Disturbance Footprint will be impacted at one time. Indirect impacts resulting from the construction of the Project will be localised and actively managed as detailed in following sections. Direct impacts to MNES will be minimised where possible including through micro-siting.
- Areas of steep terrain will allow spanning of the majority of vegetated areas, particularly in habitats of low open woodlands that feature very sparse canopy trees of very low height. In such areas, clearing is likely to be limited to that required for tower footprints and widening of existing access tracks. These tower and access locations will be confirmed during the detailed design phase. Where possible, tower height adjustments have been used to reduce the direct impact to MNES by increasing the gap between infrastructure and vegetation.
- Waterway crossings containing riparian vegetation corridors will be spanned in most instances, and particularly where values for and occurrences of listed threatened flora and fauna species have been identified by surveys or desktop mapping. Larger waterways will have higher towers and longer spans to avoid the bed and banks of waterways and place towers as far back as possible from fringing vegetation. For access tracks across ephemeral waterways, existing crossings or clearings will be preferentially used. Where clearing is required within a riparian corridor it will be minimised with larger habitat trees retained where possible.
- Rehabilitation will occur progressively as the construction process advances. Disturbed areas not required for access roads and maintenance areas around structures will be rehabilitated as soon as practicable.

7.2.1 Design Adjustments

7.2.1.1 Mid-span of Transmission Line

The mid-span of a transmission line refers to the entire area of the easement between two towers.

In many locations along the Project, the mid-span area does not require ground disturbance, removal of canopy vegetation or the installation of physical infrastructure, as only the conductors pass overhead. This characteristic provides an opportunity to minimise impacts to environmental values within the Project Area, particularly where the alignment crosses sensitive or high-value habitats (**Photo 7.3**).



Photo 7.3 Mid Span Clearing Reduction (where green denotes midspan and brown denotes tower pads) Maintaining Connectivity and Reducing Direct Impacts

Where MNES values occur at specific locations underneath the mid-span of Project infrastructure, no impact is expected during project construction or operation of the Project. Mid-spanning clearing reduction minimises impacts the key MNES values including, but are not limited to:

- Semi-evergreen vine thicket TEC (**Photo 7.4**)
- Coastal saltmarsh TEC
- Suitable habitat for the following:
    - *Bertya opponens*
    - *Samadera bidwillii*
    - *Atalaya collina*
    - *Cossinia australiana*.
- Habitat for EPBC Act threatened species including:
    - Current denning, foraging and dispersal for greater glider (southern and central)
    - Denning, foraging and dispersal for yellow-bellied glider
    - Breeding, foraging and dispersal for greater glider
    - Denning and refuge habitat for northern quoll
    - Foraging and dispersal habitat for grey-headed flying-fox
    - Nesting and foraging for black-breasted button quail.



Photo 7.4 Mid Span Clearing Reduction Minimising Impact to SEVT (circled in red)

7.2.1.2 Habitat Connectivity

Habitat connectivity measures are necessary to reduce impacts of fragmentation where Project infrastructure has potential to isolate habitat patches and restrict movement of MNES species. Of the threatened and migratory listed species known or potentially occurring within the Project Area, the greater glider (southern and central) and the yellow-bellied glider (south-eastern) are determined to be most vulnerable to habitat fragmentation impacts. These species are limited to movement within areas of suitable habitat and are unable to move through cleared areas beyond the maximum volplane distance (approximately 1.5 x height of the tallest tree). As such, linear infrastructure without breaks which is greater than the maximum volplane distance represents a significant barrier to movement. In several locations, this limitation to movement imposed by Project infrastructure has been minimised by the use of a retained vegetation connection underneath the mid-span of transmission lines which provides movement opportunities for these species through connected habitat.

7.3 Mitigate and Manage

Throughout the life of the Project, potential impacts on MNES will be directly or indirectly managed via Project Management Plans. Mitigation and management measures stated within Project Management Plans have been developed utilising available best practice guidance and/or governmental guidance where available. All mitigation and management measures relevant to MNES will be captured in one or multiple of the Project Management Plans including:

- Powerlink's overarching Environmental Management Plan (EMP) which includes actions to limit and reduce the potential impacts on MNES and biodiversity across the life of the Project.
- Environmental annexure prepared by Powerlink to support the construction phase.
- Environmental Work Plan (EWP) prepared by Powerlink and updated as a live spatial document.
- Construction Environmental Management Plan (CEMP) (to be developed by the constructor). This document will establish the baseline requirements for environmental management during construction of the Project.
- MNES Management Plan has been prepared that details management measures for MNES that potentially occur within the Project Area.
- *Cycas megacarpa* Translocation Management Plan (CTMP) has been prepared that outlines the proposed translocation and associated management measures necessary to achieve successful translocation of *Cycas megacarpa*.
- Bushfire Management Plan (BMP) will be prepared based on the Powerlink EMP and will be implemented to minimise the risk of unexpected fire as a result of construction activities. This plan will be managed in accordance with the EWP, EMP and environmental annexure prepared by Powerlink.
- Rehabilitation Management Plan (RMP) based on the Powerlink EMP detailing rehabilitation specifications that provide a framework outlining how the rehabilitation will be managed during the construction phase, will be prepared.
- Acid sulfate soils management plan (ASSMP) has been developed to identify, manage and mitigate the disturbance of acid sulfate soils.
- Water Quality Management Plan (WQMP) has been prepared to protect surrounding waterways from indirect impacts of the Project.
- Erosion and Sediment Control Plan (ESCP) will be prepared based on the Powerlink EMP and standards within the International Erosion Control Association (IECA) as part of the CEMP to establish a framework for the management of drainage, erosion and sedimentation through the development of the Project's detailed design and subsequent construction and operational phases.

The above management plans where finalised have been incorporated into the PER as requested in the PER Guidelines. Project Management Plans include performance criteria and general requirements/standard operational controls. All measures included in the Project Management Plans will be consistent with the S.M.A.R.T principle for each management objective (**Section 7.3.1**), ensuring they are:

- Specific–prescriptive, with no uncertainty or ambiguity around their purpose or implementation.
- Measurable–the status (i.e. success or failure) and outcomes/results can be measured.
- Achievable–through the chosen method of implementation, by the responsible personnel and within the specified timeframe.
- Relevant–to the action/impact being controlled and to the protected matter.
- Time bound–Measures were given specific and achievable timeframes for implementation in relation to specific development activities or stages.

7.3.1 Key Management Objectives

Twelve key management objectives have been developed for the Project to mitigate and manage impacts to MNES. **Table 7.1** contains a summary of these management objectives and the key management actions associated with each objective. For a detailed list of key management actions, including timing, responsible party, monitoring, trigger and corrective actions refer to **Section 5.3** within the MNES Management Plan.

Table 7.1 Management Objectives and Key Management Actions

Management Objective	Management Action/s
Vegetation clearing is limited to the Disturbance Footprint	• Identify MNES flora and TEC's through pre-clearance surveys • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Disturbance activities must be contained to Disturbance Footprint • 10 m protection zone will be maintained around MNES flora and TEC's where they are directly adjacent to disturbance activities • Refer to Table 5.1 of the MNES Management Plan for further details on mitigation measures.
Retention and avoidance of individuals or populations of MNES threatened flora within the Disturbance Footprint	• Pre-clearance surveys will be undertaken within suitable habitat within the Disturbance Footprint and for protected plants under the *Nature Conservation Act 1992* • Obtain relevant permits • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Clearance protection zone in proximity to retained individuals to be maintained Clearing will be in accordance with all approval conditions • Where new populations of MNES threatened flora are identified, the Unexpected Finds Protocol must be followed • Refer to Table 5.2 of the MNES Management Plan for further details on mitigation measures, including species specific mitigation measures for *Cycas megacarpa* and *Samadera bidwillii*.
Prevent and minimise mortality of MNES fauna	• Appropriately qualified fauna spotter catcher to undertake pre-clearance habitat assessment and be present during clearing and disturbance to habitat features • Clearing must be staged, with non-habitat trees felled first • Tampering with an animal breeding place to be carried out in accordance with an approved Species Management Program • Clear delineation of habitat features to be retained • Habitat trees must be soft-felled • Restrict vehicles to approved access tracks • Vehicle travelling speed restricted to <40 km/hr • Excavations must be secured (e.g. covered) • Refer to Table 5.3 of the MNES Management Plan for further details on mitigation measures, including species specific mitigation measures for the koala, greater glider, collared delma, northern quoll, black-breasted button-quail, squatter pigeon, grey-headed flying-fox, white-throated needletail and migratory shorebirds.

Management Objective	Management Action/s

Minimise degradation of MNES habitat through dust, contamination, erosion and sedimentation	• Contamination
	  ○ Hazardous materials must be stored and handled appropriately
	  ○ An Emergency Response Plan will be developed
	  ○ Spill kits will be available during construction
	  ○ Hazardous materials locations will be bunded
	  ○ All waste disposed of in accordance with legislative requirements
	  ○ No refuelling within 50 m of a watercourse
	  ○ Application of herbicides in accordance with legislative requirements.
	• Dust
	  ○ Dust suppression measures including vehicles restricted to approved tracks, cover all loose loads and set speed limits (<40 km/hr)
	  ○ Application of dust suppressants as required
	  ○ Dust generating activities will be limited on days with strong winds blowing towards sensitive receptors or dust sensitive locations
	  ○ Regular monitoring and visual surveillance to trigger management actions will be undertaken.
	• Erosion and Sediment Control
	  ○ Soil sampling and testing to inform both erosion and sediment control (ESC) and rehabilitation
	  ○ Develop ESCP in accordance with the IECA Best Practice Erosion and Sediment Control Guidelines 2008
	  ○ Extent and duration of soil exposure will be minimised
	  ○ Disturbed areas will be promptly stabilised
	  ○ Site is monitored and controls adjusted to maintain required performance standard
	  ○ Minimum personnel requirements will apply for ESCP development and verification.
	• Refer to Table 5.4 of the MNES Management Plan for further details on mitigation measures.

No increase in weed presence and abundance within the Project Area	• Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • Refer to Table 5.5 of the MNES Management Plan for further details on mitigation measures.

Management Objective	Management Action/s
No increase in pest presence and abundance within the Project Area	• All waste to be secured • Biosecurity Instrument Permit to be obtained for moving materials out of or within different biosecurity zones • Educate workforce in the identification of pest fauna species • Avoid inclusion of any water retaining voids or pits • Refer to Table 5.6 of the MNES Management Plan for further details on mitigation measures.
Retain connectivity and key fauna dispersal corridors throughout the Project Area	• Habitat features to be relocated to adjacent areas • Retain habitat trees in-situ (e.g. habitat tree to be stem injected and left in easement) • Implement controls to prevent introduction or spread of weeds that may degrade MNES species • Retain trees (stem injected where required) in situ as suitable gliding poles in riparian areas • Refer to Table 5.7 of the MNES Management Plan for further details on mitigation measures.
Reduce the loss of high-value fauna habitat features such as hollow bearing trees/logs/surface rocks	• During the pre-clearance survey, the fauna spotter-catcher will locate, record and mark the habitat features (including those to be retained in situ) • Habitat features unable to be retained in situ to be relocated to adjacent areas • Install tree protection to habitat trees immediately adjacent to areas of earthworks • Refer to Table 5.8 of the MNES Management Plan for further details on mitigation measures, including species specific mitigation measures for the painted honeyeater.
Prevent any uncontrolled fire within the Project Area	• Bushfire Management Plan will be developed • Burning of vegetation strictly prohibited unless a permit is obtained • Designated parking areas for vehicles and machinery • During operation, vegetation within the Disturbance Footprint will be managed in accordance with Powerlink's vegetation specification • Refer to Table 5.9 of the MNES Management Plan for further details on mitigation measures.
Minimise impacts to threatened fauna from increased light, noise and vibration	• Plant and equipment to be fitted with appropriate noise attenuation and maintained • Deliveries and removal of material and equipment to and from site within approved hours for construction • Plant to be turned off when not in use • No unnecessary use of horns or other audible signals on mobile plant or equipment • Machinery and equipment will be maintained in good working condition • Refer to Table 5.10 of the MNES Management Plan for further details on mitigation measures.

Management Objective	Management Action/s
Areas of disturbance are rehabilitated progressively to ensure they are stable (to minimise erosion)	• Rehabilitation Management Plan must be developed by an appropriately qualified person • Rehabilitation Specialist to oversee rehabilitation activities • Minimum 70% ground cover to be achieved on all completed earthworks • ESC measures must remain in place and monitoring undertaken, until site stabilisation criteria is achieved • Progressive rehabilitation will be completed to avoid extended periods of soil exposure • Refer to Table 5.11 of the MNES Management Plan for further details on mitigation measures.
Minimise disruption to waterbodies through altered hydrology, disturbance to acid sulfate soils, erosion and sedimentation	• A Water Quality Monitoring Plan must be developed by an appropriately qualified person • Dewatering Management Plan will be developed • Acid Sulphate Soil Management Plan will be developed • Awareness training for identification and management of ASS will be undertaken • Water extraction activities will be strictly controlled and monitored to ensure no waterbodies are completed drained • Erosion and sediment control measures in accordance with IECA 2008 • Refer to Table 5.12 of the MNES Management Plan for further details on mitigation measures.

7.3.1.1 Unexpected Finds Protocol–Threatened Flora

Despite the significant survey effort to date, Powerlink recognise that there is potential for a previously unidentified threatened plant individual or population to be observed during future surveys for the Project (i.e. targeted surveys of any new areas established during detailed design and pre-clearance surveys). In this circumstance, the unexpected finds protocol for threatened flora would be initiated. Refer to Appendix A within the MNES Management Plan for further details.

7.4 Rehabilitate

Areas of temporary construction activities that are not required for operations will be subject to rehabilitation efforts. Rehabilitation will include leveling activities and seeding to achieve soil stabilisation.

The existing transmission line was subject to rehabilitation at the end of construction to stabilise disturbed areas with grass. Due to the nature of electrical assets, areas that are initially required to be cleared are also required to be maintained during operation to ensure the asset is electrically safe. This includes removal of incompatible species and allowing compatible species to regenerate over time where they do not have an unacceptable impact on bushfire risk underneath and around electrical assets. It should also be noted that ancillary disturbance activities for laydown areas are selected in areas that have been previously cleared or are required to be cleared to ensure electrical safety of the asset. As a result, there are minimal opportunities for regenerative rehabilitation within the proposed Disturbance Footprint.

The below sections detail the areas of the Project that will be rehabilitated, what will be included in the Project's RMP, the treatment methodology, establishment and monitoring key indicators and decommissioning activities.

7.4.1 Areas to Rehabilitate

As described in Chapter 2, there are many components to the Project and within the Disturbance Footprint there are several activities which provide the opportunity to rehabilitate. In accordance with section 8.1.1 of the PER Guidelines, areas of temporary construction activities that are not required for operations will be subject to rehabilitation efforts including:

- laydown areas
- batching plant sites
- brake and winch sites
- tower pads (including batters)
- all disturbance associated with ESC (e.g. drains)
- temporary access tracks
- soil disturbance within the mid span
- batters and disturbance associated with substation earthworks
- temporary clean-down facilities.

In addition, the stabilisation of areas to be either 'cut' or 'filled' as part of tower pad construction, site levelling or existing track widening have been considered as part of rehabilitation activities. Refer to Table 5.11 of the MNES Management Plan for details on key management actions and monitoring for the progressive rehabilitation of areas of disturbance.

7.4.2 Rehabilitation Management Plan

A RMP for this Project will be prepared in accordance with the Powerlink EMP and will identify rehabilitation areas, best practice standards, acceptance criteria and monitoring. This Plan will be prepared by a Rehabilitation Specialist with a minimum of five (5) years' experience in supervising and carrying out large scale rehabilitation activities. This Specialist will be present on site when revegetation activities are being carried out and be available to provide advice or attend site where required during establishment and monitoring periods. The RMP must include the following:

- site/project background information
- rehabilitation objectives
- planning phase
- implementation phase
- maintenance, monitoring and reporting
- results of soil tests and recommendations
- expected soil horizon volumes and stockpile locations
- land ownership and land use

- regulatory requirements
- rehabilitation risk assessment (particularly climate)
- rehabilitation objectives and completion criteria
- map spatially delineating the site and the proposed rehabilitation treatment method of each area
- map showing final landform and rehab plan
- rehabilitation schedule
- ground preparation
- treatment application/revegetation
- maintenance requirements
- rehabilitation quality assurance
- rehabilitation monitoring program
- rehabilitation reporting requirements
- corrective actions.

7.4.3 Treatment Methodology

All treatments require thorough subsoil preparation, including ripping, cultivation, or roughening depending on slope steepness, followed by topsoil installation within three days. Weed growth monitoring and control (if required) will form part of the stabilisation process. Ground preparation works must be carried out prior to commencing any rehabilitation treatments and in accordance with the RMP.

The following rehabilitation treatments may be utilised. Rehabilitation treatments must be in accordance with the RMP and soil testing recommendations for the site:

- drill or broadcast seeding
- hydromulching–standard
- bonded fibre matrix
- hydrocompost
- straw mulching
- organic blanket
- seeded mesh-lined drain
- turfing.

7.4.4 Establishment and Monitoring

To ensure the long-term stability and ecological recovery of landforms disturbed during transmission line construction, including tower pads, access tracks, and cleared corridors, a rehabilitation monitoring program will be established. The program aims to verify that rehabilitation measures are effective and environmental risks, such as erosion and weed invasion, are managed. In accordance with the IECA Best Practice Erosion and Sediment Control Guidelines, a minimum 70% ground cover (or equivalent to pre-existing ground cover) must be achieved on all completed earthworks exposed to accelerated soil erosion within 30 days. Other additional key indicators to be monitored will include:

- soil stability, through monitoring evidence of erosion, sediment movement, and soil compaction
- weed presence, by monitoring the density and extent of invasive or non-target species
- compliance with design benchmarks to ensure achievement of specified rehabilitation outcomes (e.g. 70% ground cover, no erosion features).

Monitoring of key indicators will be undertaken by visual inspections. Visual inspections will involve transect walks and photo-point monitoring to assess vegetation and erosion. A baseline survey will be conducted immediately after construction and prior to the commencement of rehabilitation works. Initial monitoring will then occur monthly for the first three months to assess germination and early growth. Following this, ongoing monitoring will be performed quarterly for up to two years or until benchmark conditions are met. Additionally, event-based inspections will be carried out after significant rainfall or disturbance events to ensure the effectiveness of rehabilitation and the stability of the site. ESC measures must remain in place and monitoring undertaken, until site stabilisation criteria is achieved.

7.4.5 Decommissioning

Rehabilitation outcomes will be determined in consultation with landholders in terms of their desired use of temporary construction sites following the completion of construction. The objective of the rehabilitation and management actions is to return temporarily disturbed areas to a stabilised landform. Given the operational life (typically 50 years), a review of any further rehabilitation measures will be undertaken at the time of decommissioning.

7.5 Monitoring

Monitoring programs have been developed to support ongoing understanding of condition of MNES values within the Project Area and to monitor the potential impacts within the Disturbance Footprint. Monitoring programs to be undertaken during the Project lifetime are provided in **Table 7.2**. Refer to **Table 6.1** and **Table 6.2** in the MNES Management Plan for details pertaining to timing and frequency, trigger thresholds and corrective actions. Also refer to the WQMP for details on water quality monitoring, OMP for details on offset monitoring and CTMP for details on *Cycas megacarpa* translocation monitoring.

Table 7.2 Monitoring Programs

Monitoring Program	Purpose	Key Indicators
Longterm Monitoring: Disturbance Footprint		
Cycas megacarpa	To monitor the survival, growth, and recruitment of retained (in-situ) *Cycas megacarpa* individuals within the Disturbance Footprint. This program will evaluate the success of the mitigation measure and alert Powerlink to any decline in condition. This will enable the implementation of any corrective actions should they be required, and ensure the programme remains compliant with approval conditions.	• Growth and health condition (frond development, pest/disease presence, damage) • Cone and seed production (reproductive success) • Seedling establishment and recruitment • Firmness in ground (Root development indicator)
Samadera bidwillii	To ensure the protection, viability, and recovery of *Samadera bidwillii* populations affected by transmission line construction (where overspanning impacts to habitat are not possible). The program aims to monitor ecological health, reproductive success, and threats to inform adaptive management and conservation actions.	• Population structure: Plant density, height, stem diameter, leaf size • Reproductive success: Ongoing clonal reproduction • Threats: Weed invasion, pest damage (e.g. *Atteva albiguttata*), habitat fragmentation, fire impact • Regeneration capacity: Root suckering, post-fire recovery.
Rehabilitation /stabilisation of landforms	To ensure the long-term stability and ecological recovery of landforms disturbed during transmission line construction, including tower pads, access tracks, and cleared corridors. The program aims to verify that rehabilitation measures are effective and environmental risks such as erosion and weed invasion, are managed.	• Soil stability: Evidence of erosion, sediment movement, and soil compaction. • Weed presence: Density and extent of invasive or non-target species. • Compliance with design benchmarks: Achievement of specified rehabilitation outcomes (e.g. 70% ground cover, no erosion features).
Weeds	To monitor the presence, abundance, and spread of weeds within the Project Area and to evaluate whether control measures implemented are effective at minimising the incursion and spread of weeds. Monitoring ensures early detection of new incursions and supports compliance with biosecurity requirements.	• Construction phase: ○ Weed presence/occurrence: cover/density/count in proximity to MNES flora and/or TECs. • Operational phase: ○ Weed occurrence: species present, extent of cover, and changes in distribution ○ Trend data: changes in abundance or spread over

Monitoring Program	Purpose	Key Indicators
		time compared with baseline conditions.
Water quality monitoring	To monitor and manage potential impacts on water quality in the Calliope River (until the rehabilitation criteria are met) resulting from transmission line construction activities. The program aims to ensure compliance with environmental standards, protect aquatic ecosystems, and guide timely corrective actions.	• Physical parameters: Turbidity, temperature, total suspended solids (TSS) • Chemical parameters: electrical conductivity, pH, dissolved oxygen, total organic carbon (TOC), dissolved organic carbon (DOC), herbicides, pesticides, nutrients (nitrogen and phosphorus), ammonia, nitrogen oxides (NOx).
Longterm MNES Monitoring: Offset Property		
Cycas megacarpa	Refer to CTMP (**Appendix M**) for details, inclusive of Key Indicators, Methods, Timing and Frequency, Trigger Thresholds, Corrective Actions	
Threatened gliders (greater glider and yellow-bellied glider)	Refer to OMP (**Appendix F**) for details, inclusive of Key Indicators, Methods, Timing and Frequency, Trigger Thresholds, Corrective Actions	
Collared delma	Refer to OMP (**Appendix F**) for details, inclusive of Key Indicators, Methods, Timing and Frequency, Trigger Thresholds, Corrective Actions	

8.0 Significant Impact Assessment–Ecology

This chapter addresses section 6.2 of the PER Guidelines with respect to significant impact assessments (SIAs) for listed threatened species and ecological communities under section 18 and section 18A of the EPBC Act. Impacts regarding the relevant controlling provisions concerning the Great Barrier Reef are addressed in Chapter 9.

SIAs have been undertaken in accordance with the *Significant Impact Guidelines 1.1–MNES* (Department of the Environment, 2013a), and have utilised relevant information from Approved Conservation Advices, Listing Advices, the SPRAT database, National Recovery Plans and peer reviewed journal articles to establish conclusions. Habitat modelling criteria are detailed in each MNES SIA as well as the Likelihood of Occurrence included as **Appendix E**.

According to the PER Guideline, a significant impact is defined as an action which is likely to have a notable negative impact on 'habitat critical for the survival of the species', an 'important population' or 'important habitat' for a migratory species. In the absence of species-specific policy guidelines or recovery plans, the definitions from the MNES Guidelines for 'population of a species', 'important population', and 'habitat critical for the survival of the species' were applied to relevant threatened or migratory species impact assessments, as described in **Section 8.1** and presented in each of the subsections for each MNES.

The following is described in each of the subsection for each MNES, to describe a comprehensive understanding of each MNES being assessed:

- description and status under the EPBC Act
- ecology and distribution
- occurrence and potential habitat:
    - occurrence within the surrounding region
    - occurrence within the Project Area
    - species habitat.
- important population or population
- habitat critical to the survival of the species
- project impacts
- key mitigation measures
- significant impact assessment.

The Disturbance Footprint covers an area of 423.7 ha. For the purpose of the impact assessments and design flexibility, complete clearing of the Disturbance Footprint has been assumed and the area includes a 2% buffer for the majority of MNES habitat types. For Greater Glider foraging and dispersal habitat and Koala climate refugia, the buffer has been increased following detailed assessments for minor design amendments and constructability considerations. The increases for these two habitat types are 0.9 ha and 1 ha respectively. The increases are to facilitate minor micrositing due to the overall areas of impacts to these habitat types being minimal (e.g. 3.4 ha of impact to Greater Glider

foraging and dispersal across the Project Area). However, this total impact may be reduced during detailed design and during construction, as vegetation adjacent to the transmission line may remain in place if it does not violate the exclusion zones.

Potential direct and indirect impacts as a result of the Project have been assessed for the three (3) TECs, six (6) threatened flora species, 27 threatened fauna species and nine (9) migratory species considered known or potentially occurring within the Study Area. The assessment of potential impacts has been undertaken in accordance with the Significant Impact Guidelines 1.1–MNES. The precautionary principle has been applied when deciding whether or not the Project is likely to have a significant impact on a value. Where a species is both threatened and migratory, the species has been assessed based on its' threatened status.

A summary of the key assessment findings, including the likelihood of occurrence outcome and the significant impact assessments are presented in **Table 8.1**, with the detailed SIA of MNES presented in **Section 8.2**.

Table 8.1 Summary of the SIA

MNES	Status	Likelihood of Occurrence	Habitat / Direct Impact			Assessment Outcome
			Habitat Utilisation		Extent within Disturbance Footprint (ha)	
Threatened Ecological Communities						
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions (SEVT TEC)	Endangered	Known	-		2.2	Likely
Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions (Eucalypt Floodplain Forest TEC)	Endangered	Known	-		16.6	Likely
Subtropical and Temperate Coastal Saltmarsh (Coastal Saltmarsh TEC)	Vulnerable	Known	Vulnerable TECs are not considered MNES, SIA not undertaken			
Threatened Flora						
Atalaya collina (Yarwun whitewood)	Endangered	High	Suitable		1.6	Unlikely
Bertya opponens (coolabah bertya)	Vulnerable	High	Suitable		77.7	Unlikely
Cossinia australiana	Endangered	Known	Suitable		2.4	Unlikely
Cycas megacarpa	Endangered	Known	Confirmed	23.2 (Full clearing)	29.8 (Selective clearing)	Likely
			Suspected	0.5 (Full clearing)	-	

MNES	Status	Likelihood of Occurrence	Habitat / Direct Impact			Assessment Outcome
			Habitat Utilisation		Extent within Disturbance Footprint (ha)	
Polianthion minutiflorum (small-flowered polianthion)	Vulnerable	High	Suitable		8.1	Unlikely
Samadera bidwillii (quassia)	Vulnerable	Known	Known	0.0 (Full clearing)	0.2 (Selective clearing)	Likely
			Suitable	96.7 (Full clearing)	19.0 (Selective clearing)	
Threatened Migratory Shorebirds						
Common greenshank (*Tringa nebularia*)	Endangered, Migratory	Moderate	Roosting and foraging		1.1	Unlikely
Curlew sandpiper (*Calidris ferruginea*)	Critically Endangered, Migratory					
Eastern curlew (*Numenius madagascariensis*)	Critically Endangered, Migratory					
Lesser sand plover (*Charadrius mongolus*)	Endangered, Migratory					
Nunivak bar-tailed godwit (*Limosa lapponica baueri*)	Endangered, Migratory					
Great knot (*Calidris tenuirostris*)	Vulnerable, Migratory	Moderate	Roosting and foraging		1.1	Unlikely
Greater sand plover (*Charadrius leschenaultia*)						
Red knot (*Calidris canutus*)						
Ruddy turnstone (*Arenaria interpres*)						

MNES	Status	Likelihood of Occurrence	Habitat / Direct Impact		Assessment Outcome
			Habitat Utilisation	Extent within Disturbance Footprint (ha)	
Sharp-tailed sandpiper (*Calidris acuminata*)					
Terek sandpiper (*Xenus cinereus*)					
Threatened Fauna					
Australian Painted Snipe (*Rostratula australis*)	Endangered	Moderate	Seasonal breeding, foraging and dispersal	0.6	Unlikely
Black-breasted Button Quail (*Turnix melanogaste*r)	Vulnerable	Moderate	Nesting and foraging	3.7	Unlikely
Collared Delma (*Delma torquata*)	Vulnerable	Known	Suitable	49.0	Likely
Flatback Turtle (*Natator depressus*)	Vulnerable, Migratory	Moderate	Foraging	-	Unlikely
Greater Glider (Southern and Central) (*Petauroides volans*)	Endangered	High	Foraging and dispersal	4.3	Likely
			Likely or current denning	31.5	
			Potential or future denning	105.7	
Green Turtle (*Chelonia mydas*)	Vulnerable, Migratory	Moderate	Foraging	-	Unlikely
Grey-headed Flying Fox (*Pteropus poliocephalus*)	Vulnerable	Known	Foraging and dispersal	125.3	Unlikely
Koala (*Phascolarctos cinereus*)	Endangered	Known	Breeding, foraging and shelter	131.0	Likely
			Climate refugia	22.8	
			Dispersal	267.9	
Latham's Snipe (*Gallinago hardwickii*)	Vulnerable, Migratory	Moderate	Seasonal breeding, foraging and dispersal	0.6	Unlikely
Loggerhead Turtle (*Caretta caretta*)	Endangered, Migratory	Moderate	Foraging	-	Unlikely
	Endangered	Moderate	Denning and refuge	38.4	Unlikely

MNES	Status	Likelihood of Occurrence	Habitat / Direct Impact		Assessment Outcome
			Habitat Utilisation	Extent within Disturbance Footprint (ha)	
Northern Quoll (*Dasyurus hallucatus*)			Foraging and dispersal	53.8	
Painted Honeyeater (*Grantiella picta*)	Vulnerable	Moderate	Foraging and dispersal	9.0	Unlikely
Squatter Pigeon (southern) (*Geophaps scripta scripta*)	Vulnerable	Known	Breeding	14.4	Unlikely
			Dispersal	137.0	
			Foraging	0.9	
Water Mouse (*Xeromys myoides*)	Vulnerable	High	Breeding, foraging and dispersal	0.5	Unlikely
White-throated Needletail (*Hirundapus caudacutus*)	Vulnerable, Migratory	High	Roosting and foraging	84.6	Unlikely
			Foraging and dispersal	70.3	
Yellow-bellied Glider (south-eastern) (*Petaurus australis australis*)	Vulnerable	High	Denning, foraging and dispersal	20.9	Likely
Migratory Species					
Eastern Osprey (*Pandion haliaetus*)	Migratory	Known	Breeding and dispersal	0.2	Unlikely
Fork-tailed Swift (*Apus pacificus*)	Migratory	Known	Foraging and dispersal	417.6	Unlikely
Oriental Cuckoo (*Cuculus optatus*)	Migratory	Moderate	Foraging and dispersal	155.0	Unlikely
Migratory Shorebirds (6 species)	Migratory	Moderate	Roosting and foraging	1.1	Unlikely

8.1 Generic Terms

This section provides a set of generic terms that are discussed in each SIA for each listed threatened species, migratory species and/or Threatened Ecological Community (TEC). Some of these terms are not applicable in every assessment. These terms are defined within the *Significant Impact Guidelines 1.1–Matters of National Environmental Significance* (Department of the Environment, 2013a).

8.1.1 Habitat Critical to the Survival

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.

8.1.2 Population of a Species

A 'population of a species' is a term used when assessing Critically Endangered and Endangered species. It refers to the occurrence of the species in a particular area and includes a geographically distinct regional population or a population, or collection of local populations, that occurs within a particular bioregion. This term may not be called out specifically within guidance material provided by DCCEEW including but not limited to conservation advice, listing advice, SPRAT profiles or recovery plans.

8.1.3 Important Population

An 'important population' is defined as a population that is necessary for a species' long-term survival and recovery and is relevant to species that have an EPBC Act listing status of Vulnerable. 'Important populations may include:

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

8.1.4 Important Habitat: Migratory Species

An area of 'important habitat' for a migratory species consists of:

- Habitat within an area where the species is declining.
- Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species.
- Habitat that is of critical importance to the species at particular life-cycle stages.
- Habitat utilised by a migratory species which is at the limit of the species range.

8.1.5 Ecologically Significant Proportion

The species that are listed as migratory under the EPBC Act exhibit a broad range of life cycles and population sizes, so the definition of what is an 'Ecologically Significant Proportion' will differ between species. Factors to consider include the species' population status, genetic distinctiveness and species-specific behavioural patterns.

8.1.6 Population of a Migratory Species

'Population', in relation to migratory species, refers to the entire population or a significant proportion that cyclically and predictably cross one or more national jurisdictional boundaries including Australia.

8.2 Significant Impact Assessment

8.2.1 Endangered Threatened Ecological Communities

8.2.1.1 Semi-evergreen Vine Thickets of the Brigalow Belt (North and South) and Nandewar Bioregions (SEVT TEC)

Table 8.2 SEVT TEC: Ecology and Relevance to the Project Area

SEVT TEC	
Profile	**Conservation status** Endangered **Distribution** SEVT TEC extends from north-west of Townsville in Queensland to central northern New South Wales, mostly within the Brigalow Belt North and South IBRA bioregion (Department of the Environment, 2001). The Distribution of this TEC overlaps with the Project Area. **TEC characteristics** SEVT TEC is considered an extreme form of dry seasonal subtropical rainforest. It occurs in areas with a subtropical, seasonally dry climate with an average annual rainfall of 500–750 mm on soils of high to medium fertility. This TEC is often associated with more elevated, freely drained sites. Within a given region, species richness declines as rainfall decreases and/or becomes more seasonal (Department of the Environment, 2001). SEVT TEC is generally characterised by the prominence of trees with microphyll sized leaves (2.5–7.5 cm long) and the frequent presence of swollen-stemmed *Brachychiton* spp. (bottle trees) as emergents from the vegetation in Queensland. The thickets typically have an uneven canopy 4–9 m high with mixed evergreen, semi-evergreen and deciduous emergent tree species 9–18 m high and vines, twining or scrambling plants prominent (Department of the Environment, 2001). **Habitat critical to the survival of the TEC** The *Conservation Advice for Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions* (Department of Climate Change, Energy, the Environment and Water 2023) states that 'given the very restricted and fragmented distribution of SEVT, all areas that meet the definition of this ecological community are considered habitat critical to the community's long-term survival'. Therefore, all mapped areas of SEVT TEC within the Disturbance Footprint and Project Area are considered habitat critical to the survival of the TEC.

SEVT TEC

Current threats

Several key threats are present across the range of the ecological community. Clearing remains an ongoing threat along with the resultant high level of fragmentation and lack of connectivity between fragments.

Other main threats affecting the SEVT TEC include inappropriate fire regimes, invasion by introduced plant species, increased grazing by domestic stock and native animals, vertebrate pests, and coastal and peri-urban development (Department of the Environment, 2001).

Recovery plan

National recovery plan for the "Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions" ecological community (McDonald, 2010).

In the Project Area

Surveys

Field surveys have been undertaken within the Project Area from March 2023 to July 2025, which included four baseline flora surveys. As this TEC does not have key diagnostic characteristics or condition thresholds, dedicated TEC assessments were not undertaken.

TEC occurrence

Within the Project Area, 14 patches of remnant and regrowth RE 11.11.18 are considered analogous with the SEVT TEC. This TEC does not have key diagnostic characteristics or condition thresholds, but this community within the Project Area matches the description of the TEC within the *National recovery plan for the "Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions" ecological community* (McDonald, 2010).

Habitat within the Project Area

Habitat type	Habitat modelling criteria	Area (ha)	
		Project Area	Disturbance Footprint
SEVT TEC	Remnant and regrowth RE 11.11.18 which are the analogous REs as identified in the *National recovery plan for the "Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions" ecological community* (McDonald, 2010).	149.1	2.2

Table 8.3 Assessment of Potential Project Impacts and Mitigation and Management Commitments for SEVT TEC

Potential Impact	Assessment	Mitigation Commitments
Direct		
Vegetation clearing leading to reductions in the total area of the TEC	The Disturbance Footprint has largely been co-located with an existing transmission line, and existing access tracks will be utilised with many being widened. Clearing has the potential to reduce TEC patch size further. This TEC has an average canopy height 4-9 m proving the opportunity to over-span and leave vegetation intact.	• Identify MNES flora and TEC's through pre-clearance surveys. • Extent of vegetation clearing will be clearly delineated (EWP and onsite). • Disturbance activities must be contained to Disturbance Footprint subject to minor micro-siting within Field Survey Extent. • 10 m protection zone will be maintained around MNES flora and TEC's where they are directly adjacent to disturbance activities. • Refer to Table 5.1, MNES Management Plan for further details on mitigation measures.
Indirect		
Weed incursion	Within this vegetation community, weed species are common particularly exotic grasses. Exotic flora species are competitors for nutrients and resources need to sustain the components of this TEC. Exotic grasses are often promoted by landholders as a source of fodder/stock feed. The presence of exotic grasses for stock feed also promotes the usage of these areas for ongoing grazing further impacting this community.	• Baseline biosecurity surveys and ongoing inspections and management will be undertaken. • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance. • Land access biosecurity requirements to be adhered to. • Project specific biosecurity inductions will be undertaken. • A biosecurity inspection and clean down of vehicles, machinery and plant. • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements. • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch). • Use only native or certified weed free seeds in all rehabilitation works • Refer to Table 5.5 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Increased edge effects	The main environmental impacts of new edges created by the Project are considered to include: • The modification of microclimates where new edges are created due to a greater penetration of light and wind into the remaining vegetation. Microclimate changes should be expected in the creation of new edges as greater temperature extremes and lower air humidity are generally observed at edge communities, with this effect known to increase if vegetation is dense or cover is high • Changes to soil properties including greater compaction and erosion, and less organic matter • The introduction of weeds and pathogens through mud and dirt falling off vehicles • Changes in vegetation community composition.	• Baseline biosecurity surveys and ongoing inspections and management will be undertaken. • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance. • Land access biosecurity requirements to be adhered to. • Project specific biosecurity inductions will be undertaken. • A biosecurity inspection and clean down of vehicles, machinery and plant. • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements. • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch). • Use only native or certified weed free seeds in all rehabilitation works. • Refer to Table 5.5 of the MNES Management Plan for further details on mitigation measures.
Elevated dust	Dust emissions may result following construction activities and affect adjacent habitat. Dust can settle on adjacent vegetation, coating leaves and reducing photosynthesis, respiration, and growth.	• Dust suppression measures including vehicles restricted to approved tracks, cover all loose loads and set speed limits (<40 km/hr). • Application of dust suppressants as required. • Dust generating activities will be limited on days with strong winds blowing towards sensitive receptors or dust sensitive locations. • Regular monitoring and visual surveillance to trigger management actions will be undertaken. • Refer to Table 5.4 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Contamination (chemical spills)	During construction, chemical spills from machinery and runoff have the potential to modify SEVT.	• Hazardous materials must be stored and handled appropriately. • An Emergency Response Plan will be developed. • Spill kits will be available during construction. • Hazardous materials locations will be bunded. • All waste disposed of in accordance with legislative requirements. • No refuelling within 50 m of a watercourse. • Application of herbicides in accordance with legislative requirements. • Refer to Table 5.4 of the MNES Management Plan for further details on mitigation measures.
Uncontrolled bush fires	Bushfires are a key threat to this vegetation community and weed incursions (weed grasses) may increase fuel loads supporting high intensity fires.	• Bushfire Management Plan will be developed. • Burning of vegetation strictly prohibited unless a permit is obtained. • Designated parking areas for vehicles and machinery. • During operation, vegetation within the Disturbance Footprint will be managed in accordance with Powerlink's vegetation specification. • Refer to Table 5.9 of the MNES Management Plan for further details on mitigation measures.

Table 8.4 Significant Impact Assessment: SEVT TEC

Impact Criteria	Assessment
Reduce the extent of the ecological community?	**Likely.** Approximately 2.2 ha of confirmed SEVT TEC would need to be unavoidably cleared due to the development of the Project. Across the wider region this ecological community has been heavily degraded by land clearing, grazing, inappropriate fire regime and the introduction of invasive pasture grasses like buffel grass, Guinea grass and thatch grass along with lantana poses a significant threat to SEVT TEC. SEVT canopy heights are often less than 10 m and, in many instances, will be able to be spanned over and retained with minimal disturbance, as noted in the adjacent existing transmission line. Despite this, it is anticipated that some patches of SEVT within the Disturbance Footprint will unavoidably require a portion of the patch to be cleared, therefore, there is potential to reduce the extent of this community.

Impact Criteria	Assessment
Fragment or increase fragmentation of the ecological community, for example by clearing vegetation for roads or transmission lines?	**Unlikely.** Multiple confirmed patches of the SEVT TEC are located within the Project Area and intersect the proposed Disturbance Footprint. As the footprint aligns with an existing easement containing powerline infrastructure, no additional fragmentation of the TEC is anticipated. Due to the lower canopy height and frequent positioning on steep southern slopes, many patches can be spanned with minimal interference, as consistent with observations along the current transmission corridor. Despite unavoidable clearing of approximate 2.2 ha of SEVT TEC, the proposed alignment leverages an existing transmission line corridor to minimise further ecological fragmentation.
Adversely affect habitat critical to the survival of the ecological community?	**Likely.** The areas considered critical to the survival of the SEVT TEC includes all that meet the definition for the ecological community (Department of Climate Change, Energy, the Environment and Water, 2023). Approximately 2.2 ha of confirmed SEVT TEC within the Disturbance Footprint is likely to be unavoidably impacted. Therefore, the Project may adversely affect habitat critical to the survival of the TEC.
Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for the ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns?	**Unlikely.** Edge effects induced by clearing have the potential to alter abiotic factors by increasing light penetration, surface runoff and exposure to wind, which can in turn change soil moisture and nutrient dynamics. Clearing also increases susceptibility to invasion by exotic grasses (e.g. buffel grass, Guinea grass), which elevate fire risk, and lantana, which can alter soil conditions and nutrient cycling (Department of Climate Change, Energy, the Environment and Water, 2023). Construction activities also carry potential risks to abiotic factors through chemical spills, dust deposition, sedimentation, and runoff, all of which could alter soil structure, nutrient availability within SEVT. To mitigate these risks, an Erosion and Sediment Control Plan will be implemented, alongside spill prevention measures and rapid response protocols. In addition, landform stabilisation measures (native ground cover vegetation) will be utilised in conjunction with erosion and sediment control to limit long term changes to surface water drainage patterns. Project design and construction will not alter groundwater levels with water requirements largely derived from surface water (dams) On this basis, the Project is unlikely to modify or destroy abiotic factors—such as water, nutrients, or soil—necessary for the ecological community's survival, including groundwater levels or surface water drainage patterns.

Impact Criteria	Assessment
Cause a substantial change in the species composition of an occurrence of the ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting?	**Unlikely.** SEVT TEC is generally regarded as a fire-sensitive community and remnants are frequently associated with areas protected from fire by topography and/or substrate (Fensham, 1995). The primary risk to this community is uncontrolled burns associated with landholder grazing practices. Species composition could be changed through the introduction of weeds, changing fire regimes and edge effects. Burning of vegetation during construction will be actively avoided unless permission is granted from local authorities and all work will be consistent with Powerlink's procedures for fire/bushfire prevention. During operation, vegetation within the Disturbance Footprint will be managed in accordance with Powerlink's vegetation specification. This includes periodic monitoring of span vegetation risk, span bushfire risk and vegetation height. This information is used to determine vegetation maintenance activities which reduce fire fuel loads along the easement and will also benefit the management of elevated fuel loads in proximity to SEVT. The project will not actively engage in specific fire management, but the management of fuel loads will benefit SEVT in the event of uncontrolled bushfires which may sweep through areas containing this vegetation community. For construction, biosecurity measures outlined in Table 5.5 of the MNES Management Plan will be implemented to limit the introduction or spread of weed species in the Disturbance Footprint. This will include washdown protocols, inspection of vehicles, landholder consultation and monitoring of the access tracks and Disturbance Footprint. Landform stabilisation will be undertaken utilising native ground cover species to assist in limiting the spread of weed incursion. Flora or species harvesting will not be undertaken, especially fruiting or keystone species. In addition, there will be no requirement for hunting or harvesting of fauna which may provide pollination or seed dispersal of the vegetation components which characterise this vegetation community. By implementing the proposed management strategies, the Project is expected to effectively prevent the spread of weeds into SEVT, mitigate edge effects, and minimise the risk of fire. As a result, it is expected that the species composition of undisturbed SEVT TEC patches will not be altered as a result of the Project.

Impact Criteria	Assessment
Cause a substantial reduction in the quality or integrity of an occurrence of the ecological community, including, but not limited to: **– assisting invasive species, that are harmful to the listed ecological community, to become established, or** **– causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community?**	**Unlikely.** The Project has the potential to reduce the quality and integrity of SEVT within the Project Area through weed incursion and altered fire regimes. Introduced pasture grasses and shrubs, particularly lantana, buffel grass and Guinea grass, can modify fuel loads and increase fire intensity, posing a risk to this fire-sensitive community. These species also compete with native grasses and forbs, reducing ground-layer diversity and suppressing native seedling recruitment. Lantana further threatens community integrity by altering understorey composition and structure. Of the 2.2 ha, a small portion will be selectively cleared rather than fully cleared, providing the opportunity for the shrub layer and low trees to be retained during construction and operation and thereby reducing weed incursion pressure to those areas. During construction, biosecurity measures outlined in Table 5.5 of the MNES Management Plan will be implemented to limit the introduction or spread of weed species in the Disturbance Footprint. This will include washdown protocols, inspection of vehicles, landholder consultation and monitoring of the access tracks and Disturbance Footprint. Landform stabilisation will be undertaken utilising native ground cover species to assist in limiting the spread of weed incursion. During operation, vegetation within the Disturbance Footprint will be managed in accordance with Powerlink's vegetation specification. These specifications detail condition assessments to be undertaken every 2-4 years across the length of transmission line. Derived from the assessment; maintenance measures will be implemented for the safe operation of the transmission line in accordance with Powerlink's asset management strategy. This may include selective clearing of incompatible vegetation species as needed for the safe operation of the transmission line. As a joint land manager on easements and access tracks; in certain instances, Powerlink may assist with the control of biosecurity matters as outlined within Table 5.5 of the MNES Management Plan. Collectively, these actions will limit adverse impacts, and it is therefore unlikely that the Project will significantly reduce the quality or integrity of this ecological community.

Impact Criteria	Assessment
Interfere with the recovery of the ecological community?	**Likely.** The recovery objectives stated in the National Recovery Plan for SEVT (McDonald, 2010) aim to prevent further loss and improve the condition of remnant patches, reduce key threats such as fire, weeds and grazing, and enhance connectivity between patches. The Project is likely to interfere with these objectives. Vegetation clearing will contribute to further reduction of an already highly cleared and fragmented ecological community, counter to the objective of minimising loss and improving representation in the landscape. Edge effects from clearing and disturbance will increase vulnerability to invasive species such as buffel grass, Guinea grass and lantana, all of which are identified in the recovery plan as major threats to SEVT persistence and recovery. Altered fuel dynamics from exotic grasses may also undermine fire management actions by increasing the risk of high-intensity fires, which are inconsistent with recovery requirements for this fire-sensitive community. Although mitigation measures such as avoidance and weed management and reducing potential fuel loads will limit key threats to retained patches of SEVT within the Project Area, 2.2 ha of the community is required to be cleared for the Project. Accordingly, the Project is likely to interfere with the recovery of the ecological community.
Significant Residual Impact	**Likely to have a significant impact**

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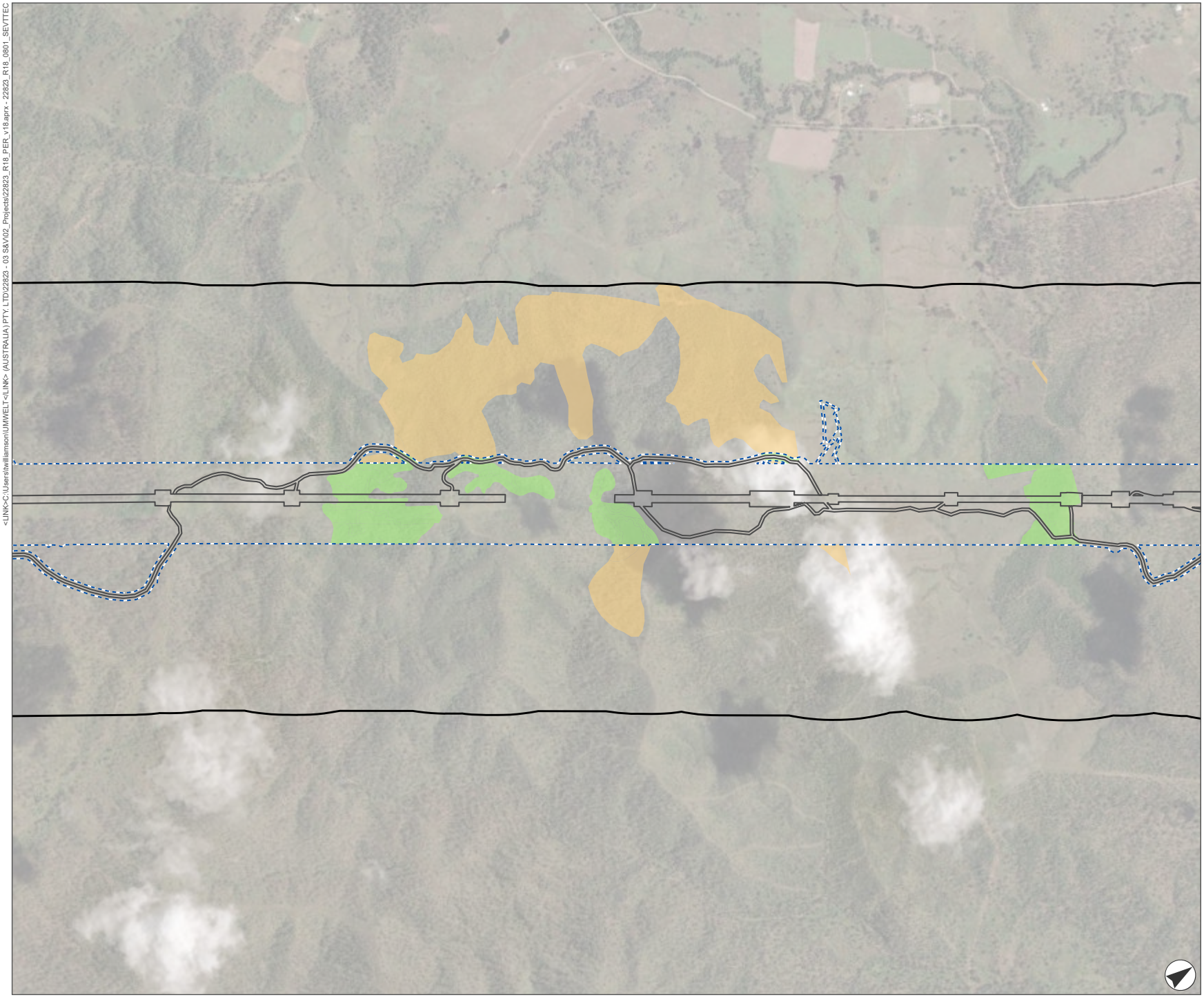


FIGURE 8.1-13

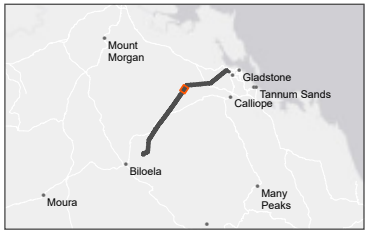
SEVT TEC within the Field Survey Extent and Disturbance Footprint

Legend

- Field Survey Extent
- Disturbance Footprint
- Project Area

Threatened Ecological Community

- SEVT
- Potential SEVT



0 0.5 1

Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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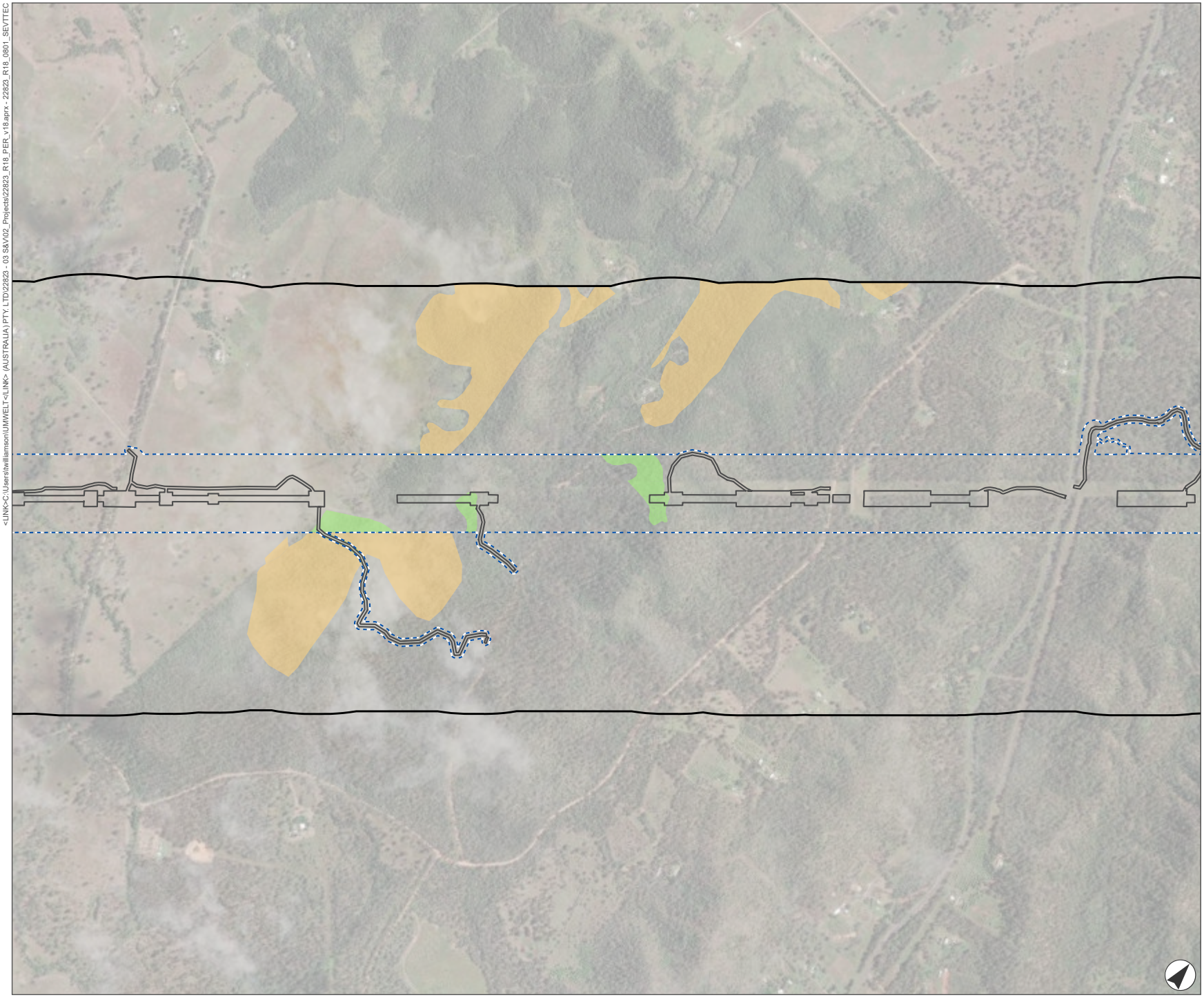


FIGURE 8.1-19

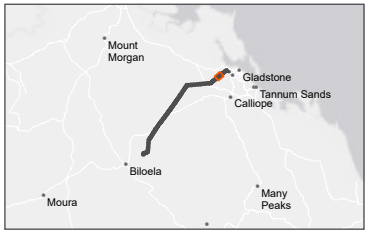
SEVT TEC within the Field Survey Extent and Disturbance Footprint

Legend

- Field Survey Extent
- Disturbance Footprint
- Project Area

Threatened Ecological Community

- SEVT
- Potential SEVT



0 0.5 1

Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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8.2.1.2 Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions (Eucalypt Floodplain Forest TEC)

Table 8.5 Eucalypt Floodplain Forest TEC: Ecology and Relevance to the Project Area

Eucalypt Floodplain Forest TEC	
Profile	**Conservation status** Endangered **Distribution** This TEC comprises floodplain forest and woodland of the New South Wales North Coast and SEQ IBRA bioregions, extending onto Curtis Island in the Brigalow Belt North IBRA bioregion. It stretches from near Raymond Terrace (north of Newcastle, New South Wales) in the south to just north of Gladstone, Queensland (Department of Climate Change, Energy, the Environment and Water, 2022a). The Distribution of this TEC overlaps with the Project Area. **TEC characteristics** The ecological community primarily occurs on alluvial landforms like floodplains, riverbanks (riparian zones of parent rivers and other tributaries), terraces, and periodically flooded depressions. While alluvial soils are the dominant type, the community can occur on in-situ soils within localized depressions as well. These in-situ soils may experience occasional saturation, waterlogging, or inundation. The ecological community generally occurs below 50 m ASL, although it can occur up to 250 m ASL (Department of Climate Change, Energy, the Environment and Water, 2022a). **Habitat critical to the survival of the TEC** Under 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, 2022a), patches meeting TEC condition thresholds Class A and Class B are classified as habitat critical for survival. Patches that meet the minimum condition TEC threshold (Class C) and are determined under Section 2.5 of the TEC's approved conservation advice to be critical for survival due to their location, function, or regionally/locally important species are also classified as habitat critical to survival. Of the nine patches of Eucalypt Floodplain Forest TEC within the Project Area, one is class B and considered habitat critical to the survival of the TEC, based on the above context. The other 8 patches are Class C2, however, are all are conservatively considered habitat critical to the survival of the TEC given their large patch size, which relates to function. **Current Threats** There are multiple threats to this TEC (Department of Climate Change, Energy, the Environment and Water, 2022a), which have been split into subheadings below. Habitat Loss and Degradation:

Eucalypt Floodplain Forest TEC

- Land clearing, primarily for agriculture, has significantly reduced the extent of the ecological community
- Selective harvesting of dominant canopy trees has altered the community structure and composition.

Hydrological Alterations:

- Dams, weirs, levees, roads, and bridges have disrupted natural water flow patterns
- Water extraction for irrigation, flood mitigation works, and drainage have further impacted water availability.

Introduced Species:

- Invasive plants, particularly transformer weeds, threaten the community by aggressively replacing native flora and altering the ecosystem structure
- Predation and habitat destruction, transmission and spread of invasive plants, grazing and trampling pressures, and adverse competitive or lethal impacts to fauna.

Other:

- Climate change interacts with existing threats, such as habitat loss and invasive species, potentially worsening their impacts
- Changes in fire frequency and intensity can disrupt regeneration of some species and reduce overall biodiversity
- Fungal pathogens like Phytophthora cinnamomic, honey fungus and myrtle rust cause dieback in susceptible trees and shrubs within the ecological community. Additionally, the amphibian population is threatened by the chytrid fungus, while bird species are at risk from Psittacine circoviral disease.

Recovery plan

A recovery plan has not been prepared for this TEC.

In the Project Area

Surveys

Field surveys have been undertaken within the Project Area from March 2023 to July 2025, which included four baseline flora surveys. TEC assessments were undertaken throughout patches of analogous REs.

TEC occurrence

A total of nine patches of RE 12.3.3 were recorded within and adjacent to the Project Area which met the key diagnostic criteria and condition thresholds for the Eucalypt Floodplain Forest TEC (**Figure 8.2).**

Habitat within the Project Area

Habitat type	Habitat modelling criteria	Area (ha)	
		Project Area	Disturbance Footprint

Eucalypt Floodplain Forest TEC				
	Eucalypt Floodplain Forest TEC	Select patches of RE 12.3.3 that met the key diagnostic characteristics and key condition thresholds (**Section 5.3.1.3**).	39.1	13.4
	Potential Eucalypt Floodplain Forest TEC	Patches of potential RE12.3.3 that were outside the Disturbance Footprint and were unable to be verified.	12.2	-
	Eucalypt Floodplain Forest TEC	Due to the construction of the Project, two patches within SEFFW07 and SEFFW09 will be below the condition threshold of 2 ha (for C2 condition) and are isolated from remaining patches by more than 30 m. Therefore, these patches are considered too small and isolated to be considered the TEC and effectively lost due to the Project. As a consequence of patch unviability, these remaining areas have been included in the calculation of impacts despite an absence of direct disturbance.		3.2

Table 8.6 Assessment of Potential Project Impacts and Mitigation and Management Commitments for Eucalypt Floodplain Forest TEC

Potential Impact	Assessment	Mitigation Commitments
Direct		
Vegetation clearing leading to reductions in the total area of the TEC	The Disturbance Footprint has largely been co-located with an existing transmission line and substation expansion and is sited adjacent to the existing Calliope River Substation. Clearing has the potential to reduce TEC patch size further specifically around the existing substation. Two patches will be isolated and reduced to less than the condition threshold and effectively lost due to the Project.	• Identify MNES flora and TEC's through pre-clearance surveys • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Disturbance activities must be contained to Disturbance Footprint • 10 m protection zone will be maintained around MNES flora and TEC's where they are directly adjacent to disturbance activities • Refer to Table 5.1 of the MNES Management Plan for further details on mitigation measures.
Indirect		
Weed and pest incursion	Within this vegetation community, weed species are common particularly exotic	• Baseline biosecurity surveys and ongoing inspections and management will be undertaken

Potential Impact	Assessment	Mitigation Commitments
	grasses. Exotic flora species are competitors for nutrients and resources needed to sustain the components of this TEC. Noted in this TEC; transformer weeds, which are highly invasive plants that can significantly disrupt the structure and function of this vegetation community. Potential transformer weeds in the area include Guinea grass and thatch grass. The presence of these exotic species can increase fire fuel loads altering the intensity and frequency of bushfires	• Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • Bushfire Management Plan will be developed • During operation, vegetation within the Disturbance Footprint will be managed in accordance with Powerlink's vegetation specification • Refer to Tables 5.5 and Table 5.9 of the MNES Management Plan for further details on mitigation measures.
Increased edge effects	The main environmental impacts of new edges created by the Project are considered to include: • The modification of microclimates where new edges are created due to a greater penetration of light and wind into the remaining vegetation. Microclimate changes should be expected in the creation of new edges as greater temperature extremes and lower air humidity are generally observed at edge communities, with this effect known to increase if vegetation is dense or cover is high.	• Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works

Potential Impact	Assessment	Mitigation Commitments
	• Changes to soil properties including greater compaction and erosion, and less organic matter. • The introduction of weeds and pathogens through mud and dirt falling off vehicles. • The physical disturbance of edge vegetation. Ongoing impacts on newly created edge vegetation may occur through the upkeep of access tracks (e.g. weed control, grading). • Changes in vegetation community composition.	• Refer to Table 5.5 of the MNES Management Plan for further details on mitigation measures.
Elevated dust	Dust emissions may result following construction activities and affect adjacent habitat. Dust can settle on adjacent vegetation, coating leaves and reducing photosynthesis, respiration, and growth.	• Dust suppression measures including vehicles restricted to approved tracks, cover all loose loads and set speed limits (<40 km/hr) • Application of dust suppressants as required • Dust generating activities will be limited on days with strong winds blowing towards sensitive receptors or dust sensitive locations • Regular monitoring and visual surveillance to trigger management actions will be undertaken • Refer to Table 5.4 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Contamination (chemical spills)	During construction, chemical spills from machinery and runoff have the potential to modify the TEC.	• Hazardous materials must be stored and handled appropriately • An Emergency Response Plan will be developed • Spill kits will be available during construction • Hazardous materials locations will be bunded • All waste disposed of in accordance with legislative requirements • No refuelling within 50 m of a watercourse • Application of herbicides in accordance with legislative requirements • Refer to Table 5.4 of the MNES Management Plan for further details on mitigation measures.

Table 8.7 Significant Impact Assessment: Eucalypt Floodplain Forest TEC

Impact Criteria	Assessment
Reduce the extent of the ecological community?	**Likely.** Up to 16.6 ha of Eucalypt Floodplain Forest TEC will be cleared due the development of the Project, of the total 51.3 ha potentially and known to occur within the Project Area. While the nature of the clearing doesn't result in total loss of a patch, patch size will be reduced, and isolation in some areas will result. However, as a large portion of this TEC is located next to the Calliope River substation and 16.6 ha of clearing is required, the TEC extent will be reduced as a result of this Project.
Fragment or increase fragmentation of the ecological community, for example by clearing vegetation for roads or transmission lines?	**Potential.** Several confirmed patches of Eucalypt Floodplain Forest TEC are intersected by the Disturbance Footprint. These patches are already fragmented due to the existing transmission line infrastructure, substation, surrounding linear infrastructure and the coal conveyer belt situated adjacent to the Disturbance Footprint. Co-location of the proposed transmission line corridor with the existing transmission line is likely to limit additional fragmentation within the easement; however, the positioning of the proposed works near the substation is likely to fragment the larger TEC patch within the Disturbance Footprint. Consequentially this Project has the potential to fragment this TEC further.
Adversely affect habitat critical to the survival of the ecological community?	**Likely**. All patches of Eucalypt Floodplain Forest TEC within the Disturbance footprint are classed as habitat critical to the survival of the community. Up to 16.6 ha of Eucalypt Floodplain Forest TEC will be affected due the development of the Project. Therefore, the Project is likely to adversely affect habitat critical to the survival of the TEC.

Impact Criteria	Assessment
Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for the ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns?	**Unlikely**. Construction has the potential to result in dust emissions, erosion and sedimentation, machinery/chemical spills and water pollution via uncontained run off. The construction activities near the substation will include roads/impervious surfaces which can contribute to sediment runoff into nearby vegetation. However, runoff from impervious surfaces should be minimal due to the flat topography around Section E. Regardless of the topography, erosion and sediment control measures will be implemented to mitigate potential impacts associated with erosion and sedimentation and pollutants from chemical spills and are detailed in Table 5.4 of the MNES Management Plan. Ongoing management will also include gravel surfaces within the substation to prevent runoff. Project design and construction will not alter groundwater levels with water requirements largely derived from surface water (dams) and appropriate spill prevention and response plans will be developed to cover Project activities, as well as the types and quantities of fuel, oil and chemicals held. Therefore, it is unlikely the Project will modify or destroy abiotic factors.

Impact Criteria	Assessment
Cause a substantial change in the species composition of an occurrence of the ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting?	**Unlikely.** Construction processes can spread weed species which compete against native species and can increase fire fuel loads. A significant threat to the Eucalypt Floodplain Forest TEC is transformer weeds which are highly invasive plants that can significantly disrupt the structure and function of this vegetation community. Potential transformer weeds in the area include *Megathyrsus maximus var. maximus* and *Hyparrhenia rufa*. For construction, biosecurity measures as outlined within Table 5.5 of the MNES Management Plan will be implemented to limit the introduction or spread of weed species in the Disturbance Footprint. This will include washdown protocols, inspection of vehicles, landholder consultation and monitoring of the access tracks and Disturbance Footprint. Landform stabilisation will be undertaken utilising native ground cover species to assist in limiting the spread of weed incursion. During operation, vegetation within the Disturbance Footprint will be managed in accordance with Powerlink's vegetation specification. This includes periodic monitoring of span vegetation risk, span bushfire risk and vegetation height. This information is used to determine vegetation maintenance activities which reduce fire fuel loads along the easement. The project will not actively engage in specific fire management, but the management of fuel loads will benefit Eucalypt Floodplain Forest TEC in the event of uncontrolled bushfires which may sweep through areas containing this vegetation community at the junction of Section D-E. There is no requirement for any flora or fauna harvesting, nor is there likely to be a loss of functionally important species from this vegetation community. Therefore, it is expected that no significant change in species composition in remaining Eucalypt Floodplain Forest TEC patches would be anticipated because of the development of this Project.

Impact Criteria	Assessment
Cause a substantial reduction in the quality or integrity of an occurrence of the ecological community, including, but not limited to: **– assisting invasive species, that are harmful to the listed ecological community, to become established, or** **– causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community?**	**Unlikely.** The Project has the ability to reduce the quality or integrity of this vegetation community through potential weed incursion and altered fire regimes. Introduced species often outcompete native grass and forb species reducing ground layer biodiversity and potentially suppressing the germination of any native seedlings. During construction, biosecurity measures outlined Table 5.5 of the MNES Management Plan will be implemented to limit the introduction or spread of weed species in the Disturbance Footprint. This will include washdown protocols, inspection of vehicles, landholder consultation and monitoring of the access tracks and Disturbance Footprint. Landform stabilisation will be undertaken utilising native ground cover species to assist in limiting the spread of weed incursion. During operation, vegetation within the Disturbance Footprint will be managed in accordance with Powerlink's vegetation specification. As a joint land manager on easements and access tracks; in certain instances, Powerlink may assist with the control of biosecurity matters as outlined in Table 5.5 of the MNES Management Plan. Consequentially it is unlikely that the Project will significantly reduce the integrity or quality of this ecological community.
Interfere with the recovery of the ecological community?	**Potential.** 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, 2022a) states that a national recovery plan for the Eucalypt Floodplain Forest TEC is not required, because the priority actions listed in the Conservation Advice are sufficient to provide protection and guidance on vegetation community recovery. The priority actions include: • Protect the TEC to prevent further loss. • Restore the TEC by active abatement of threats, appropriate management, restoration and other conservation initiatives. • Communicate, engage with and support people to increase understanding of the value and function of the TEC and encourage their efforts in its protection and recovery. • Research and monitoring to improve understanding of the TEC and best methods to aids its management and recovery. The Project proposes to clear up to 16.6 ha of TEC, and therefore is not in line with the priority actions and may interfere with the recovery of the TEC.
Significant Residual Impact	**Likely to have a significant impact.**



FIGURE 8.2-21

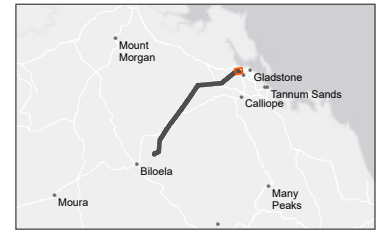
Eucalypt Floodplain Forest TEC within the Field Survey Extent and Disturbance Footprint

Legend

- TEC Assessment Location
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Disturbance Footprint
- Project Area

Threatened Ecological Community

- Eucalypt floodplain
- Potential Eucalypt floodplain



0 0.5 1

Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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8.2.2 Vulnerable Threatened Ecological Communities

8.2.2.1 Subtropical and Temperate Coastal Saltmarsh (Coastal Saltmarsh TEC)

This TEC is classified as Vulnerable under the EPBC Act. Under the Act, approval is required for actions that have, or are likely to have, a significant impact on ecological communities listed as Critically Endangered or Endangered. Communities listed as Vulnerable are not considered Matters of National Environmental Significance for the purposes of Part 3 of the EPBC Act, which governs environmental approval requirements. Consequently, the Subtropical and Temperate Coastal Saltmarsh TEC does not trigger a SIA.

8.2.3 Endangered Flora Species

8.2.3.1 Atalaya collina (Yarwun Whitewood)

Table 8.8 *Atalaya collina*: Ecology and Relevance to the Project Area

Atalaya collina	
Profile	**Conservation status** Endangered **Distribution** *Atalaya collina* is a Queensland endemic species that is only known from two extant locations. One population is west of Gladstone, near Mt Sugarloaf, and the other is near Nagoorin, west of Miriam Vale. **Population** The Yarwun population (west of Gladstone) consists of 10 trees of an even age structure, with all plants 3-4 m tall. (Department of the Environment, Water, Heritage and the Arts, 2008a). No known populations are within the Project Area as the species was not observed during field surveys. **Historical records within the desktop search extent** The species has been historically observed (1992) west of Mount Stowe State Forest, approximately 1.5 km north of the Project Area. **Habitat** This species occurs in semi-evergreen vine thicket or dry rainforest on moderately drained, clay loams. The Yarwun population occurs alongside *Atalaya rigida* and *Atalaya salicifolia*. Both populations occur in partially cleared, highly disturbed areas (Department of Climate Change, Energy, the Environment and Water, 2025k). **Habitat critical to the survival of the species**

Atalaya collina

Habitat critical to the survival of *A.collina* is not defined in the Conservation Advice for the species (Department of the Environment, Water, Heritage and the Arts, 2008a).

Based on the findings of the field surveys, the species habitat requirements, known threats and given the species has not been recorded within the Project Area, habitat within the Project Area is not considered critical to the survival of the species.

Current threats to the species

The main identified and potential threats to *Atalaya collina*, as identified in the Conservation Advice for the species (Department of the Environment, Water, Heritage and the Arts, 2008a), are:

- low population size
- increase exposure of habitat due to clearing of the surrounding area
- grazing that prevents seedling establishment
- fire
- invasive weeds
- insect predation of seedlings
- trampling, browsing or grazing.

Recovery plan

- A recovery plan has not been adopted for this species.

In the Project Area

Surveys

Field surveys have been undertaken within the Project Area from March 2023 to July 2025, which included four separate flora surveys. A total of 513 flora survey sites in line with relevant guidance material have been undertaken across the Project Area including quaternaries (394), secondaries (11), tertiaries (42), BioCondition assessments (55), TEC assessments (11) and opportunistic threatened species meanders.

Species occurrence

The species was not recorded during field surveys. Given the presence of isolated pockets of suitable habitat and existing records in Mount Stowe State Forest, approximately 1.5 km west of the Project Area, this species has been conservatively assessed as having a high likelihood of occurring with the Project Area.

Suitable habitat within the Project Area

Habitat type	Habitat modelling criteria	Area (ha)	
		Project Area	Disturbance Footprint
Suitable habitat	Remnant and regrowth RE 11.11.18 in Section D only.	81.9	1.6

Atalaya collina	
	Sections A–C are outside the species distribution; given only two populations are known; at Yarwun (near Section D) and Miriam vale (80 km south of Project Area). Areas already surveyed have been excluded and includes a 5 m buffer associated with either side of field survey tracklogs for all vegetation communities.

Table 8.9 Assessment of Potential Project Impacts and Mitigation and Management Commitments for *Atalaya collina*

Potential Impact	Assessment	Mitigation Commitments
Direct		
Vegetation clearing causing habitat loss and fragmentation	Vegetation clearing required for construction will result in direct impacts to 1.6 ha of suitable habitat within the Disturbance Footprint. While it is considered suitable habitat, no individuals have been recorded within the Disturbance Footprint or Project Area.	• Identify MNES flora and TEC's through pre-clearance surveys • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Disturbance activities must be contained to Disturbance Footprint • 10 m protection zones will be maintained around MNES flora and TEC's where they are directly adjacent to disturbance activities • Refer to Table 5.1 of the MNES Management Plan for further details on mitigation measures.
Mortality	There are currently no known individuals within the Disturbance Footprint or the Project Area. No individuals are proposed to be removed, however, there is a risk that the Project will result in mortality to individuals that haven't been recorded in field surveys to date.	• Pre-clearance surveys will be undertaken within suitable habitat within the Disturbance Footprint and for protected plants under the *Nature Conservation Act 1992* • Obtain relevant permits • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Clearance protection zones in proximity to retained individuals to be maintained • Clearing will be in accordance with all approval conditions • Where new populations of MNES threatened flora are identified, the Unexpected Finds Protocol must be followed. • Refer to Table 5.2 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Indirect		
Reduced habitat quality due to edge effects	The main environmental impacts of new edges created by the Project are considered to include: • The modification of microclimates where new edges are created due to a greater penetration of light and wind into the remaining vegetation. Microclimate changes should be expected in the creation of new edges as greater temperature extremes and lower air humidity are generally observed at edge communities, with this effect known to increase if vegetation is dense or cover is high. • Changes to soil properties including greater compaction and erosion, and less organic matter. • The introduction of weeds and pathogens through mud and dirt falling off vehicles. • The physical disturbance of edge vegetation. Ongoing impacts on newly created edge vegetation may occur through the upkeep of access tracks (e.g., weed control, grading). • Changes in vegetation community composition.	• Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • Refer to Table 5.5 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Reduced habitat quality or individual health due to erosion and sedimentation	Erosion and sedimentation can smother vegetation and alter soil structure, reducing the availability of nutrients and suitable substrates for plant growth. Sediment deposition in nearby habitats can degrade water quality and disrupt microhabitats, leading to reduced habitat quality.	• Soil sampling and testing to inform both erosion and sediment control (ESC) and rehabilitation • Develop Erosion and Sediment Control Plan (ESCP) in accordance with the IECA Best Practice Erosion and Sediment Control Guidelines 2008 • Extent and duration of soil exposure will be minimised • Disturbed areas will be promptly stabilised • Site is monitored and controls adjusted to maintain required performance standard • Minimum personnel requirements will apply for ESCP development and verification • Refer to Table 5.4 of the MNES Management Plan for further details on mitigation measures.
Exotic flora species colonisation and encroachment	Across all vegetation communities within the Project Area, weed species are common particularly exotic grasses. Exotic flora species are competitors for nutrients and resources needed to sustain this species. Exotic grasses are often promoted by landholders as a source of fodder/stock feed further exacerbating exotic flora encroachment.	• Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • Refer to Table 5.5 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Reduced habitat quality due to dust emissions	Dust emissions may result following construction activities and affect adjacent habitat. Dust can settle on adjacent vegetation, coating leaves and reducing photosynthesis, respiration, and growth.	• Dust suppression measures including vehicles restricted to approved tracks, cover all loose loads and set speed limits (<40 km/hr) • Application of dust suppressants as required • Dust generating activities will be limited on days with strong winds blowing towards sensitive receptors or dust sensitive locations • Regular monitoring and visual surveillance to trigger management actions will be undertaken • Refer to Table 5.4 of the MNES Management Plan for further details on mitigation measures.
Alterations to fire regimes including uncontrolled fires	Changes to fire frequency within the Project Area may impact on habitat and lead to degradation. Construction activities are unlikely to significantly alter existing grazing pressure or the implementation of land management practices currently employed by the landholder. Although the increased plant and vehicle presence will result in an increased number of potential ignition sources, employment of standard construction protocols will ensure the risk of bushfire is actively managed.	• Bushfire Management Plan will be developed • Burning of vegetation strictly prohibited unless a permit is obtained • Designated parking areas for vehicles and machinery • During operation, vegetation within the Disturbance Footprint will be managed in accordance with Powerlink's vegetation specification • Refer to Table 5.9 of the MNES Management Plan for further details on mitigation measures.

Table 8.10 Significant Impact Assessment: *Atalaya collina*

Impact Criteria	Assessment
Lead to a long-term decrease in the size of a population	**Unlikely.** There are currently no known populations within the Disturbance Footprint or the Project Area. Therefore, no known population will be impacted by the Project. During construction, the pre-clearance survey unexpected finds protocol will be followed to ensure any potential impacts to the species (if observed) are avoided or managed appropriately. As a population is currently not known to occur within the Disturbance Footprint or Project Area and avoidance and management measures will be implemented if it is recorded, the Project is unlikely to lead to a long-term decrease in the size of a population.
Reduce the area of occupancy of the species	**Unlikely.** There are currently no known populations within the Disturbance Footprint or the Project Area. Therefore, based on current knowledge, the Project will not reduce the area of occupancy of the species. During construction, the pre-clearance survey unexpected finds protocol will be followed to ensure any potential impacts to the species (if observed) are avoided or managed appropriately. As no individuals are proposed to be removed by the Project, the Project is unlikely to reduce the area of occupancy of the species.
Fragment an existing population into two or more populations	**Unlikely.** There are currently no known populations within the Disturbance Footprint or the Project Area. Therefore, the Project is unlikely to fragment an existing population into two or more populations. The closest known records of the species are recorded from the Mount Stowe State Forest, approximately 1.5 km west of the Project Area. During construction, the pre-clearance survey unexpected finds protocol will be followed to ensure any potential impacts to the species (if observed) are avoided or managed appropriately. The Disturbance Footprint is co-located adjacent to existing transmission infrastructure and is typically narrow and linear, therefore reducing the likelihood for further fragmentation. The Project is therefore unlikely to fragment an existing population into two or more populations.

Impact Criteria	Assessment
Adversely affect habitat critical to the survival of a species	**Unlikely.** Using the definition from the Significant Impact Guidelines 1.1–Matter of National Environmental Significance (Department of the Environment, 2013a), habitat within the Disturbance Footprint and Project Area is currently not considered habitat critical to the survival of the species as no individuals have been recorded. If the species is recorded during pre-clearance surveys, the habitat may be considered critical to the survival of the species and the pre-clearance survey unexpected finds protocol will be followed. This will ensure any potential impacts are avoided or managed appropriately. The Project propose to remove up to 1.6 ha of suitable *Atalaya collina* habitat within the Disturbance Footprint Indirect impacts on identified suitable habitat will be managed via the implementation of the MNES Management Plan. Micro-siting will be undertaken, and the pre-clearance survey unexpected finds protocol will be followed. This will ensure any potential impacts are avoided or managed appropriately. It is considered unlikely that the Project will adversely affect habitat critical to the survival of the species.
Disrupt the breeding cycle of a population	**Unlikely.** There are currently no known populations within the Disturbance Footprint or the Project Area, and the closest known records of the species are recorded from the Mount Stowe State Forest, approximately 1.5 km north of the Project Area. There is limited information on the life cycle of the species, with ongoing research in germination and propagation a priority within the species' current conservation advice. The Project may disrupt the breeding cycle of the species through altered fire regimes, removal of potential habitat and exacerbating weed incursion. These risks will be managed through the implementation of the MNES Management Plan. Given a population of the species is not known from the Disturbance Footprint or Project Area, and the Project will manage potential indirect impacts to the species, it is unlikely that the Project will disrupt the breeding cycle of a population.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely.** A total of 1.6 ha of suitable habitat within the Disturbance Footprint is proposed to be impacted by the Project. Retained suitable habitat will not be subject to further degradation from the Project. Retained suitable habitat within the Project Area will not be subject to further degradation from dust and weed incursion during construction due to active monitoring and management outlined in Table 5.4 and 5.5 of the MNES Management Plan. Therefore, the removal of 1.6 ha of suitable habitat for this species is unlikely to cause the species to decline.

Impact Criteria	Assessment
Result in invasive species that are harmful to an Endangered species becoming established in the Endangered species' habitat	**Unlikely.** Weeds are a recognised threat to *Atalaya collina*. Weeds were recorded throughout the Disturbance Footprint, in varying degrees of severity. There is an inherent risk of weed dispersal with any infrastructure project. The Project will follow best practice construction and operational method, including biosecurity mitigations outlined within Table 5.5 of the MNES Management Plan limiting the spread of weeds throughout the Disturbance Footprint associated with construction. Therefore, it is unlikely that the Project will result in an invasive species becoming established.
Introduce disease that may cause the species to decline	**Unlikely.** Disease is not an identified threat to *Atalaya collina*. The Project will follow best practice construction and operational methods to prevent the spread of disease throughout the Disturbance Footprint. Therefore, it is unlikely that the Project will result in the introduction of a disease that may cause the species to decline.
Interfere with the recovery of the species	**Unlikely.** No individuals have currently been recorded within the Disturbance Footprint or Project Area, and pre-clearance surveys will be undertaken across all 1.6 ha of suitable habitat for *Atalaya collina*. Indirect impacts will be managed through implementation of the Project EMPs. As such, impacts from the Project are unlikely to interfere with the recovery of the species.
Significant Residual Impact	**Unlikely to have a significant impact.**



FIGURE 8.3-1

Atalaya collina Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

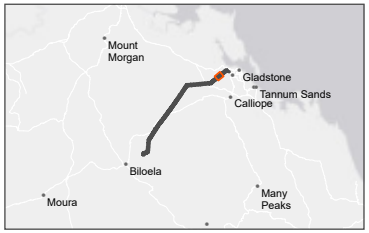
- Field Survey Extent
- Project Area
- *Atalaya collina* Records (ALA)

***Atalaya collina* Habitat**

- Suitable Habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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8.2.3.2 *Cossinia australiana*

Table 8.11 *Cossinia australiana*: Ecology and Relevance to the Project Area

Cossinia australiana	
Profile	**Conservation status** Endangered **Distribution** The species' distribution is from Rockhampton to Kingaroy, east of the Great Dividing Range, a distance of approximately 300 km. **Population** The number of distinct populations of *C. australiana* is unknown. At most sites the species is recorded as uncommon, usually as scattered individuals (Department of the Environment Water Heritage and the Arts, 2008a). At three freehold sites and one road reserve, fewer than 10 individuals were recorded, with the largest known population comprising 150 individuals in Cania Gorge National Park (Department of the Environment Water Heritage and the Arts, 2008a). **Historical records within the desktop search extent** A record for the species from 2005 is centred along the western boundary of Project Area (approximately 750 m west). Information provided with the record specifies that the specimen was located within a "Semi evergreen vine thicket in drainage lines and gullies in ranges. Mostly fine-grained sediments with occasional basalt on slopes". **Habitat** *Cossinia australiana* occurs from 20 to 520 m altitude and is found in Araucarian vine forest or vine thicket on fertile soils in central and southern Queensland, including red volcanic soil and black loam (Department of Environment and Science, 2022). Within these habitats it is generally uncommon, found as scattered individuals. The species appears to prefer ecotonal situations around dry rainforest edges. Trees and shrubs which *Cossinia australiana* is often associated include *Alyxia ruscifolia*, *Capparis arborea*, *Drypetes deplanchei*, *Flindersia australis*, *Owenia venosa* and *Siphonodon australis* (Department of Environment and Science, 2022). **Habitat critical to the survival of the species** Habitat critical to the survival of *C. australiana* is not defined in the Conservation Advice (Department of the Environment Water Heritage and the Arts, 2008a). Refer to **Section 8.1.1** for the generic definition that has been applied for this assessment. Habitat critical to the survival of the species includes all habitat where the species has been identified in the ecotone between remnant RE 11.10.4 (*Eucalyptus decorticans* woodland) and 11.10.18 (semi-evergreen vine thicket) on sandstones soils. Habitat critical for this species includes a 20m buffer around vine thicket vegetation to encompass ecotonal transition. Critical habitat does not occur within the Disturbance Footprint.

Cossinia australiana

Current threats to the species

The main identified and potential threats to *Cossinia australiana*, as identified in the Conservation Advice for the species (Department of the Environment Water Heritage and the Arts, 2008a), are:

- Exotic weeds, including *Lantana camara**, *Aristolochia elegans**, *Anredera cordifolia**, *Dolichandra unguis-cati** and *Asparagus plumosus**
- Invasion of vine forest margins by weeds also increases fuel loads and leads to fire incursions
- Habitat loss due to clearing
- Increased disease and susceptibility to insects due to the very small, isolated populations and fragmented habitat
- Road widening and maintenance activities.

Recovery Plan

- A recovery plan has not been adopted for this species.

In the Project Area

Surveys

Field surveys have been undertaken within the Project Area from March 2023 to July 2025, which included four separate flora surveys. A total of 513 flora survey sites in line with relevant guidance material have been undertaken across the Project Area including quaternaries (394), secondaries (11), tertiaries (42), BioCondition assessments (55), TEC assessments (11) and opportunistic threatened species meanders.

Species occurrence

Cossinia australiana was recorded during field surveys within the Project Area (Section B), south of the Callide Timber Reserve. A total of 11 individuals were recorded within an ecotone between remnant RE 11.10.4 (*Eucalyptus decorticans* woodland) and 11.10.18 (semi-evergreen vine thicket) on sandstones soils at two locations approximately 100 m apart. The closest individuals occur approximately 300 m to the west of the Disturbance Footprint. Individuals occurred at heights between 1.6 and 8.0 m tall.

Habitat within the Project Area

Habitat type	Habitat modelling rules	Area (ha):	
		Project Area	**Disturbance Footprint**
Suitable habitat	Vine thicket communities i.e. RE 11.10.8 and 11.11.18 between 20 and 600 m ASL with a 20 m buffer applied to encompass ecotone transition. Both remnant and regrowth condition communities are included. Regrowth communities included as the species is known to occur within ecotones. No Araucarian vine forest communities were recorded in Project Area. The ecotone width in a vine thicket	277.6	2.4

Cossinia australiana

community is not a fixed value, but a dynamic characteristic determined by the interactions of environmental factors and the resilience of the plant communities. As such, a 20 m buffer has been utilised to encompass ecotonal range based on field survey observations as part of this project.

Areas already surveyed have been excluded and includes a 5 m buffer associated with either side of field survey tracklogs for all vegetation communities.

Table 8.12 Assessment of Potential Project Impacts and Mitigation and Management Commitments for *Cossinia australiana*

Potential Impact	Assessment	Mitigation Commitments
Direct		
Vegetation clearing causing habitat loss and fragmentation	Vegetation clearing required for construction will result in direct impacts to 2.4 ha of suitable habitat within the Disturbance Footprint. While it is considered suitable habitat, no individuals have been recorded within the Disturbance Footprint or Project Area.	• Identify MNES flora and TEC's through pre-clearance surveys • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Disturbance activities must be contained to Disturbance Footprint subject to minor micro-siting within the Field Survey Extent • 10 m protection zones will be maintained around MNES flora and TEC's where they are directly adjacent to disturbance activities • Refer to Table 5.1, MNES Management Plan for further details on mitigation measures.
Mortality	There are currently no known individuals within the Disturbance Footprint, however, individuals have been recorded within the Project Area. No individuals are proposed to be removed, however, there is a risk that the Project will result in mortality to individuals that haven't been recorded in field surveys to date.	• Pre-clearance surveys will be undertaken within suitable habitat within the Disturbance Footprint and for protected plants under the *Nature Conservation Act 1992* • Obtain relevant permits • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Clearance protection zones in proximity to retained individuals to be maintained • Clearing will be in accordance with all approval conditions • Where new populations of MNES threatened flora are identified, refer to Unexpected Finds Protocol • Refer to Table 5.2 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Indirect		
Reduced habitat quality or individual health due to edge effects	The main environmental impacts of new edges created by the Project are considered to include: • The modification of microclimates where new edges are created due to a greater penetration of light and wind into the remaining vegetation. Microclimate changes should be expected in the creation of new edges as greater temperature extremes and lower air humidity are generally observed at edge communities, with this effect known to increase if vegetation is dense or cover is high. • Changes to soil properties including greater compaction and erosion, and less organic matter. • The introduction of weeds and pathogens through mud and dirt falling off vehicles. • The physical disturbance of edge vegetation. Ongoing impacts on newly created edge vegetation may occur through the upkeep of access tracks (e.g., weed control, grading). • Changes in vegetation community composition.	• Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • Refer to Table 5.5 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Reduced habitat quality or individual health due to erosion and sedimentation	Erosion and sedimentation can smother vegetation and alter soil structure, reducing the availability of nutrients and suitable substrates for plant growth. Sediment deposition in nearby habitats can degrade water quality and disrupt microhabitats, leading to reduced habitat quality.	• Soil sampling and testing to inform both erosion and sediment control (ESC) and rehabilitation • Develop Erosion and Sediment Control Plan (ESCP) in accordance with the IECA Best Practice Erosion and Sediment Control Guidelines 2008 • Extent and duration of soil exposure will be minimised • Disturbed areas will be promptly stabilised. • Site is monitored and controls adjusted to maintain required performance • Minimum personnel requirements will apply for ESCP development and verification • Refer to Table 5.4 of the MNES Management Plan for further details on mitigation measures.
Exotic flora species colonisation and encroachment	Across all vegetation communities within the Project Area, weed species are common particularly exotic grasses. Exotic flora species are competitors for nutrients and resources needed to sustain this species. Exotic grasses are often promoted by landholders as a source of fodder/stock feed further exacerbating exotic flora encroachment.	• Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • Refer to Table 5.5 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Reduced habitat quality or individual health due to dust emissions	Dust emissions may result following construction activities and affect adjacent habitat. Dust can settle on adjacent vegetation, coating leaves and reducing photosynthesis, respiration, and growth. It was noted during field surveys the dust carried approximately 10-15m into adjacent vegetation from the existing access track near where this species recorded.	• Dust suppression measures including vehicles restricted to approved tracks, cover all loose loads and set speed limits (<40 km/hr) • Application of dust suppressants as required • Dust generating activities will be limited on days with strong winds blowing towards sensitive receptors or dust sensitive locations • Regular monitoring and visual surveillance to trigger management actions will be undertaken • Refer to Table 5.4 of the MNES Management Plan for further details on mitigation measures.
Alterations to fire regimes including uncontrolled fires	Changes to fire frequency within the Project Area may impact on habitat and lead to degradation. Construction activities are unlikely to significantly alter existing grazing pressure or the implementation of land management practices currently employed by the landholder. Although the increased plant and vehicle presence will result in an increased number of potential ignition sources, employment of standard construction protocols will ensure the risk of bushfire is actively managed.	• Bushfire Management Plan will be developed • Burning of vegetation strictly prohibited unless a permit is obtained • Designated parking areas for vehicles and machinery • During operation, vegetation within the Disturbance Footprint will be managed in accordance with Powerlink's vegetation specification • Refer to Table 5.9 of the MNES Management Plan for further details on mitigation measures.

Table 8.13 Significant Impact Assessment: *Cossinia australiana*

Impact Criteria	Assessment
Lead to a long-term decrease in the size of a population	**Unlikely.** While a population was recorded during field surveys, individuals are approximately 300 m from the Disturbance Footprint. There are currently no known populations within the Disturbance Footprint. No individuals are proposed to be directly cleared for the Project and indirect impacts will be mitigated through the implementation of the MNES Management Plan. Pre-clearance surveys within suitable mapped habitat will be undertaken prior to construction to determine the presence of the species in the Disturbance Footprint. If individuals are identified, the pre-clearance survey unexpected finds protocol will then be followed to ensure any potential impacts on the species are avoided or managed appropriately. As a population is currently not known to occur within the Disturbance Footprint and avoidance measures will be implemented for individuals that occur approximately 300 m from the Disturbance Footprint, the Project is unlikely to lead to a long-term decrease in the size of a population.
Reduce the area of occupancy of the species	**Unlikely.** While a population was recorded during field surveys, individuals are approximately 300 m from the Disturbance Footprint. There are currently no known populations within the Disturbance Footprint. No individuals are proposed to be directly cleared for the Project. Therefore, based on current knowledge, the Project will not reduce the area of occupancy of the species. Pre-clearance surveys will be undertaken prior to construction to determine the presence of the species in the Disturbance Footprint. If individuals are identified, the pre-clearance survey unexpected finds protocol will then be followed to ensure any potential impacts on the species are avoided or managed appropriately. As no individuals are proposed to be removed by the Project, the Project is unlikely to reduce the area of occupancy of the species.
Fragment an existing population into two or more populations	**Unlikely.** While a population was recorded during field surveys, individuals approximately 300 m from the Disturbance Footprint. There are currently no known populations within the Disturbance Footprint. Therefore, the Project is unlikely to fragment an existing population into two or more populations. In the event that this species is identified within the Disturbance Footprint as part of pre-clearance surveys, the number of individuals and extent will be recorded and infrastructure micro-sited to minimise the potential for fragmentation of the population. The pre-clearance survey unexpected finds protocol will then be followed to ensure any potential impacts on the species are avoided or managed appropriately.

Impact Criteria	Assessment
	If this species is identified within the Disturbance Footprint, the extent, location and configuration of vegetation clearing is unlikely to reduce the population's ability to continue to exchange genetic material between individuals and reproduce at the local site scale as this species' seed is likely bird dispersed. The Disturbance Footprint is typically narrow and is co-located adjacent to existing transmission infrastructure, therefore reducing the likelihood for further fragmentation. The Project therefore unlikely to fragment an existing population into two or more populations.
Adversely affect habitat critical to the survival of a species	**Unlikely.** Using the definition from the *Significant Impact Guidelines 1.1–Matters of National Environmental Significance* (Department of the Environment, 2013a), habitat where individuals were recorded constitutes habitat critical to the survival of the species. This occurs within the Project Area, but not within the Disturbance Footprint. Indirect impacts to this habitat will be mitigated through implementation of management plans. If the species is recorded within the Disturbance Footprint during pre-clearance surveys, the habitat may be considered critical to the survival of the species. Micro-siting will be undertaken, and the pre-clearance survey unexpected finds protocol will be followed. This will ensure any potential impacts are avoided or managed appropriately. The Project proposed to remove up to 2.4 ha of suitable *Cossinia australiana* habitat within the Disturbance Footprint. The area of impact may be reduced as an outcome of ongoing detailed design process. Indirect impacts on identified habitat will be managed via the implementation of the MNES Management Plan. Micro-siting will be undertaken, and the pre-clearance survey unexpected finds protocol will be followed. This will ensure any potential impacts are avoided or managed appropriately. It is considered unlikely that the Project will adversely affect habitat critical to the survival of the species.
Disrupt the breeding cycle of a population	**Unlikely.** While a population was recorded during field surveys, individuals are approximately 100 m from the Disturbance Footprint. There are currently no known populations within the Disturbance Footprint. There is limited information on the life cycle of the species; however, flower structure suggests insect or animal pollination. The Project may disrupt the breeding cycle of the species through altered fire regimes, removal of suitable habitat and exacerbating weed incursion. These risks will be managed through the implementation of the MNES Management Plan. Therefore, given a population of the species is not known from the Disturbance Footprint, and the Project will manage potential threats to the species, it is unlikely the Project will disrupt the breeding cycle of a population.

Impact Criteria	Assessment
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely.** A maximum of 2.4 ha of suitable habitat is proposed to be impacted by the Project. Retained suitable habitat within the Project Area will not be subject to further degradation from dust and weed incursion during construction due to active monitoring and management as outlined within Table 5.4 and 5.5 of the MNES Management Plan. Therefore, the removal of 2.4 ha of suitable habitat for this species is unlikely to cause the species to decline.
Result in invasive species that are harmful to an Endangered species becoming established in the Endangered species' habitat	**Unlikely.** Weeds are a threat to *Cossinia australiana*. Weeds were recorded throughout the Project Area, in varying degrees of severity. There is an inherent risk of weed dispersal with the construction of any infrastructure project. The Project will follow best practice construction and operational methods, to limit the spread of weeds associated with Project construction. Therefore, it is unlikely that the Project will result in an invasive species becoming established.
Introduce disease that may cause the species to decline	**Unlikely.** Susceptibility to diseases, due to the small, isolated populations, is a potential threat to *Cossinia australiana*. The Project will follow best practice construction and operational methods to prevent the spread of disease throughout the Disturbance Footprint. Therefore, it is unlikely that the Project will result in the introduction of a disease that may cause the species to decline.
Interfere with the recovery of the species	**Unlikely.** There is no adopted recovery plan for this species. While a population was recorded during field surveys, individuals are approximately 300 m from the Disturbance Footprint. There are currently no known populations within the Disturbance Footprint. Pre-clearance surveys will be undertaken across all areas of suitable habitat within the Disturbance Footprint. The Project proposes to remove a maximum of 2.4 ha of suitable habitat within the Disturbance Footprint. Indirect impacts such as weed incursion and dust will be managed through the MNES Management Plan. As such, direct and indirect impacts are considered unlikely to interfere with the recovery of the species.
Significant Residual Impact	**Unlikely to have a significant impact.**

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FIGURE 8.4-2

Cossinia australiana Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

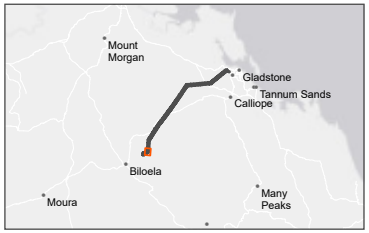
- Watercourse
- Field Survey Extent
- Project Area
- *Cossinia australiana* Records (ALA)
- *Cossinia australiana* Records (Umwelt)

***Cossinia australiana* Habitat**

- Suitable Habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
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FIGURE 8.4-3

Cossinia australiana Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

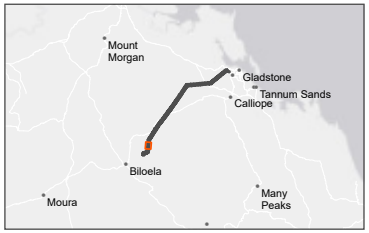
- Field Survey Extent
- Project Area
- *Cossinia australiana* Records (ALA)
- *Cossinia australiana* Records (Umwelt)

***Cossinia australiana* Habitat**

- Suitable Habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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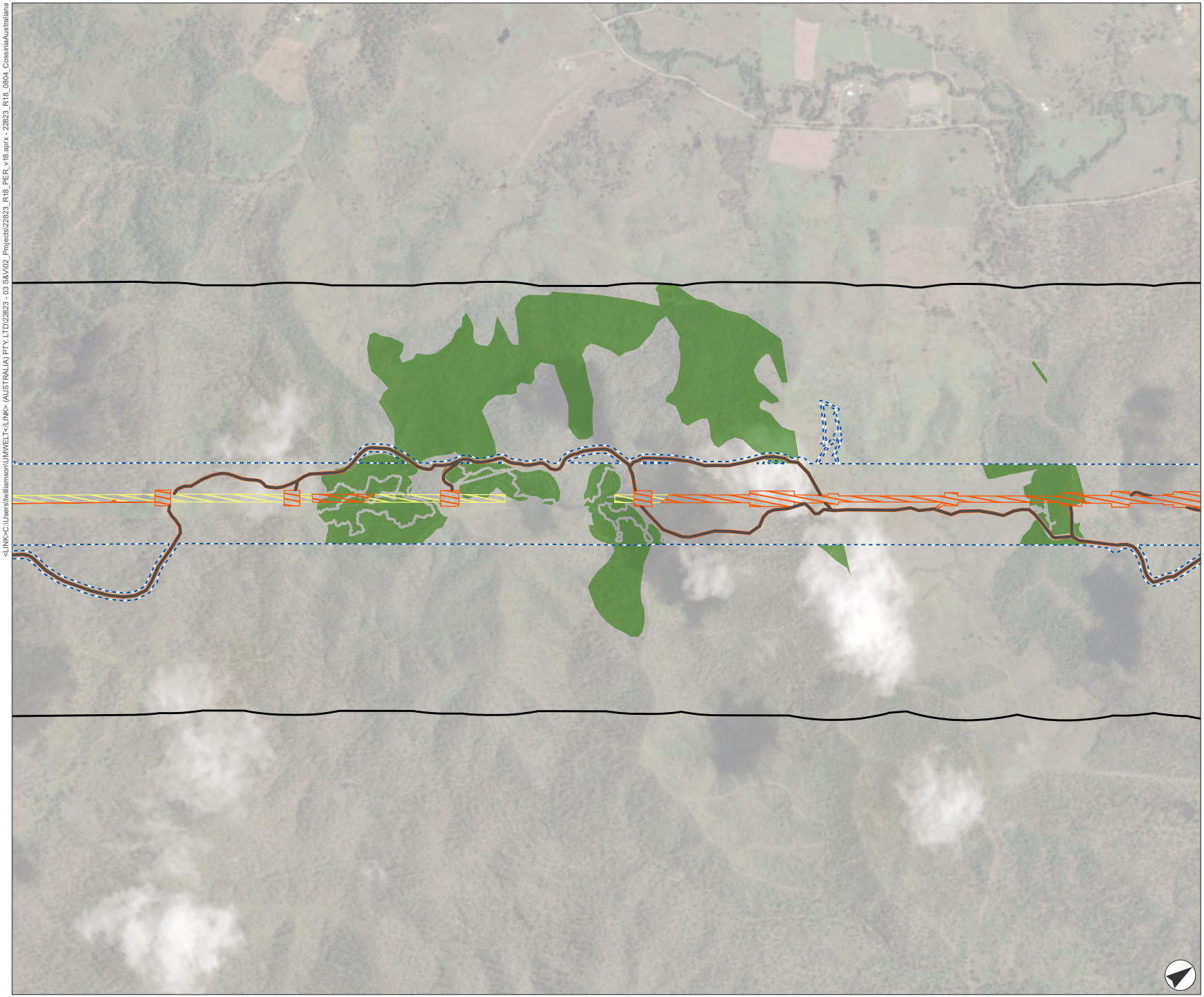


FIGURE 8.4-13

Cossinia australiana Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

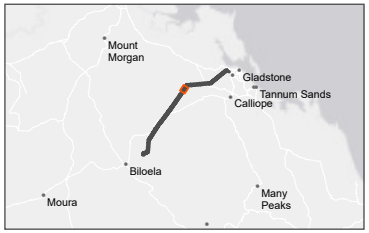
- Field Survey Extent
- Project Area

***Cossinia australiana* Habitat**

- Suitable Habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.4-14

Cossinia australiana Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

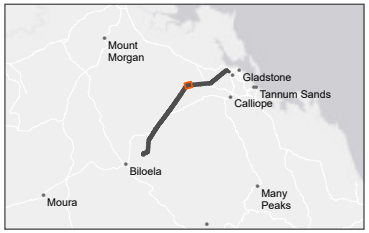
- Field Survey Extent
- Project Area

***Cossinia australiana* Habitat**

- Suitable Habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



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Kilometres

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FIGURE 8.4-19

Cossinia australiana Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

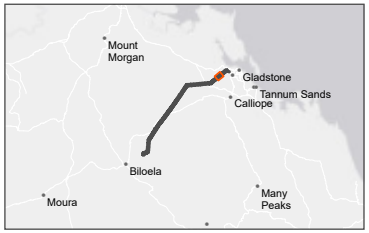
- Field Survey Extent
- Project Area

***Cossinia australiana* Habitat**

- Suitable Habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



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8.2.3.3 *Cycas megacarpa*

Table 8.14 *Cycas megacarpa*: Ecology and Relevance to the Project Area

Cycas megacarpa	
Profile	**Conservation status** Endangered **Distribution** *Cycas megacarpa* is endemic to south-east Queensland, found from as far south as Woolooga to Bouldercombe in the north. **Population** Based on records held at the Queensland Herbarium, 46 known populations of *Cycas megacarpa* are documented, with an estimated minimum area of occupancy of 2,527 ha and a projected total number of individuals greater than 372,964 across the species range (Queensland Herbarium, 2007b). Of the 46 known populations, 20 populations are known to occur in reserve tenures while the remaining 26 populations occur in freehold, vacant crown land, grazing homestead or unknown tenure types. Population sizes range from <10–>1,000. As reported by the (Queensland Herbarium, 2007b), seven of these populations are identified as being important populations and considered to be viable in the long term. Between 3,500–4,500 plants are considered to constitute a minimum viable population for the species (Queensland Herbarium, 2007b). The individuals identified within the Project Area form a population as active recruitment was noted and individuals were observed across all age classes, including seedlings, juveniles, sub-adults, adults and large adults. In total, approximately 5,243 individuals were observed during field surveys within the Project Area. **Historical records within the desktop search extent** Historical Atlas of Living Australia records of the species occur within the region as a grid formation (desensitised). The most recent historical record is from 2023 and is approximately 2.5 km east of the Project Area. **Habitat** *Cycas megacarpa* is found in woodland, open woodland and open forests dominated by *Eucalyptus crebra* and *Blakella citriodora* as well as *Corymbia erythrophloia, Eucalyptus melanophloia* and *Lophostemon confertus*, often in conjunction with a grassy understory (Queensland Herbarium, 2007b). It occurs at altitudes of 40–680 m, typically on undulating, hilly terrain either on gentle to steep slopes or hill crests (Queensland Herbarium, 2007). The soils are generally well drained, shallow, often stony, sandy loam to clay loam in texture and derived from sandstones, fine grained sediments and acid and basic volcanic rocks (Queensland Herbarium, 2007b). Within the Project Area, the species occurred within RE 11.3.25, 11.3.26, 11.11.3, 11.11.15, 11.12.1 and 11.12.6.

Cycas megacarpa

Habitat critical to the survival of the species

As per the National Multi-species Recovery Plan (Queensland Herbarium, 2007b), habitat where remaining viable populations occur is considered to be critical to the survival of *Cycas megacarpa*. Therefore, conservatively all known habitat within the Disturbance Footprint is critical to the survival of the species.

Current threats to the species

The main identified and potential threats to *Cycas megacarpa*, as identified in the species SPRAT profile (Department of Climate Change, Energy, the Environment and Water, 2024f), are:

- Destruction due to land clearing, including for development for housing, road building, mining and permitted land clearing.
- Legal harvesting and commercial salvage.
- Illegal harvesting, whole plants and seed.
- Loss of genetic variation and insect pollinators, particularly relevant for small populations.
- Land management practices, including:
  - Fire
  - Timber harvesting.

Other threats not listed in 'Threats' within the National Multi-species Recovery Plan (Queensland Herbarium, 2007b) include predation from the beetle, *Lilioceris nigripes* and the lycaenid butterfly (*Theclinesthes onycha*) and/or predation and damage from feral pigs* (*Sus scrofa*).

Recovery plan

National Multi-species Recovery Plan for the cycads, Cycas megacarpa, Cycas ophiolitica, Macrozamia cranei, Macrozamia lomandroides, Macrozamia pauli-guilielmi and Macrozamia platyrhachis (Queensland Herbarium, 2007b).

In the Project Area

Surveys

Field surveys have been undertaken within the Project Area from March 2023 to February 2026, which included four separate baseline flora surveys and two targeted *Cycas megacarpa* surveys. A total of 513 flora survey sites in line with relevant guidance material have been undertaken across the Project Area including quaternaries (394), secondaries (11), tertiaries (42), BioCondition assessments (55), TEC assessments (11) and opportunistic threatened species meanders.

Species occurrence

Cycas megacarpa was observed in several locations along Section B in multiple vegetation communities. In total, approximately 5,296 individuals were observed during field surveys. An estimated 1,032 individuals occur within the Disturbance Footprint of which 623 will remain in-situ (under the mid-span of Disturbance Footprint) and approximately 400 will be directly impacted and translocated from tower pads, brake and winch site, access track widening and laydowns. All development class categories were observed.

Cycas megacarpa

Habitat within the Project Area

Habitat type	Habitat modelling criteria	Area (ha)		
		Project Area	Disturbance Footprint	
			Full clearing	Selective clearing
Known habitat–confirmed	An 80 m buffer on confirmed *Cycas megacarpa* records, to reflect the latest population research which indicates most individuals disperse within 80 m of mature female plants (Etherington et al. 2018; James 2016 PhD thesis). All vegetation types within the buffer have been included, noting that this species was recorded in the Project Area within non-remnant vegetation.	645.8	23.2	29.8
Known habitat - suspected	Remnant and regrowth RE 11.10.13, 11.10.8, 11.11.15, 11.11.18, 11.11.3, 11.11.4, 11.12.1, 11.12.6, 11.3.4, as well as non-remnant vegetation. Known habitat (suspected) includes vegetation communities that *Cycas megacarpa* is known to can occur in, including remnant and regrowth vegetation communities and select non-remnant areas. Where targeted surveys were undertaken in suspected habitat and found to be absent, these areas were removed from the mapping.	3,397.8	0.5	0.0

Within the Disturbance Footprint, existing clearing along current access tracks totals 8.1 ha of known habitat–confirmed. Individuals of this species are not present on the access tracks but these areas fall within the buffer of known records. These access tracks are currently maintained and utilised for the existing transmission line and will continue to be utilised for the Project during operation. As a consequence of the existing utilisation of the access tracks, areas that overlap with buffered known habitat has not been included in the calculations for impacts to this species.

Table 8.15 Assessment of Potential Project Impacts and Mitigation and Management Commitments for *Cycas megacarpa*

Potential Impact	Assessment	Mitigation Commitments
Direct		
Vegetation clearing causing habitat loss and fragmentation	Vegetation clearing required for construction will result in direct impacts to 53.0 ha of known (confirmed) habitat and 0.5 ha of known (suspected) habitat. Of habitat within the Disturbance Footprint, 29.8 ha of known habitat in the mid-span will be selectively cleared and *Cycas megacarpa* individuals remaining in-situ, whilst 23.2 ha of known habitat will be lost due to the Project. Of suspected known habitat, 0.5 ha of suspected known habitat will be lost due to the Project.	• Pre-clearance surveys will be undertaken within suitable habitat within the Disturbance Footprint and for protected plants under the *Nature Conservation Act 1992* • Identify MNES flora and TEC's through pre-clearance surveys • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Disturbance activities must be contained to Disturbance Footprint • 10 m protection zones will be maintained around MNES flora and TEC's where they are directly adjacent to disturbance activities • Refer to Table 5.1, MNES Management Plan for further details on mitigation measures.
Mortality	A total of 5,296 individuals were recorded within the Project Area, of which 1,032 occur within the Disturbance Footprint. Of these 632 will be retained under the mid span and approximately 400 will be translocated and four unable to be translocated due to OHS constraints. In addition, there is a risk that the Project will result in mortality to individuals that haven't been recorded in field surveys to date.	• Pre-clearance surveys will be undertaken within suitable habitat within the Disturbance Footprint and for protected plants under the *Nature Conservation Act 1992* • Relevant permits will be obtained • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Clearance protection zones in proximity to retained individuals to be maintained • Clearing will be in accordance with all approval conditions • Where new populations of MNES threatened flora are identified, refer to Unexpected Finds Protocol • A Cycas Translocation Management Plan has been developed (**Appendix M**) • Signage for relevant fines for taking of plants will be installed • Individuals will not be utilised as signposts or markers
Loss of mature adults	The loss of mature adults and seed propagation through clearing may interrupt the breeding cycle of a population.	
Illegal harvesting	Illegal harvesting is a known threat to species. The Project will result in increased exposure and access to the population.	

Potential Impact	Assessment	Mitigation Commitments
		• Refer to Table 5.2 of the MNES Management Plan for further details on mitigation measures.
Indirect		
Reduced habitat quality or individual health due to edge effects	The main environmental impacts of new edges created by the Project are considered to include: • The modification of microclimates where new edges are created due to a greater penetration of light and wind into the remaining vegetation. Microclimate changes should be expected in the creation of new edges as greater temperature extremes and lower air humidity are generally observed at edge communities, with this effect known to increase if vegetation is dense or cover is high. • Changes to soil properties including greater compaction and erosion, and less organic matter. • The introduction of weeds and pathogens through mud and dirt falling off vehicles. • The physical disturbance of edge vegetation. Ongoing impacts on newly created edge vegetation may occur through the upkeep of access tracks (e.g., weed control, grading). • Changes in vegetation community composition.	• Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • Refer to Table 5.5 of the MNES Management Plan for further details on mitigation measures.
Reduced habitat quality or individual health due to erosion and sedimentation	Erosion and sedimentation can smother vegetation and alter soil structure, reducing the availability of nutrients and suitable substrates for plant growth. Sediment deposition in nearby habitats can degrade water quality and disrupt microhabitats, leading to reduced habitat quality.	• Soil sampling and testing to inform both erosion and sediment control (ESC) and rehabilitation • Develop Erosion and Sediment Control Plan (ESCP) in accordance with the IECA Best Practice Erosion and Sediment Control Guidelines 2008 • Extent and duration of soil exposure will be minimised • Disturbed areas will be promptly stabilised

Potential Impact	Assessment	Mitigation Commitments
		• Site is monitored and controls adjusted to maintain required performance standard • Minimum personnel requirements will apply for ESCP development and verification • Refer to Table 5.4 of the MNES Management Plan for further details on mitigation measures.
Exotic flora species colonisation and encroachment	Across all vegetation communities within the Project Area, weed species are common particularly exotic grasses. Exotic flora species are competitors for nutrients and resources needed to sustain this species. Exotic grasses are often promoted by landholders as a source of fodder/stock feed further exacerbating exotic flora encroachment.	• Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • Refer to Table 5.5 of the MNES Management Plan for further details on mitigation measures.
Spread of insects which predate on the species	The beetle *Lilioceris nigripes* and the lycaenid butterfly are known to predate on cycads and are a potential threat to *Cycas megacarpa*. If impacts to *Cycas megacarpa* are directly correlated to the presence of *Lilioceris nigripes* or the lycaenid butterfly, then treatment is suggested.	• CTMP (**Appendix M**) • Refer to Table 5.2 of the MNES Management Plan for further details on mitigation measures.
Reduced habitat quality or individual health due to dust emissions	Dust emissions may result following construction activities and affect adjacent habitat. Dust can settle on adjacent vegetation, coating leaves and reducing photosynthesis, respiration, and growth.	• Dust suppression measures including vehicles restricted to approved tracks, cover all loose loads and set speed limits (<40 km/hr) • Application of dust suppressants as required

Potential Impact	Assessment	Mitigation Commitments
		• Dust generating activities will be limited on days with strong winds blowing towards sensitive receptors or dust sensitive locations • Regular monitoring and visual surveillance to trigger management actions will be undertaken CTMP (**Appendix M**). • Refer to Table 5.4 of the MNES Management Plan for further details on mitigation measures.
Alterations to fire regimes including uncontrolled fires	Changes to fire frequency within the Project Area may impact on habitat and lead to degradation. Construction activities are unlikely to significantly alter existing grazing pressure or the implementation of land management practices currently employed by the landholder. Although the increased plant and vehicle presence will result in an increased number of potential ignition sources, employment of standard construction protocols will ensure the risk of bushfire is actively managed.	• Bushfire Management Plan will be developed • Burning of vegetation strictly prohibited unless a permit is obtained • Designated parking areas for vehicles and machinery • During operation, vegetation within the Disturbance Footprint will be managed in accordance with Powerlink's vegetation specification • Refer to Table 5.9 of the MNES Management Plan for further details on mitigation measures.

Table 8.16 Significant Impact Assessment: *Cycas megacarpa*

Impact Criteria	Assessment
Lead to a long-term decrease in the size of a population	**Potential.** A total of 5,296 individuals were recorded within the Project Area, of which 1,032 (19.7%) occur within the Disturbance Footprint. However, the population in the surrounding landscape is likely to be significantly larger than what is known to occur within the Project Area, so 19.7% of the population is an overestimation. The population within the Project Area is likely to be connected to the population 7, 8 and 9 (associated with the Don River State Forest) which is estimated to comprise 115,200 individuals (Department of Climate Change, Energy, the Environment and Water, 2024f). While there is likely connectivity between the population within the Project Area and population 7, 8 and 9, the removal of these individuals may result in a decrease in the population size, particularly from the removal of reproductive adults, at a local scale. The Disturbance Footprint is the maximum extent of direct impacts and is composed of multiple components and is the indicative location of proposed Project infrastructure. While 1,032 individuals are known to occur within the Disturbance Footprint, the final direct impact to individuals is confined to tower pads, brake and winch locations, laydowns and access track widening with an estimate of 400 individuals to be affected. The remaining individuals within the Disturbance Footprint are located in mid span locations and will be left in-situ, with the selective removal of incompatible species (i.e. species that

Impact Criteria	Assessment
	are not within safe electrical distance to the infrastructure or have potential to grow into infrastructure) as part of Project requirements. Avoidance and mitigation measures, such as micro-siting of Project infrastructure, reduction in clearing widths of some Project tracks and retention of individuals under mid-span areas will contribute to a reduction in the number of *Cycas megacarpa* individuals impacted, as well as the final Project design. From an avoidance perspective, the Project has avoided high density *Cycas megacarpa* areas and reproductive age individuals. A translocation plan has been developed, which will detail mitigation and management measures pertaining to *Cycas megacarpa*. These measures include the translocation of individuals directly impacted, as well as propagation using seeds collected from the Disturbance Footprint and Project Area. The proposed recipient site for translocated and propagated *Cycas megacarpa* individuals is proposed to be near to the Project Area. Specific requirements for the recipient site include habitat suitability, maintaining genetic diversity and maintaining viability, ensuring the population of the species will be effectively managed. Ongoing design refinement, mitigation and avoidance measures, successful translocation, and propagation are all required to limit a long-term decrease in the size of a population. Whilst design refinement and mitigation measures are likely to be effective, it is unknown if successful translocation and propagation can be achieved, therefore the Project has the potential to decrease the size of a population in the long term.
Reduce the area of occupancy of the species	**Unlikely.** The area of occupancy for *Cycas megacarpa* is 46 km^2 within an extent of occurrence of 18,726 km^2 over the species range (Queensland Herbarium, 2007b). It is noted that the area of occupancy may be potentially overstated given the low resolution in the mapping methodology used (2 km x 2 km grid), however, the Recovery Plan is also nearly 20 years old and population data may be out of date. A total of 53.0 ha of known (confirmed) habitat and 0.5 ha of known (suspected) habitat occurs within the Disturbance Footprint. The Disturbance Footprint is linear in nature, so the species will persist within the Project Area despite of the clearing. *Cycas megacarpa* individuals are present under the existing transmission lines highlighting the ability of this species to persist after clearing activities. Very slow growth rates suggest if this species can be avoided between tower locations (mid span areas), individuals can be left in-situ for life of the Project in operational phase. The linear nature of the disturbance, the persistence of the species in the existing transmission corridor coupled with avoidance and mitigation measures suggests the area of occupancy is unlikely to be reduced as a result of the Project.

Impact Criteria	Assessment
Fragment an existing population into two or more populations	**Unlikely.** As described on the species' SPRAT profile, many populations of *Cycas megacarpa* are very small and greatly fragmented, with only a handful of adult plants (Department of Climate Change, Energy, the Environment and Water, 2024f). Cycad species are known to have little genetic flow between fragmented populations and seed dispersal is predominantly gravitational resulting in the occurrence of new plants not far from the parent plant (Queensland Herbarium, 2007b). This population has persisted in the area despite ongoing disturbance from the existing transmission infrastructure, historical thinning and grazing. Individuals in all developmental classes have been recorded, including within previously cleared areas. The Project is linear and mid span clearing widths are estimated at 30-60m. Clearing will be completed only as strictly necessary and widths minimised where possible, increasing the chances of seed dispersal between areas of retained habitat. Although vegetation clearing required for the Project may result in an increase in existing fragmentation impacts, the population present is not considered overly susceptible as shown by the species persistence under and adjacent to the existing transmission corridor.
Adversely affect habitat critical to the survival of a species	**Likely.** Habitat critical to the survival is defined as 'habitat where remaining viable populations occur' for *Cycas megacarpa* (Queensland Herbarium, 2007). The population within the Project Area can be considered viable with expected >5,200 individuals and likely connectivity to very large population to the north (within Don River State Forest where an estimate 115,200 individuals occur). Habitat where a *Cycas megacarpa* individual has been confirmed or is reasonably suspected is defined as critical to the survival of the species. Therefore, known (confirmed) and known (suspected) habitat within the Project Area is considered critical to the survival of the species. The final impact to habitat critical to the survival of *Cycas megacarpa* will be based on the final detailed design and subject to micro-siting requirements of transmission line infrastructure, access tracks and tower locations. A maximum of 51 ha of habitat critical to the survival of the species (comprising 53.0 ha of known (confirmed) and 0.5 ha of known (suspected) habitat) is proposed to be cleared for the Project. Within the Disturbance Footprint, complete removal of 23.2 ha of known – confirmed and 0.5 ha of known – suspected habitat will be required for tower pad locations, access track widening, brake and winch sites and laydown areas. Within the mid-span, 29.8 ha of known – confirmed habitat will be modified by the selective removal of incompatible species (i.e. species that are not within safe electrical distance to the infrastructure or have potential to grow into infrastructure) and *Cycas megacarpa* individuals in these locations are to be retained in-situ. Direct impacts to this quantum of habitat are likely to adversely affect habitat critical to the survival of a species. Indirect impacts to habitat adjacent to the Disturbance Footprint will be minimised through the implementation of mitigation measures.

Impact Criteria	Assessment
Disrupt the breeding cycle of a population	**Potential.** It is estimated a total of 400 individuals are proposed to be translocated for the Project, with the avoidance of a further 632 individuals within the Disturbance Footprint. Clearing may translocate mature adults that are necessary for a viable population to persist. The breeding cycle may be impacted by the removal of these individuals as they are the primary source of viable seeds. Avoidance and mitigation measures would ensure large reproductive-age individuals (>1 m) and mature female plants will be prioritised for further avoidance via micro siting, where possible. Additionally, the current avoidance and retainment of 632 individuals within the Disturbance Footprint may continue to facilitate an ongoing viable population. A large-scale collection and propagation of seeds for *Cycas megacarpa* as part of a translocation program, if required, has the potential to temporarily disrupt the breeding cycle of existing populations within the broader region. This would be managed by undertaking seed collection over an extended period, targeting, and alternating between existing populations within the broader region. Collection and propagation are correlated to the number of *Cycas megacarpa* individuals that cannot be salvaged within the Disturbance Footprint. The number of *Cycas megacarpa* individuals to be translocated to recipient sites would be maximised, to reduce the number of seeds that will need to be collected and propagated, taken from the broader region. Due to the removal of mature adults and potential collection of seeds, the Project may disrupt the breeding cycle of a population.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely.** Vegetation clearance associated with the Project will result in the removal or modification of a maximum 53 ha of habitat critical to the survival of the species, within the Disturbance Footprint. Species specific mitigation measures have been developed in the MNES Management Plan and CTMP. While the population within the Project Area is likely connected to adjacent populations, there are many other populations throughout the species distribution which will be unaffected by the Project. Habitat within the Disturbance Footprint is already fragmented and modified with weed species generally common and active grazing occurring across large portions of the wider area. Significant historical clearing has occurred across much of the Project Area. Indirect impacts on individuals and populations will be managed via the implementation of the CTMP and MNES Management Plan. Clearing for the Project will only occur as strictly necessary and co-location of infrastructure coupled with ongoing Project design refinement may further reduce impacts. Therefore, the Project is considered unlikely to modify, destroy, remove or isolate or decrease the availability of habitat to the extent that the species is likely to decline.

Impact Criteria	Assessment
Result in invasive species that are harmful to a Endangered species becoming established in the Endangered species' habitat	**Unlikely.** Weeds incursion is a lesser threat to *Cycas megacarpa* than fire sensitivity and land clearing. Weeds were recorded throughout the Disturbance Footprint, in varying degrees of severity. There is an inherent risk of weed dispersal with any infrastructure project. Of specific risk to *Cycas megacarpa*, the incursion of exotic pasture grass species such as *Cenchrus ciliaris** and *Megathyrsus maximus* var. *maximus** which may further increase fire risk. Therefore, the Project will follow best practice construction and operational methods and implement weed control measure to prevent the spread of weeds throughout the Disturbance Footprint and adjacent areas. Therefore, it is unlikely that the Project will result in an invasive species becoming established. It should be noted that the beetle *Lilioceris nigripes* and the lycaenid butterfly are known to predate on cycads and are a potential threat to *Cycas megacarpa*. If impacts to *Cycas megacarpa* are directly correlated to the presence of *Lilioceris nigripes* or the lycaenid butterfly, then treatment is suggested. At this point in time little is known on their relationship with cycads, although evidence suggests that impacts to new foliage from these species can be devastating. Monitoring proposed as part of the CTMP will enable the detection of these insect species and subsequent detection of insect damage on cycads. In summary Project activities are unlikely to result in an invasive species harmful to *Cycas megacarpa* becoming established in its habitat.
Introduce disease that may cause the species to decline	**Unlikely.** There are no diseases known to impact *Cycas megacarpa* individuals or habitat. The Project follows best practice construction and operational methods as stipulated in management plans pertaining to the Project. Therefore, it is unlikely that Project activities will introduce disease that may cause the species to decline.

Impact Criteria	Assessment
Interfere with the recovery of the species	**Potential.** A recovery plan has been adopted for *Cycas megacarpa* titled *National Multi-species Recovery Plan for the cycads, Cycas megacarpa, Cycas ophiolitica, Macrozamia cranei, Macrozamia lomandroides, Macrozamia pauli-guilielmi* and *Macrozamia platyrhachis* (Queensland Herbarium, 2007b). This document outlines the major threats and recovery actions pertaining to the species. The major threats include loss of habitat or individuals due to land clearing, removal of seeds or whole plants due to legal/illegal harvesting, and loss of genetic variation and insect pollinators. Specific threats pertaining to the Project include vegetation clearing, habitat loss, fragmentation and degradation, soil erosion, dust generation, introduction and exacerbation of introduced flora species and increased frequency and intensity of fires. The recovery plan also identifies recovery actions. The overall objectives are to prevent loss of further individuals, populations, pollinator species and habitat critical to the survival of the species, and recover existing populations to normal reproductive capacity to ensure viability in the long-term, prevent extinction, maintain genetic viability and improve the conservation status (Queensland Herbarium, 2007b). Vegetation clearing associated with the Project will result in the removal of habitat critical to the survival of the species (55 ha) and the direct removal of individuals. It should be noted that is proposed that 400 of 1,032 directly impacted individuals within the Disturbance Footprint will be translocated with the remaining individuals left in-situ. The success of the translocation is at present unknown. In summary, as habitat critical to the survival of the species will be removed, the Project has the potential to interfere with the recovery of the species.
Significant Residual Impact	**Likely to have a significant impact.**

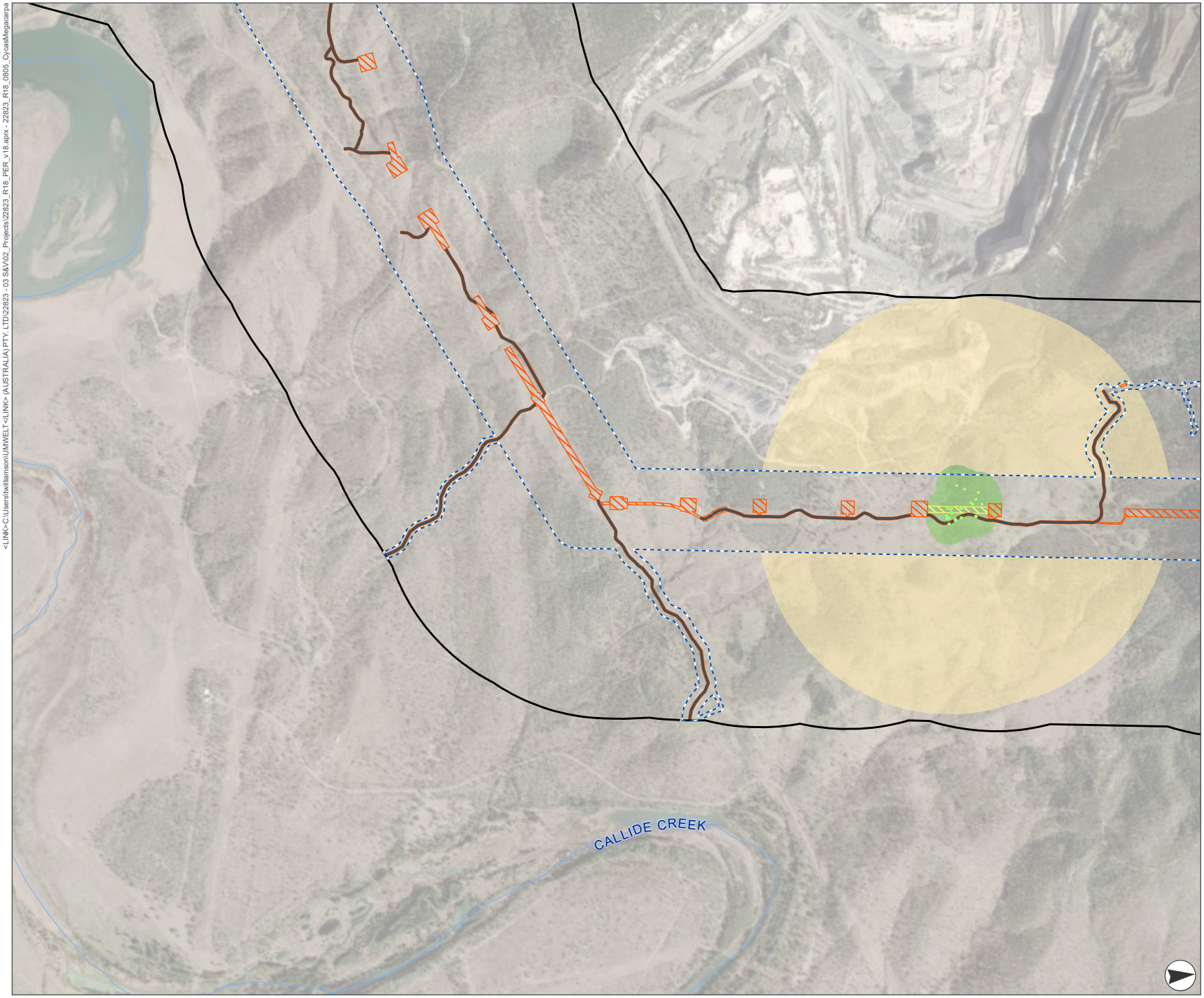


FIGURE 8.5-2

Cycas megacarpa Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

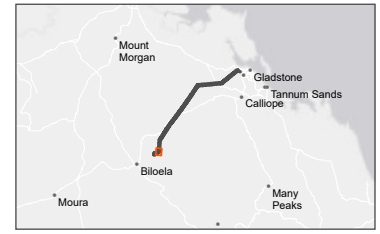
- Watercourse
- Field Survey Extent
- Project Area
- *Cycas megacarpa* Records (Umwelt)

***Cycas megacarpa* Habitat**

- Known Habitat - Confirmed
- Known Habitat - Suspected

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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FIGURE 8.5-3

Cycas megacarpa Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

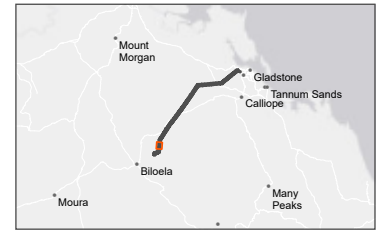
- Field Survey Extent
- Project Area
- *Cycas megacarpa* Records (Ecologica)
- *Cycas megacarpa* Records (Umwelt)

***Cycas megacarpa* Habitat**

- Known Habitat - Confirmed
- Known Habitat - Suspected

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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FIGURE 8.5-4

Cycas megacarpa Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

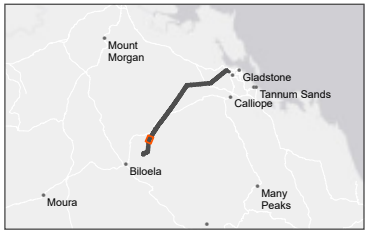
- Field Survey Extent
- Project Area
- *Cycas megacarpa* Records (Ecologica)
- *Cycas megacarpa* Records (Umwelt)

***Cycas megacarpa* Habitat**

- Known Habitat - Confirmed
- Known Habitat - Suspected

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
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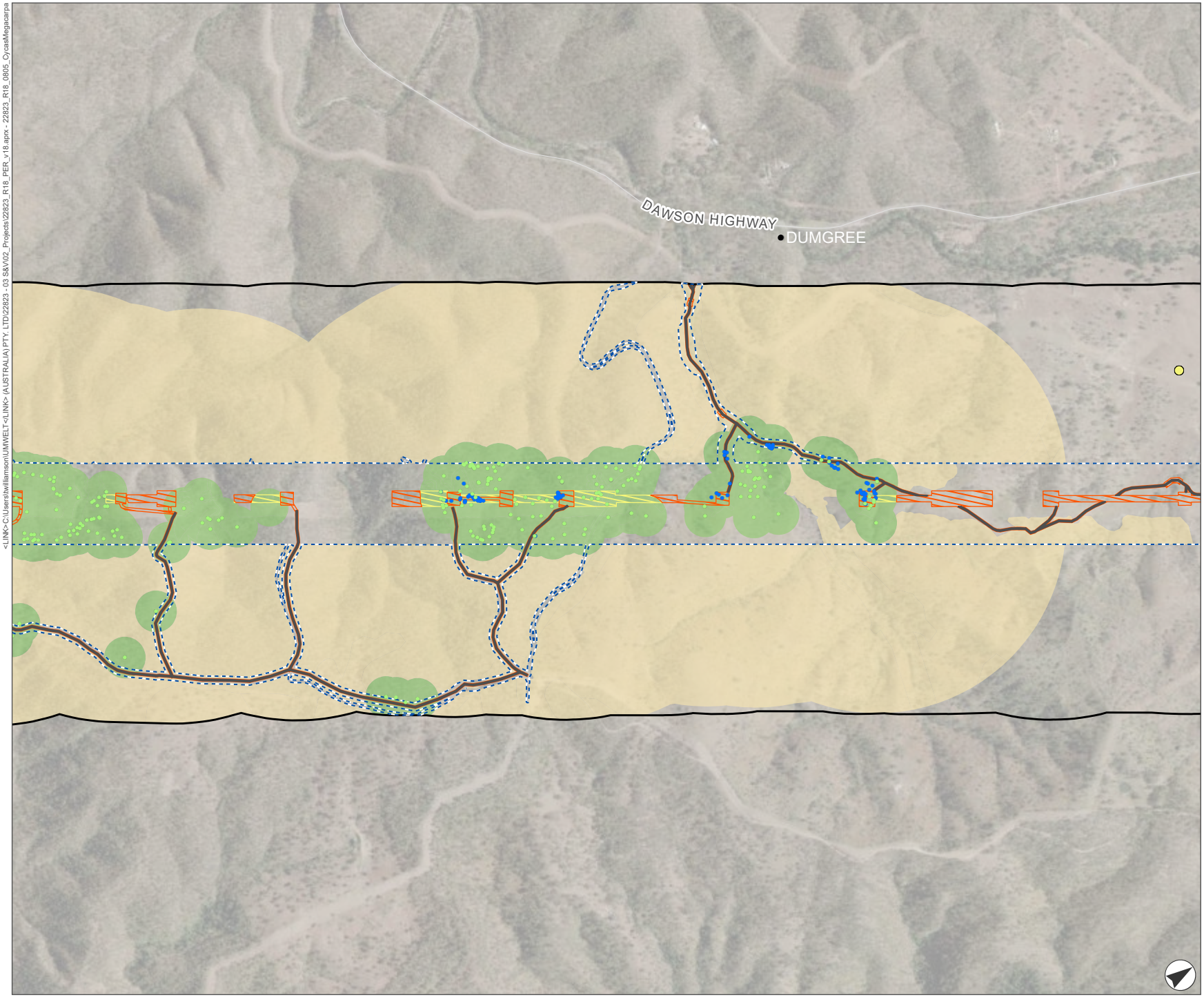


FIGURE 8.5-5

Cycas megacarpa Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

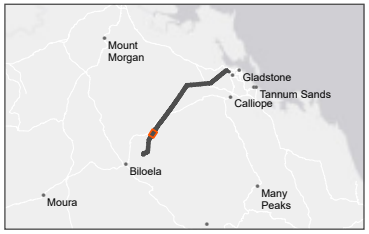
- Roads
- Field Survey Extent
- Project Area
- *Cycas megacarpa* Records (ALA)
- *Cycas megacarpa* Records (Ecologica)
- *Cycas megacarpa* Records (Umwelt)

***Cycas megacarpa* Habitat**

- Known Habitat - Confirmed
- Known Habitat - Suspected

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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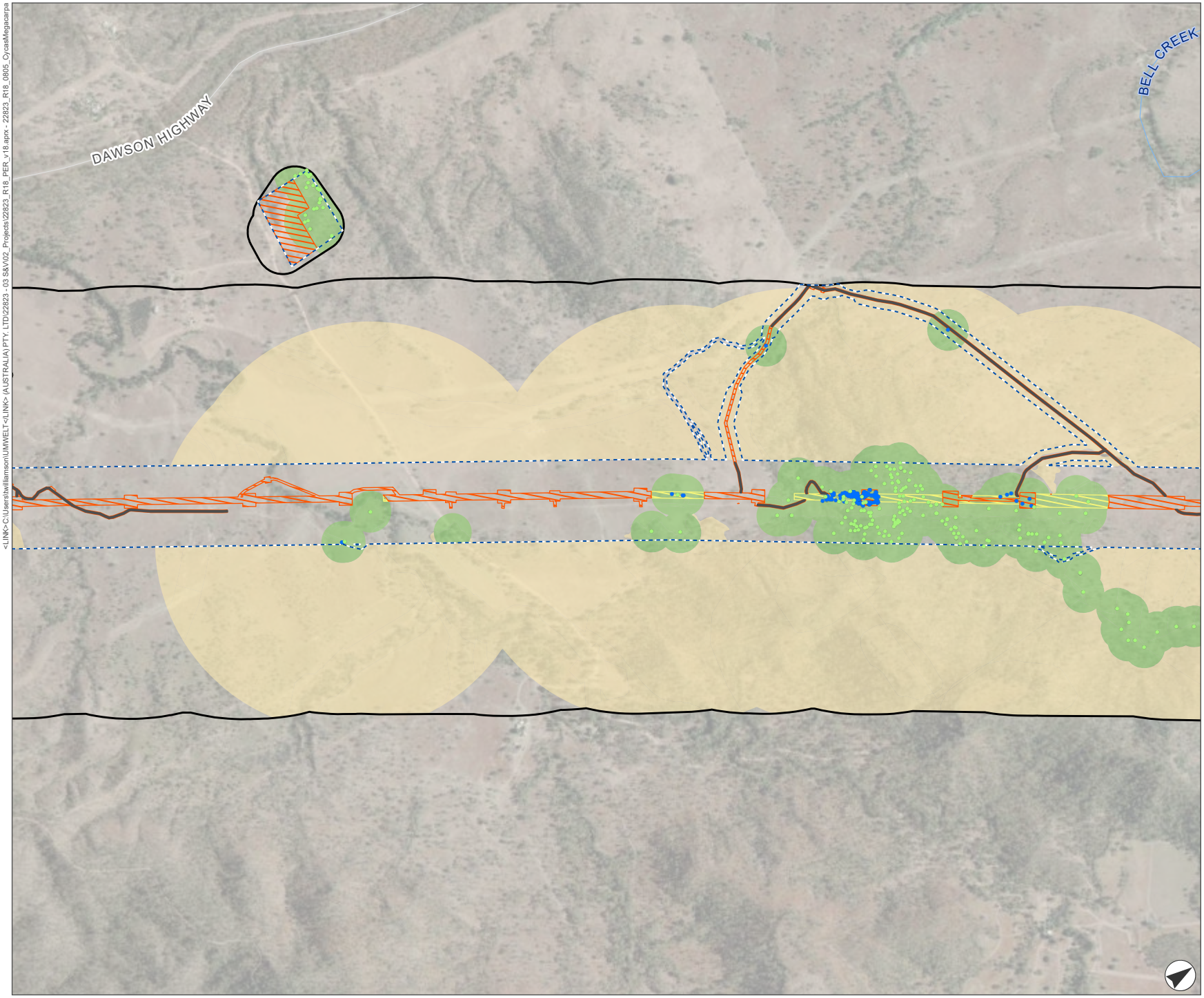


FIGURE 8.5-6

Cycas megacarpa Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

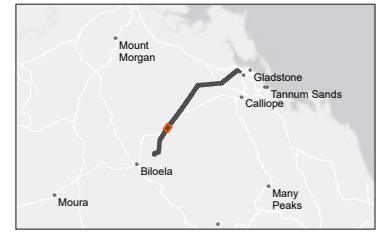
- Roads
- Watercourse
- Field Survey Extent
- Project Area
- *Cycas megacarpa* Records (ALA)
- *Cycas megacarpa* Records (Ecologica)
- *Cycas megacarpa* Records (Umwelt)

***Cycas megacarpa* Habitat**

- Known Habitat - Confirmed
- Known Habitat - Suspected

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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Kilometres

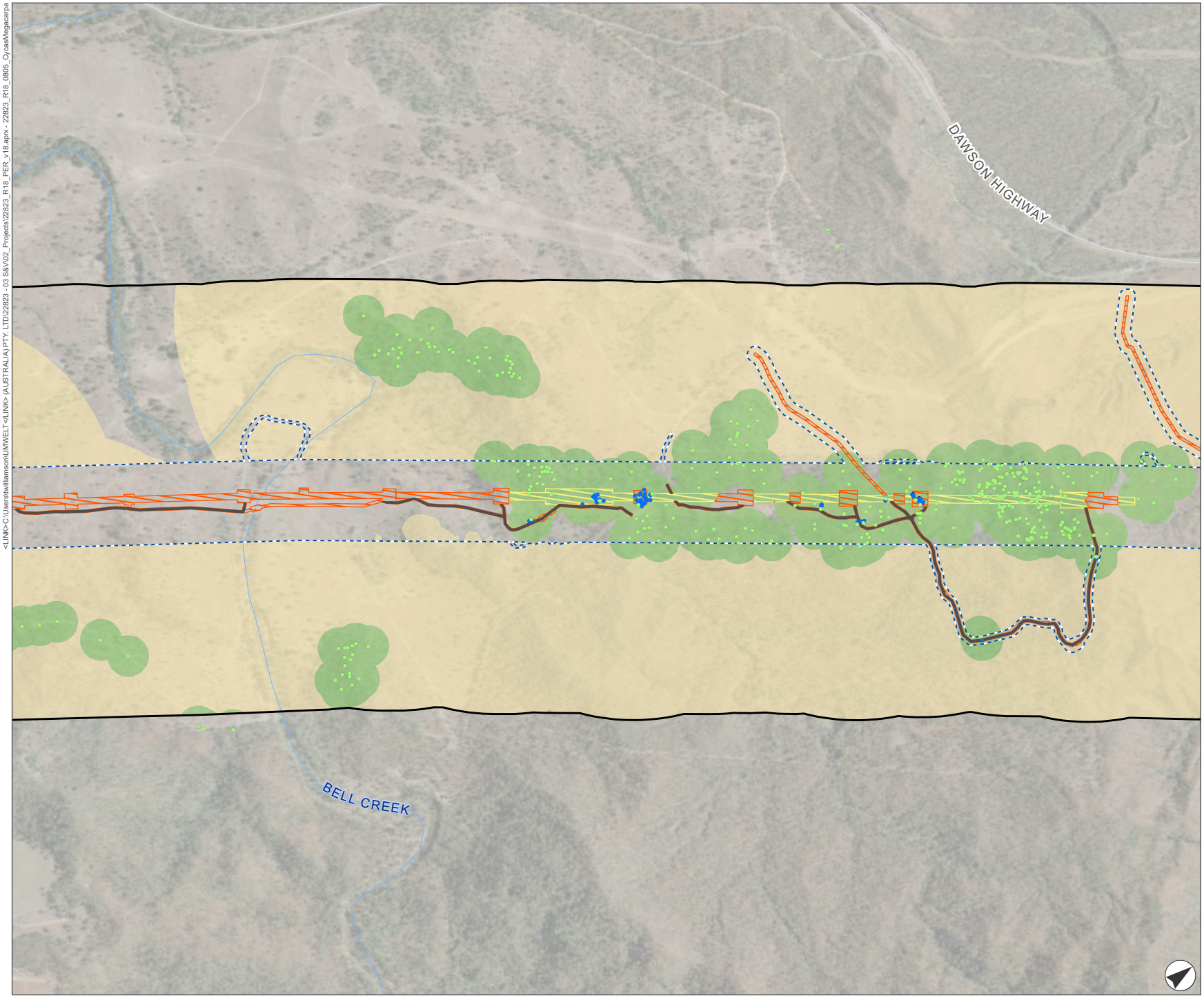
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FIGURE 8.5-7

Cycas megacarpa Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

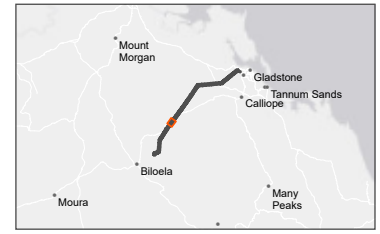
- Roads
- Watercourse
- Field Survey Extent
- Project Area
- *Cycas megacarpa* Records (Ecologica)
- *Cycas megacarpa* Records (Umwelt)

***Cycas megacarpa* Habitat**

- Known Habitat - Confirmed
- Known Habitat - Suspected

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.5-8

Cycas megacarpa Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

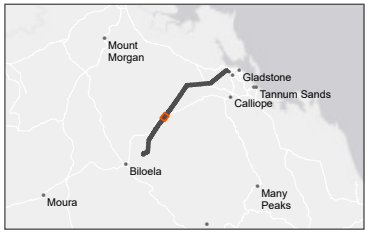
- Roads
- Field Survey Extent
- Project Area
- *Cycas megacarpa* Records (Umwelt)

***Cycas megacarpa* Habitat**

- Known Habitat - Confirmed
- Known Habitat - Suspected

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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Kilometres

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FIGURE 8.5-10

Cycas megacarpa Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

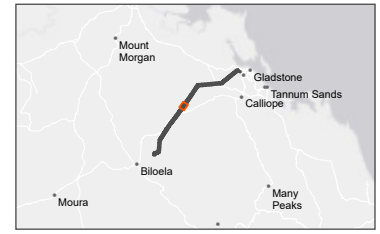
- Watercourse
- Field Survey Extent
- Project Area

***Cycas megacarpa* Habitat**

- Known Habitat - Confirmed

Disturbance Footprint

- Full Clearing
- Existing Clearance



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Kilometres

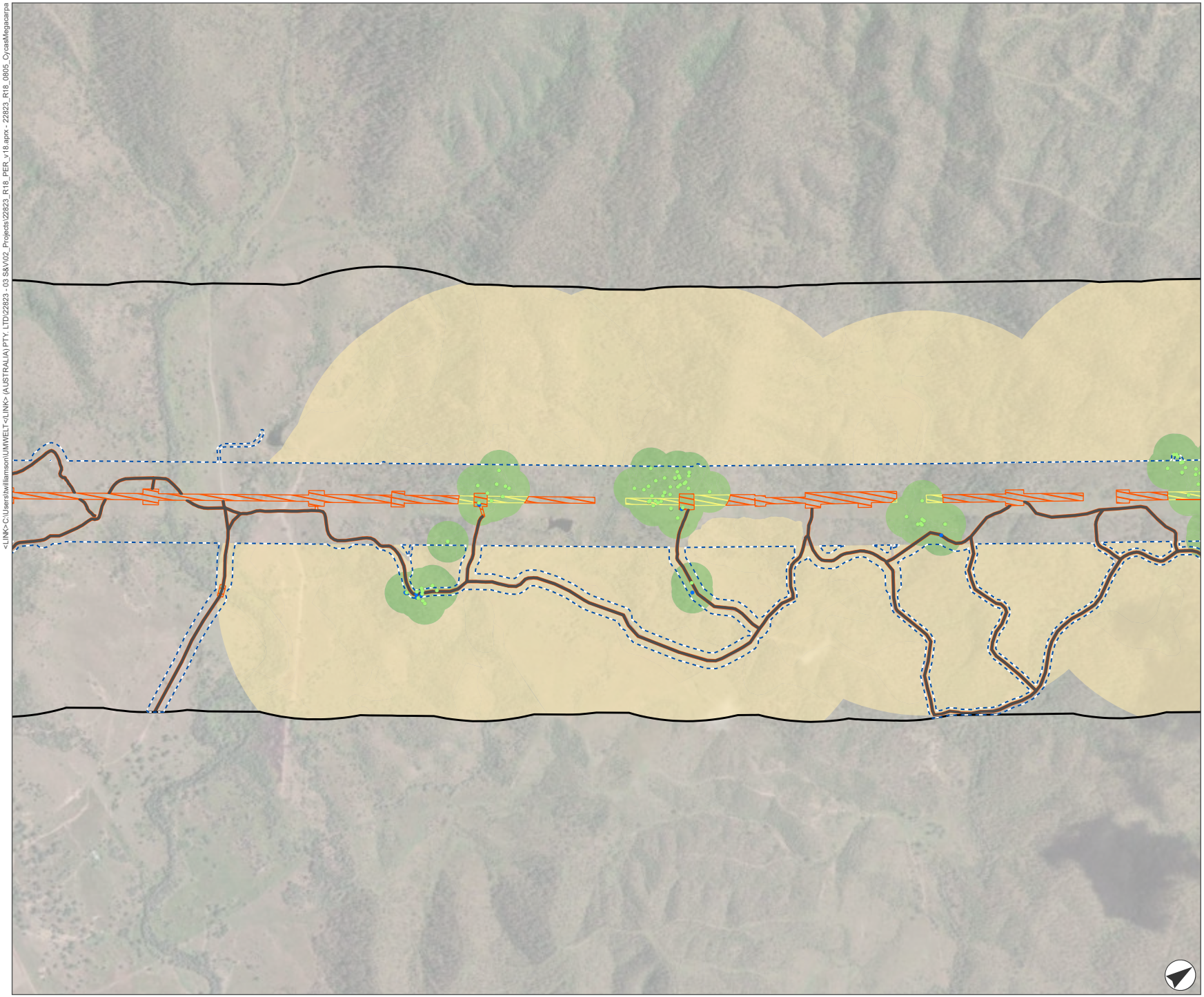
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FIGURE 8.5-12

Cycas megacarpa Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

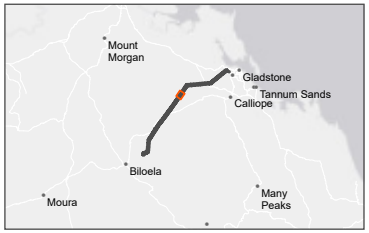
- Field Survey Extent
- Project Area
- *Cycas megacarpa* Records (Ecologica)
- *Cycas megacarpa* Records (Umwelt)

***Cycas megacarpa* Habitat**

- Known Habitat - Confirmed
- Known Habitat - Suspected

Disturbance Footprint

- Selective Clearing
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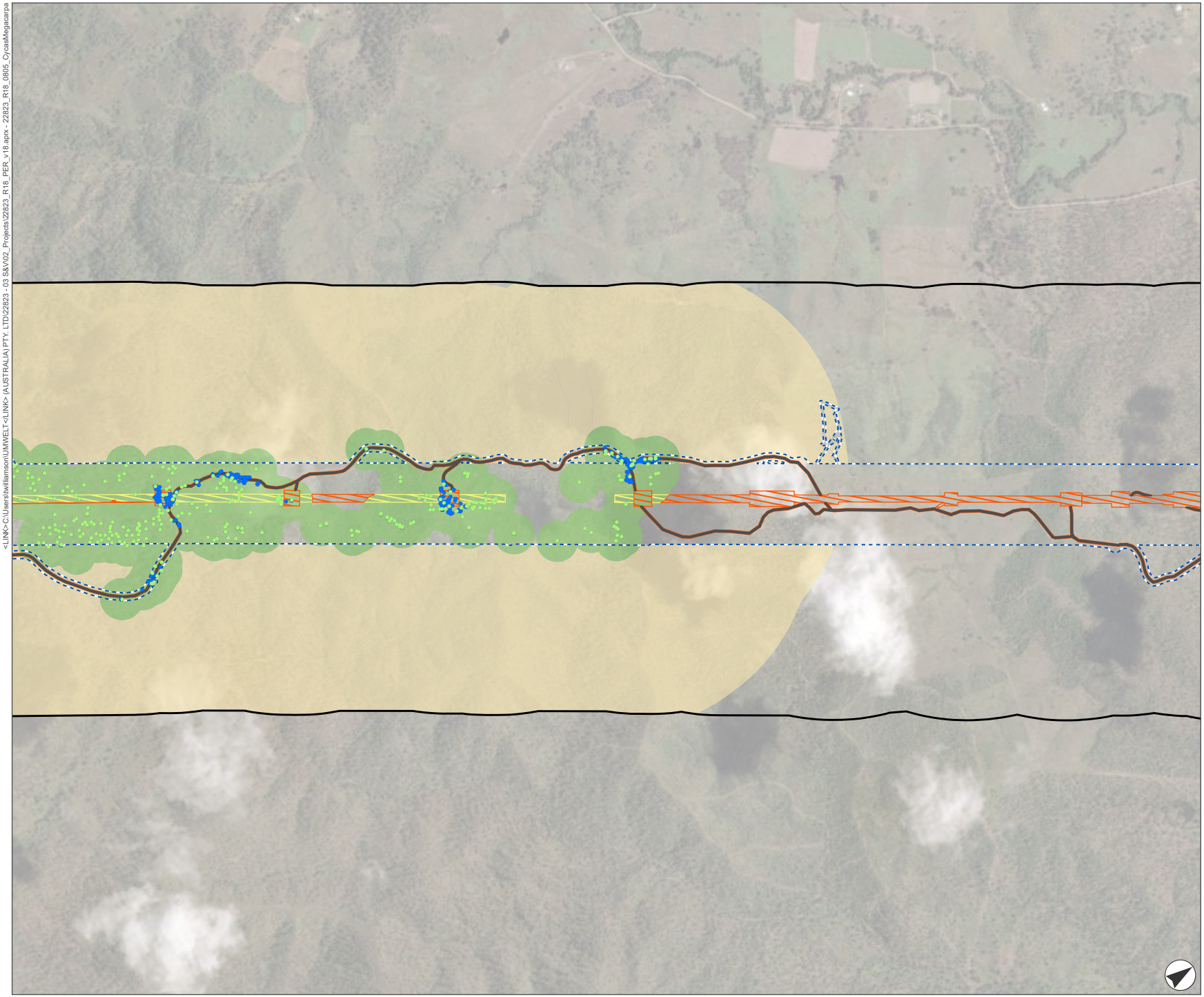


FIGURE 8.5-13

Cycas megacarpa Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

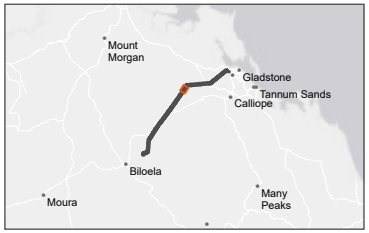
- Field Survey Extent
- Project Area
- *Cycas megacarpa* Records (Ecologica)
- *Cycas megacarpa* Records (Umwelt)

***Cycas megacarpa* Habitat**

- Known Habitat - Confirmed
- Known Habitat - Suspected

Disturbance Footprint

- Selective Clearing
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8.2.4 Vulnerable Flora Species

8.2.4.1 *Bertya opponens* (Coolabah Bertya)

Table 8.17 *Bertya opponens*: Ecology and Relevance to the Project Area

Bertya opponens	
Profile	**Conservation status** Vulnerable **Distribution** *Bertya opponens* is found in the Brigalow Belt region with a wide distribution. In Queensland, the species is widely distributed and has been recorded within an area bounded by Emerald in the north, Charleville in the south-west, Miriam Vale in the north-east and Toowoomba in the south-east, with an outlier near Charters Tower. The species extent of occurrence is estimated to be 400,000 km^2. Its area of occupancy is unknown, but given the location of records, it is estimated to be less than 2,000 km^2 (TSSC, 2016). **Important population** Important populations have not been defined for the species. Therefore, the generic definition within **Section 8.1.2** has been adopted. As the species has not been recorded within the Project Area during field surveys, no important populations of *B. opponens* are considered present. **Habitat** This species is associated with a range of vegetation types such as *Acacia shirleyi* woodland, eucalypt and *Acacia spp.* open forest with shrubby understorey, mixed shrubland, *Eucalyptus* and C*allitris* open woodland, mixed shrubland and semi-evergreen vine-thicket. Records of the species from the Devine State Forest, approximately 20 km to the south-west, note the species growing in woodland of *Eucalyptus panda, E. exserta, E. fibrosa* subsp. *nubila, E. curtisii* and *Corymbia trachyphloia* on calcareous sandstone ridgeline and on lateritic sandstone (ALA, 2025). **Historical records within the desktop search extent** A WildNet record was observed in the desktop search extent dating from 1998, approximately 5 km from the Project Area, north of the Callide Timber Reserve. Numerous ALA records for *Bertya opponens* occur within the desktop search extent, with the closest located approximately 200 m north of Section A. This record occurs within the Callide Timber Reserve and is from 1992 (ALA, 2025). An iNaturalist research-grade observations has been recorded within the Callide Mine boundary in 2024 approximately 400 m north of the Project Area. **Habitat critical to the survival of the species** Habitat critical to the survival of *B. opponens* is not defined in the Conservation Advice (TSSC, 2016). Refer to **Section 8.1.1** for the generic definition that has been applied for this assessment.

Bertya opponens

Habitat critical to the survival of *B. opponens* includes any occupied habitat due to its importance in maintaining the genetic diversity and long-term evolutionary development of the species. No individuals have been identified within the Project Area as part of the current survey program.

Current threats to the species

The main identified and potential threats to *B. opponens*, as identified in the species' conservation advice for the species (TSSC, 2016) are:

- Non-fire disturbance frequency
- Fire frequency and intensity
- Grazing by goats
- Land Clearing.

Recovery plans

The National Recovery Plan for the Bertya sp. (Cobar-coolabah) Cunningham & Milthorpe s.n., 2/8/73 (NPWS, 2002).

In the Project Area

Surveys

Field surveys have been undertaken within the Project Area from March 2023 to July 2025, which included four dedicated flora surveys. A total of 513 flora survey sites in line with relevant guidance material have been undertaken across the Project Area including quaternaries (394), secondaries (11), tertiaries (42), BioCondition assessments (55), TEC assessments (11) and opportunistic threatened species meanders.

Species occurrence

The species was not recorded during field surveys. As numerous records occur within the vicinity to the Project Area and suitable habitat occurs within the Project Area, this species has been noted as having a high likelihood of occurring.

Habitat within the Project Area

Habitat type	Habitat modelling criteria	Area (ha)	
		Project Area	Disturbance Footprint
Suitable habitat	Remnant and regrowth RE 11.10.3, 11.10.4, 11.10.8, 11.10.13, 11.11.3/c, 11.11.4/c, 11.11.10, 11.11.15, 11.11.18 and 12.11.6. This species occurs in a variety of habitats. However, has not been recorded on alluvial or volcanic derived soils. It is not known from tidal areas. Areas already surveyed have been excluded and includes a 5 m buffer associated with either side of field survey tracklogs for all vegetation communities.	5,354.1	77.7

Table 8.18 Assessment of Potential Project Impacts and Mitigation and Management Commitments for *Bertya opponens*

Potential Impact	Assessment	Mitigation Commitments
Direct		
Vegetation clearing causing habitat loss and fragmentation	Vegetation clearing required for construction will result in direct impacts to 77.7 ha of suitable habitat within the Disturbance Footprint. While it is considered suitable habitat, no individuals have been recorded within the Disturbance Footprint or Project Area.	• Identify MNES flora and TEC's through pre-clearance surveys • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Disturbance activities must be contained to Disturbance Footprint • 10 m protection zones will be maintained around MNES flora and TEC's where they are directly adjacent to disturbance activities • Pre-clearance surveys will be undertaken within suitable habitat within the Disturbance Footprint and for protected plants under the *Nature Conservation Act 1992* • Obtain relevant permits • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Clearance protection zones in proximity to retained individuals to be maintained Clearing will be in accordance with all approval conditions • Where new populations of MNES threatened flora are identified, refer to Unexpected Finds Protocol • Refer to Table 5.1 and Table 5.2 of the MNES Management Plan for further details on mitigation measures.
Mortality	There are currently no known individuals within the Disturbance Footprint or Project Area. No individuals are proposed to be removed, however, there is a risk that the Project will result in mortality to individuals that haven't been recorded in field surveys to date.	• Pre-clearance surveys will be undertaken within suitable habitat within the Disturbance Footprint and for protected plants under the *Nature Conservation Act 1992* • Obtain relevant permits • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Clearing in proximity to retained individuals to maintain protection zones where possible • Clearing will be in accordance with all approval conditions • Where new populations of MNES threatened flora are identified, refer to Unexpected Finds Protocol • Refer to Table 5.2 of the MNES Management Plan for further details on mitigation measures.
Indirect		
Reduced habitat quality or individual	The main environmental impacts of new edges created	• Baseline biosecurity surveys and ongoing inspections and management will be undertaken

Potential Impact	Assessment	Mitigation Commitments
health due to edge effects	by the Project are considered to include: • The modification of microclimates where new edges are created due to a greater penetration of light and wind into the remaining vegetation. Microclimate changes should be expected in the creation of new edges as greater temperature extremes and lower air humidity are generally observed at edge communities, with this effect known to increase if vegetation is dense or cover is high. • Changes to soil properties including greater compaction and erosion, and less organic matter. • The introduction of weeds and pathogens through mud and dirt falling off vehicles. • The physical disturbance of edge vegetation. Ongoing impacts on newly created edge vegetation may occur through the upkeep of access tracks	• Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • Refer to Table 5.5 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
	(e.g., weed control, grading). • Changes in vegetation community composition.	
Reduced habitat quality or individual health due to erosion and sedimentation	Erosion and sedimentation can smother vegetation and alter soil structure, reducing the availability of nutrients and suitable substrates for plant growth. Sediment deposition in nearby habitats can degrade water quality and disrupt microhabitats, leading to reduced habitat quality.	• Soil sampling and testing to inform both erosion and sediment control (ESC) and rehabilitation • Develop Erosion and Sediment Control Plan (ESCP) in accordance with the IECA Best Practice Erosion and Sediment Control Guidelines 2008 • Extent and duration of soil exposure will be minimised • Disturbed areas will be promptly stabilised • Site is monitored and controls adjusted to maintain required performance standard • Minimum personnel requirements will apply for ESCP development and verification • Refer to Table 5.4 of the MNES Management Plan for further details on mitigation measures.
Exotic flora species colonisation and encroachment	Across all vegetation communities within the Project Area, weed species are common particularly exotic grasses. Exotic flora species are competitors for nutrients and resources needed to sustain this species. Exotic grasses are often promoted by landholders as a source of fodder/stock feed further exacerbating exotic flora encroachment.	• Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • Refer to Table 5.5 of the MNES Management Plan for further details on mitigation measures.
Reduced habitat quality or individual health due to dust emissions	Dust emissions may result following construction activities and affect adjacent habitat. Dust can settle on	• Dust suppression measures including vehicles restricted to approved tracks, cover all loose loads and set speed limits (<40 km/hr) • Application of dust suppressants as required

Potential Impact	Assessment	Mitigation Commitments
	adjacent vegetation, coating leaves and reducing photosynthesis, respiration, and growth.	• Dust generating activities will be limited on days with strong winds blowing towards sensitive receptors or dust sensitive locations • Regular monitoring and visual surveillance to trigger management actions will be undertaken • Refer to Table 5.4 of the MNES Management Plan for further details on mitigation measures.
Alterations to fire regimes including uncontrolled fires	Changes to fire frequency within the Project Area may impact on habitat and lead to degradation. Construction activities are unlikely to significantly alter existing grazing pressure or the implementation of land management practices currently employed by the landholder. Although the increased plant and vehicle presence will result in an increased number of potential ignition sources, employment of standard construction protocols will ensure the risk of bushfire is actively managed.	• Bushfire Management Plan will be developed • Burning of vegetation strictly prohibited unless a permit is obtained • Designated parking areas for vehicles and machinery • During operation, vegetation within the Disturbance Footprint will be managed in accordance with Powerlink's vegetation specification • Refer to Table 5.9 of the MNES Management Plan for further details on mitigation measures. • Regular monitoring and visual surveillance to trigger management actions will be undertaken.

Table 8.19 Significant Impact Assessment: *Bertya opponens*

Impact Criteria	Assessment
Lead to a long-term decrease in the size of an important population of a species	**Unlikely.** There are currently no known important populations within the Disturbance Footprint or the Project Area. Therefore, no known population will be impacted by the Project. During construction, the pre-clearance survey unexpected finds protocol will be followed to ensure any potential impacts to the species (if observed) are avoided or managed appropriately.

Impact Criteria	Assessment
	As a population is currently not known to occur within the Disturbance Footprint or Project Area and avoidance and management measures will be implemented if it is recorded, the Project is unlikely to lead to a long-term decrease in the size of an important population.
Reduce the area of occupancy of an important population	**Unlikely.** There are currently no known populations within the Disturbance Footprint. In Queensland, *Bertya opponens* is reported to occur across an extensive geographical range through the Brigalow Belt bioregion. The species is reportedly rare on a landscape scale but may be locally abundant at some sites. Therefore, based on current knowledge, the Project will not reduce the area of occupancy of an important population. During construction, the pre-clearance survey unexpected finds protocol will be followed to ensure any potential impacts to the species (if observed) are avoided or managed appropriately. As no individuals are proposed to be removed by the Project, the Project is unlikely to reduce the area of occupancy of an important population.
Fragment an existing important population into two or more populations	**Unlikely.** There are currently no known important populations of *Bertya opponens* within the Disturbance Footprint. Therefore, the Project is unlikely to fragment an existing important population into two or more populations. In the event that this species is identified within the Disturbance Footprint as part of pre-clearance surveys, the number of individuals and extent will be recorded and infrastructure micro-sited to minimise the potential for fragmentation of the population. The pre-clearance survey unexpected finds protocol will then be followed to ensure any potential impacts on the species are avoided or managed appropriately. The Disturbance Footprint is co-located adjacent to existing transmission infrastructure, therefore reducing the likelihood for further fragmentation. The Project is therefore unlikely to fragment an existing important population into two or more populations.
Adversely affect habitat critical to the survival of a species	**Unlikely.** A recovery plan has been developed in New South Wales and does not provide a definition for habitat critical to the survival of *Bertya opponens*. As such, using the definition from the Significant Impact Guidelines 1.1–Matters of National Environmental Significance (Department of the Environment, 2013a), habitat within the Disturbance Footprint and Project Area is currently not considered habitat critical to the survival of the species as no individuals have been recorded. If the species is recorded during pre-clearance surveys, the habitat may be considered critical to the survival of the species. Micro-siting will be undertaken, and the pre-clearance survey unexpected finds protocol will be followed. This will ensure any potential impacts are avoided or managed appropriately.

Impact Criteria	Assessment
	The Project proposes to remove up to 77.7 ha of suitable *Bertya opponens* habitat within the Disturbance Footprint. Indirect impacts on suitable habitat will be managed via the implementation of the MNES Management Plan. Micro-siting will be undertaken, and the pre-clearance survey unexpected finds protocol will be followed. This will ensure any potential impacts are avoided or managed appropriately. It is considered unlikely that the Project will adversely affect habitat critical to the survival of the species.
Disrupt the breeding cycle of an important population	**Unlikely.** Pollination of this species is likely wind derived although the mechanism for seed dispersal requires further study. Presently, it is suggested that seed dispersal may involve an explosive release and water movement may also aid dispersal. Investigation of the seedbank at known sites in New South Wales showed that the majority of seeds were clustered around the base of the plant in a decreasing density that radiated outwards from under the canopy (NPWS, 2002). There are currently no known populations of *Bertya opponens* within the Disturbance Footprint. The Project may disrupt the breeding cycle of the species through altered fire regimes, removal of potential habitat and exacerbating weed incursion. These risks will be managed through the implementation of the MNES Management Plan. Therefore, given a population of the species is not known from the Disturbance Footprint and the Project will manage potential threats to the species, it is unlikely that the Project will disrupt the breeding cycle of a population.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely.** A total of 77.7 ha of suitable habitat within the Disturbance Footprint is proposed to be impacted by the Project. Suitable habitat is already fragmented and modified with weed species generally common and active grazing occurring across large portions of the Project Area. Significant historical clearing has occurred across much of the Project Area. Retained habitat will not be subject to further degradation from the Project. Retained suitable habitat within the Project Area will not be subject to further degradation from dust and weed incursion during construction due to active monitoring and management as required through the MNES Management Plan. Therefore, the removal of 77.7 ha of suitable habitat for this species is unlikely to cause the species to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**Unlikely.** Weeds incursion is not an identified threat to *Bertya opponens* but weed incursion can increase fire risk, which is a known threat to the species. Weeds were recorded throughout the Disturbance Footprint, in varying degrees of severity. There is an inherent risk of weed dispersal with any infrastructure project. Specifically, the incursion of exotic pasture grass species such as *Cenchrus ciliaris** and *Megathyrsus maximus* var. *maximus** which may further increase fire risk. The Project will follow best practice construction and operational methods to limit the spread of weeds throughout the Disturbance Footprint. Where the Project has contributed to the spread of high biomass grasses the removal and or

Impact Criteria	Assessment
	treatment of these species will be undertaken in accordance with Table 5.5 of the MNES Management Plan. Therefore, it is unlikely that the Project will result in an invasive species becoming established.
Introduce disease that may cause the species to decline	**Unlikely.** Disease is not an identified threat to *Bertya opponens*. The Project will follow best practice construction and operational methods to prevent the spread of disease throughout the Disturbance Footprint. Therefore, it is unlikely that the Project will result in the introduction of a disease that may cause the species to decline.
Interfere substantially with the recovery of the species	**Unlikely.** No individuals have been recorded within the Disturbance Footprint and pre-clearance surveys will be undertaken within all 77.7 ha of suitable habitat. Indirect impacts will be managed through implementation of the MNES Management Plan. As such, impacts from the Project are unlikely to interfere with the recovery of the species.
Significant Residual Impact	**Unlikely to have a significant impact.**

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FIGURE 8.6-1

Berya opponens Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

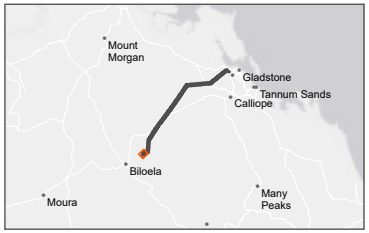
- Railway
- Watercourse
- Field Survey Extent
- Project Area
- *Bertya opponens* Records (ALA)

***Bertya opponens* Habitat**

- Suitable Habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
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FIGURE 8.6-2

Berya opponens Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

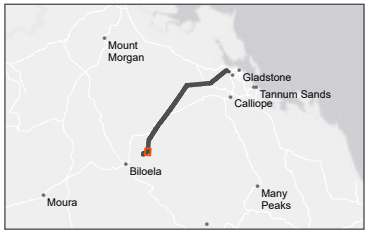
- Watercourse
- Field Survey Extent
- Project Area
- *Bertya opponens* Records (ALA)

***Bertya opponens* Habitat**

- Suitable Habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.6-3

Berya opponens Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

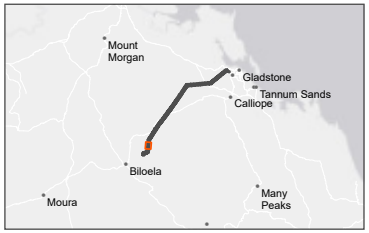
- Field Survey Extent
- Project Area

***Bertya opponens* Habitat**

- Suitable Habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.6-4

Berya opponens Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

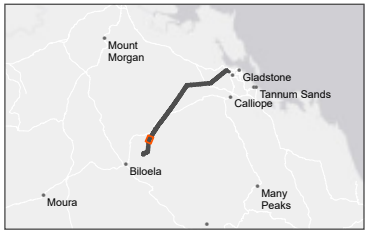
- Field Survey Extent
- Project Area

***Bertya opponens* Habitat**

- Suitable Habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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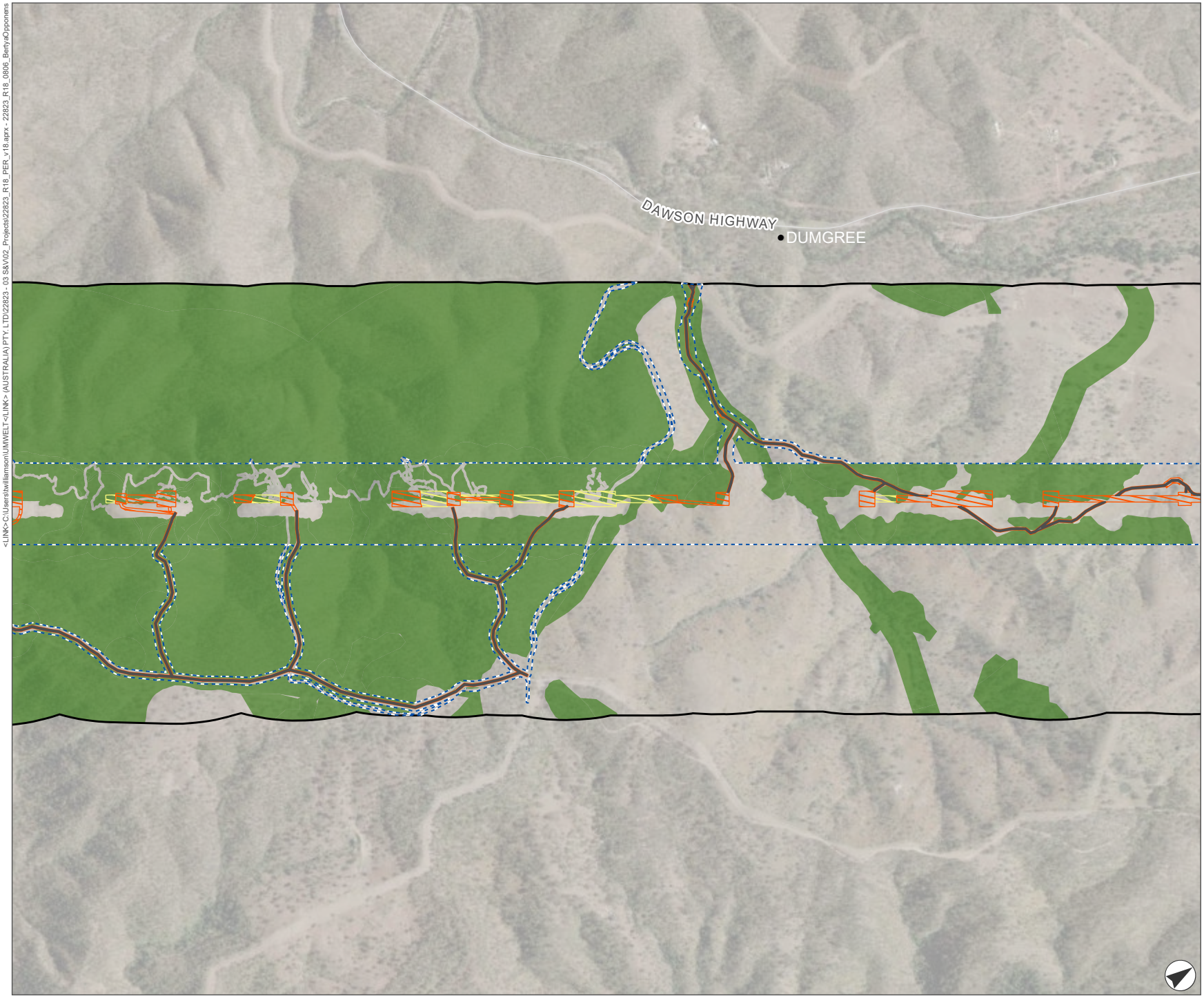


FIGURE 8.6-5

Berya opponens Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

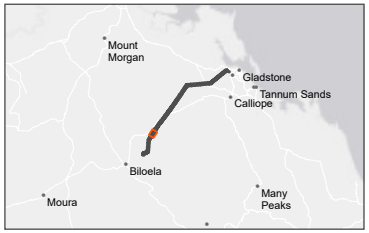
- Roads
- Field Survey Extent
- Project Area

***Bertya opponens* Habitat**

- Suitable Habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.6-6

Berya opponens Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

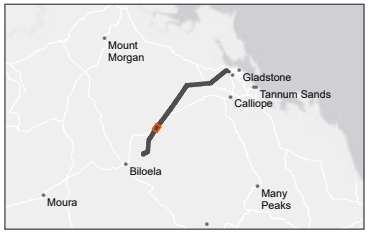
- Roads
- Watercourse
- Field Survey Extent
- Project Area

***Bertya opponens* Habitat**

- Suitable Habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.6-7

Berya opponens Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

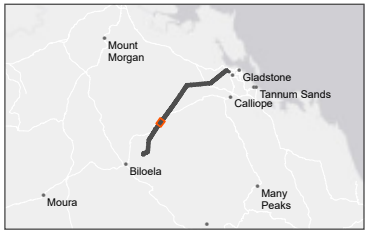
- Roads
- Watercourse
- Field Survey Extent
- Project Area

***Bertya opponens* Habitat**

- Suitable Habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.6-8

Berya opponens Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

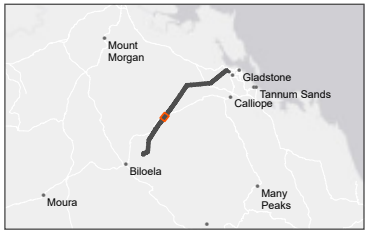
- Roads
- Field Survey Extent
- Project Area

***Bertya opponens* Habitat**

- Suitable Habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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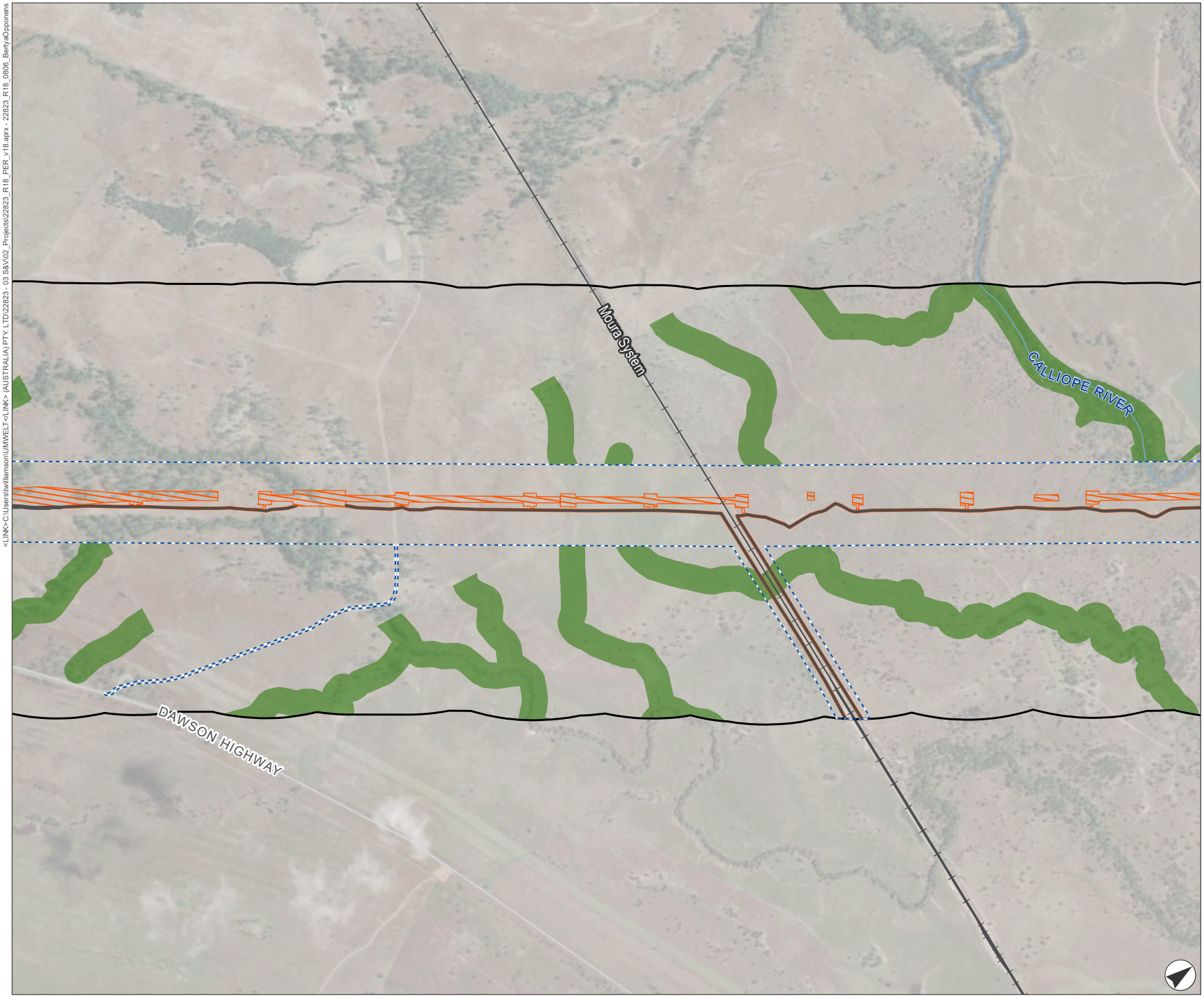


FIGURE 8.6-9

Berya opponens Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

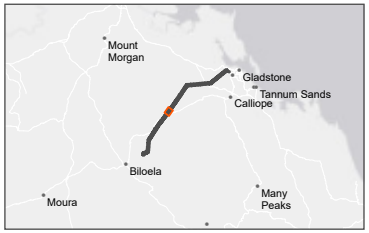
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area

***Bertya opponens* Habitat**

- Suitable Habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.6-10

Berya opponens Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

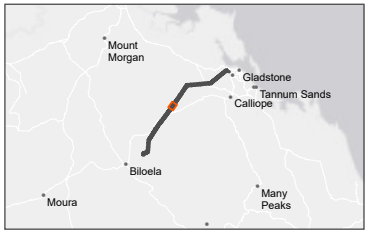
- Watercourse
- Field Survey Extent
- Project Area

***Bertya opponens* Habitat**

- Suitable Habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



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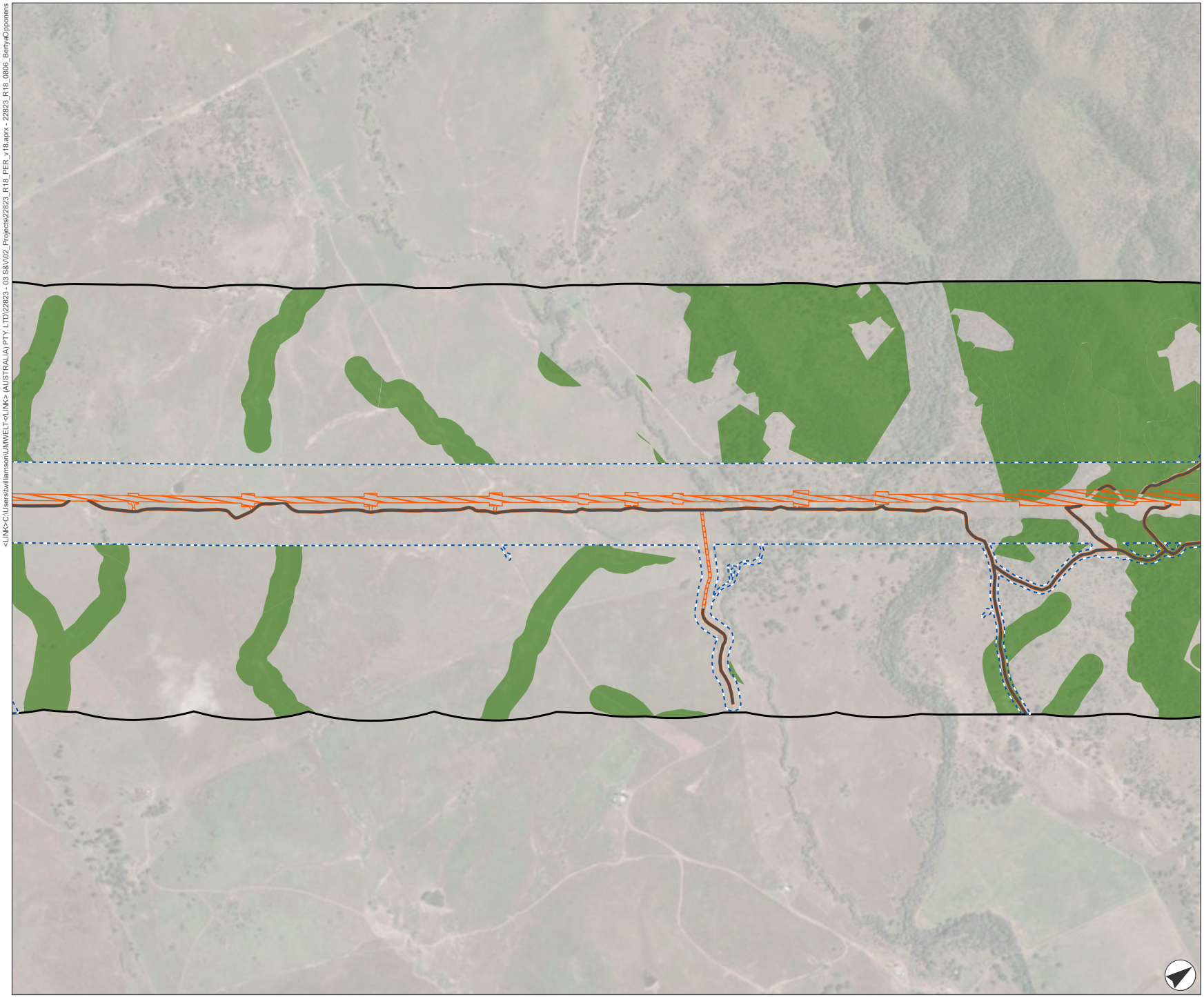


FIGURE 8.6-11

Berya opponens Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

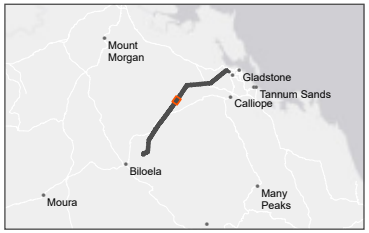
- Field Survey Extent
- Project Area

***Bertya opponens* Habitat**

- Suitable Habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.6-12

Berya opponens Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

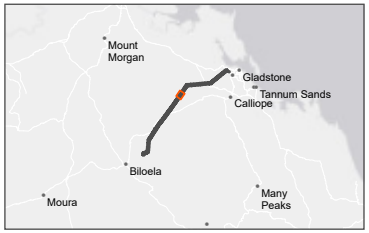
- Field Survey Extent
- Project Area

***Bertya opponens* Habitat**

- Suitable Habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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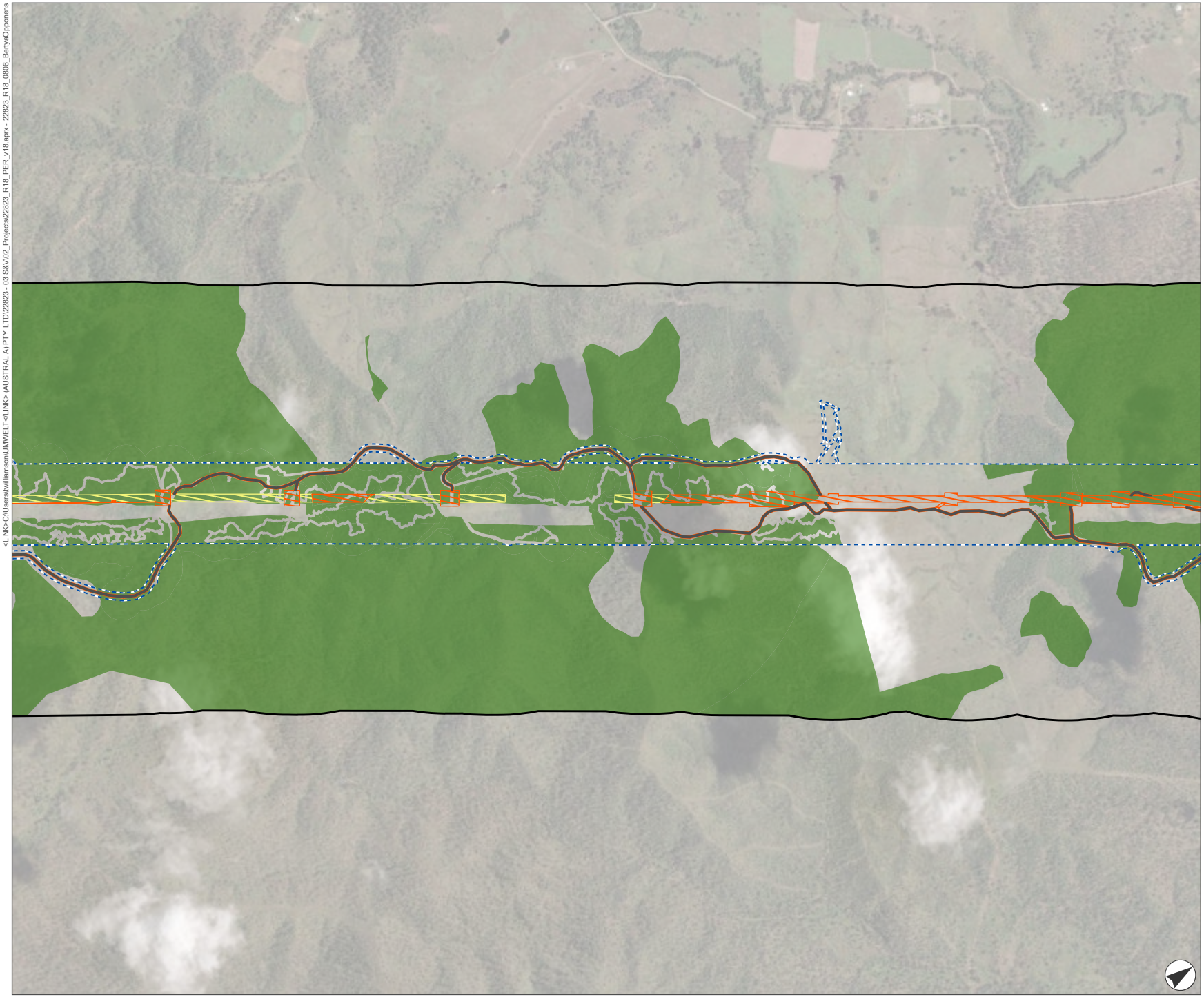


FIGURE 8.6-13

Berya opponens Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

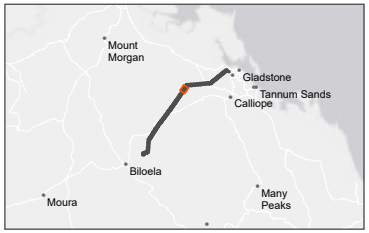
- Field Survey Extent
- Project Area

***Bertya opponens* Habitat**

- Suitable Habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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Kilometres

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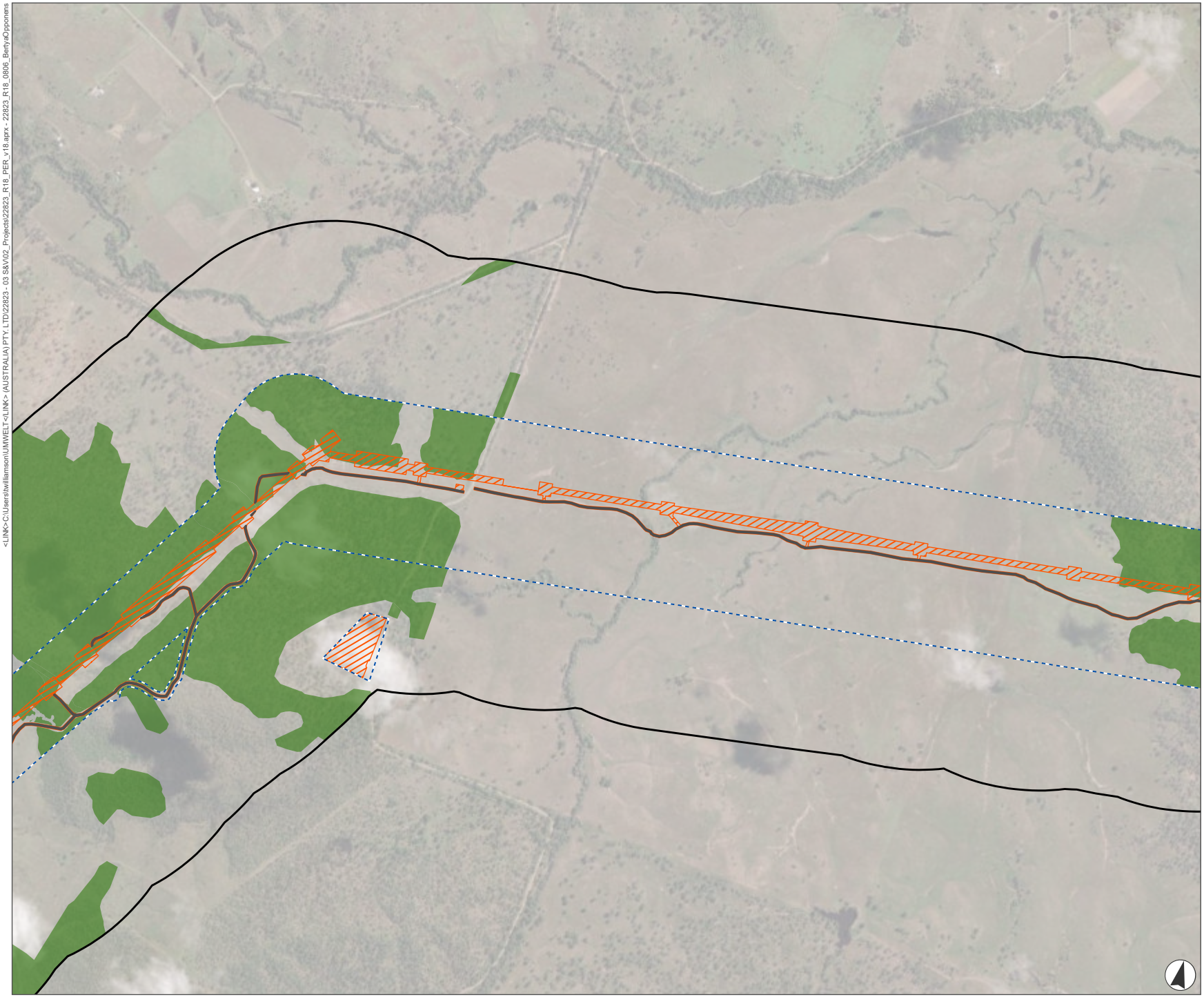


FIGURE 8.6-14

Berya opponens Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

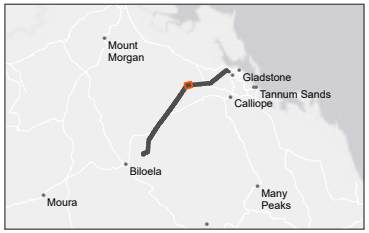
- Field Survey Extent
- Project Area

***Bertya opponens* Habitat**

- Suitable Habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



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Kilometres

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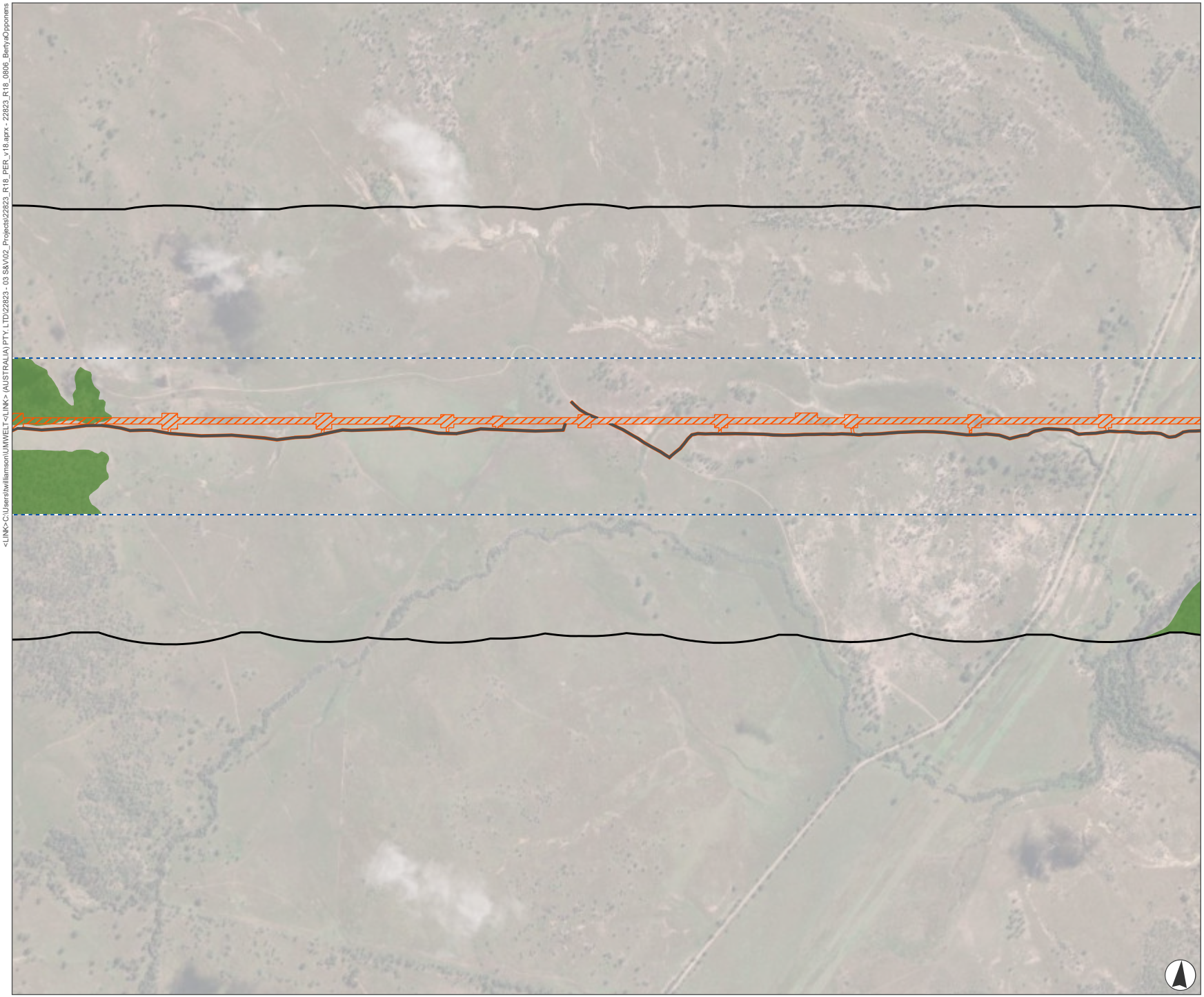


FIGURE 8.6-15

Berya opponens Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

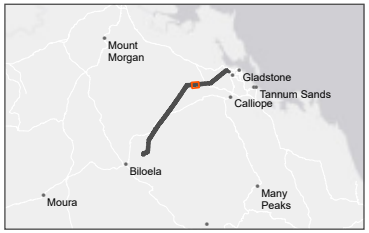
- Field Survey Extent
- Project Area

***Bertya opponens* Habitat**

- Suitable Habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



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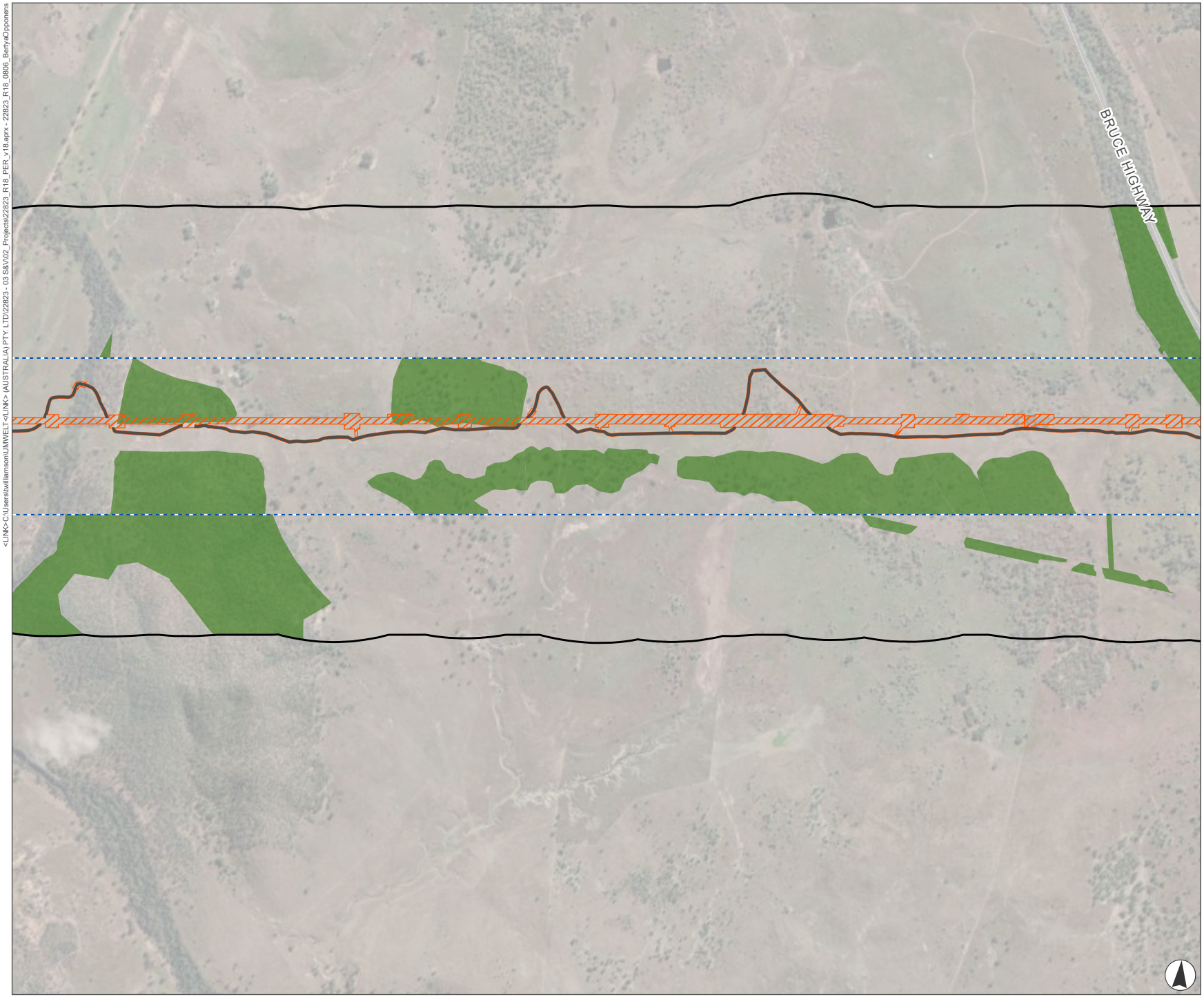


FIGURE 8.6-16

Berya opponens Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

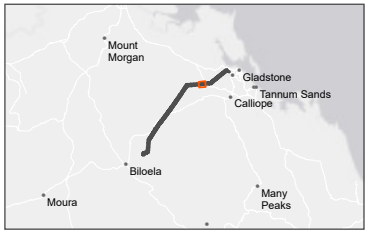
- Roads
- Field Survey Extent
- Project Area

***Bertya opponens* Habitat**

- Suitable Habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.6-17

Berya opponens Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

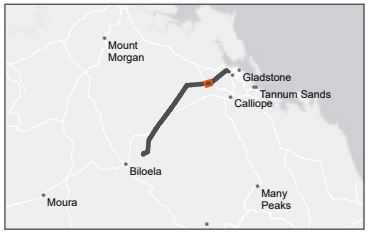
- Roads
- Field Survey Extent
- Project Area

***Bertya opponens* Habitat**

- Suitable Habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.6-18

Berya opponens Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

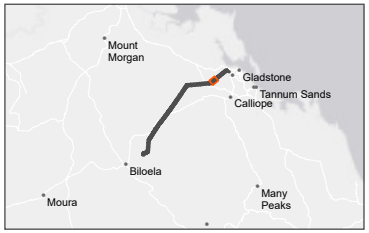
- Field Survey Extent
- Project Area

***Bertya opponens* Habitat**

- Suitable Habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.6-19

Berya opponens Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

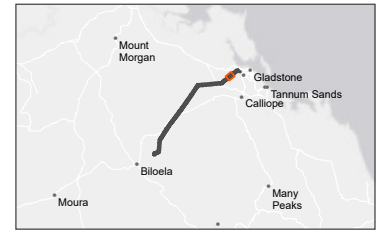
- Field Survey Extent
- Project Area

***Bertya opponens* Habitat**

- Suitable Habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.6-20

Berya opponens Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

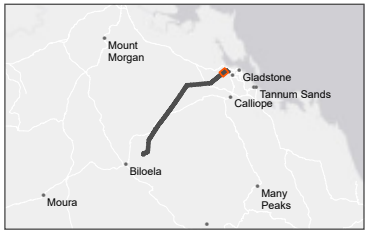
- Railway
- Watercourse
- Field Survey Extent
- Project Area

***Bertya opponens* Habitat**

- Suitable Habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.6-21

Berya opponens Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

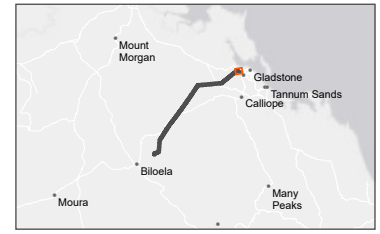
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area

***Bertya opponens* Habitat**

- Suitable Habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



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8.2.4.2 *Polianthion minutiflorum* (Small-flowered Polianthion)

Table 8.20 *Polianthion minutiflorum*: Ecology and Relevance to the Project Area

Polianthion minutiflorum	
Profile	**Conservation status:** Vulnerable **Distribution:** *Polianthion minutiflorum* is known from five areas in east Queensland, from Redcliffe Vale, about 110 km west of Mackay, south to Kingaroy, covering a distance of approximately 800 km (Department of the Environment, Water, Heritage and the Art, 2008); (Queensland Government, 2012). **Important Population**: Important populations have not been defined for the species. Therefore, the generic definition within **Section 8.1.2** has been adopted. As the species has not been recorded within the Project Area during field surveys, no important populations of *P. minutiflorum* are considered present. **Habitat:** This species grows in forests and woodlands on sandstone slopes and gullies with skeletal soil, or sometimes deeper sands adjacent to deeply weathered laterite (Department of the Environment, Water, Heritage and the Art, 2008); Queensland Government, 2012). Associated species and vegetation includes open woodland on sandy sandstone soils with *Acacia shirleyi* (lancewood), *Lysicarpus angustifolius* (budgeroo), *Corymbia aureola* (yellow bloodwood), *Eucalyptus corynodes, C. trachyphloia* (brown bloodwood), *E. cloeziana* (Gympie messmate): sandstone plateau with *E. dura, E. fibrosa* (broad-leaved ironbark), *Angophora leiocarpa* (rusty gum), *E. major* (grey gum) (Queensland Herbarium, 2012). **Historical records within the desktop search extent** The most recent WildNet record occurs approximately 9 km north of Section A of the Project Area at the Callide Mine, dating from 2006. Numerous other ALA records are known from this area near the mine and Callide Timber Reserve, with the closest record located 1.5 km north of Section A in 1996 (Atlas of Living Australia, 2025). **Habitat Critical to the Survival of the Species:** Habitat critical to the survival of *P. minutiflorum* is not defined in the Conservation Advice (Department of the Environment, Water, Heritage and the Arts, 2008a). Refer to **Section 8.1.1** for the generic definition that has been applied for this assessment. Habitat critical to the survival of *P. minutiflorum* will include habitat that is connected to the known, nearby population north-east and southwest of the Callide Mine in RE 11.10.13. This habitat may be necessary for the long-term maintenance of the species and has been conservatively considered as habitat critical to the survival. **Current Threats to the Species:** The main identified and potential threats to *P. minutiflorum*, as identified in the Conservation Advice for the species (Department of the Environment, Water, Heritage and the Arts, 2008a), are fire and vegetation clearing. **Recovery Plans:** There is no Recovery Plan for this species.

Polianthion minutiflorum

In the Project Area

Surveys: Field surveys have been undertaken within the Project Area from March 2023 to July 2025, which included four separate flora surveys. A total of 513 flora survey sites in line with relevant guidance material have been undertaken across the Project Area including quaternaries (394), secondaries (11), tertiaries (42), BioCondition assessments (55), TEC assessments (11) and opportunistic threatened species meanders.

Species occurrence: The species was not verified during field surveys. As numerous records occur within the vicinity to the Project Area and suitable habitat occurs within the Project Area, this species has been noted as having a high likelihood of occurring.

Suitable Habitat:

Suitable habitat within the Project Area reflects REs with a dominant eucalypt or SEVT canopy and occurring on land zone 10 (coarse grained sedimentary rocks), consisting of REs 11.10.3, 11.10.4, 11.10.8, 11.10.13. Areas that have been extensively surveyed have been excluded and includes a 5 m buffer associated with either side of field survey tracklogs for all vegetation communities.

Habitat within the Project Area

Habitat type	Habitat modelling criteria	Area (ha)	
		Within the Project Area	Within the Disturbance Footprint
Suitable habitat	Patches of RE 11.10.3, 11.10.4, 11.10.8, 11.10.13, in remnant or regrowth condition. A review of nearby species records shows this species is associated with vegetation communities dominated by eucalyptus spp. and occurring on sandy soils. Consequently, the determination of suitable habitat within the Project Area reflects REs with a dominant eucalypt or SEVT canopy and occurring on land zone 10 (coarse grained sedimentary rocks). Areas already surveyed have been excluded and includes a 5 m buffer associated with either side of field survey tracklogs for all vegetation communities.	440.3	8.1

Table 8.21 Assessment of Potential Project Impacts and Mitigation and Management Commitments for *Polianthion minutiflorum*

Potential Impact	Assessment	Mitigation Commitments
Direct		
Vegetation clearing causing habitat loss and fragmentation	Vegetation clearing required for construction will result in direct impacts to 8.1 ha of suitable habitat within the Disturbance Footprint. While it is considered suitable habitat, no individuals have been recorded within the Disturbance Footprint or Project Area.	• Identify MNES flora and TEC's through pre-clearance surveys • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Disturbance activities must be contained to Disturbance Footprint • 10 m protection zones will be maintained around MNES flora and TEC's where they are directly adjacent to disturbance activities • Pre-clearance surveys will be undertaken within suitable habitat within the Disturbance Footprint and for protected plants under the *Nature Conservation Act 1992* • Obtain relevant permits • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Clearing in proximity to retained individuals to maintain protection zone where possible • Clearing will be in accordance with all approval conditions • Where new populations of MNES threatened flora are identified, refer to Unexpected Finds Protocol • Refer to Table 5.1 and Table 5.2 of the MNES Management Plan for further details on mitigation measures.
Mortality	There are currently no known individuals within the Disturbance Footprint or Project Area. No individuals are proposed to be removed, however, there is a risk that the Project will result in mortality to individuals that haven't been recorded in field surveys to date.	• Pre-clearance surveys will be undertaken within suitable habitat within the Disturbance Footprint and for protected plants under the *Nature Conservation Act 1992* • Obtain relevant permits • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Clearance protection zones in proximity to retained individuals to be maintained. Clearing will be in accordance with all approval conditions • Where new populations of MNES threatened flora are identified, refer to Unexpected Finds Protocol • Refer to Table 5.2 of the MNES Management Plan for further details on mitigation measures.
Indirect		
Reduced habitat quality	The main environmental	• Baseline biosecurity surveys and ongoing inspections and management will be

Potential Impact	Assessment	Mitigation Commitments
or individual health due to edge effects	impacts of new edges created by the Project are considered to include: • The modification of microclimates where new edges are created due to a greater penetration of light and wind into the remaining vegetation. Microclimate changes should be expected in the creation of new edges as greater temperature extremes and lower air humidity are generally observed at edge communities, with this effect known to increase if vegetation is dense or cover is high. • Changes to soil properties including greater compaction and erosion, and less organic matter. • The introduction of weeds and pathogens through mud and dirt falling off vehicles. • The physical disturbance of edge vegetation. Ongoing impacts on newly created edge	undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • Refer to Table 5.5 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
	vegetation may occur through the upkeep of access tracks (e.g. weed control, grading). • Changes in vegetation community composition.	
Reduced habitat quality or individual health due to erosion and sedimentation	Erosion and sedimentation can smother vegetation and alter soil structure, reducing the availability of nutrients and suitable substrates for plant growth. Sediment deposition in nearby habitats can degrade water quality and disrupt microhabitats, leading to reduced habitat quality.	• Soil sampling and testing to inform both erosion and sediment control (ESC) and rehabilitation • Develop Erosion and Sediment Control Plan (ESCP) in accordance with the IECA Best Practice Erosion and Sediment Control Guidelines 2008 • Extent and duration of soil exposure will be minimised • Disturbed areas will be promptly stabilised. • Site is monitored and controls adjusted to maintain required performance standard • Minimum personnel requirements will apply for ESCP development and verification • Refer to Table 5.4 of the MNES Management Plan for further details on mitigation measures.
Exotic flora species colonisation and encroachment	Across all vegetation communities within the Project Area, weed species are common particularly exotic grasses. Exotic flora species are competitors for nutrients and resources needed to sustain this species. Exotic grasses are often promoted by landholders as a source of fodder/stock feed further exacerbating exotic flora encroachment.	• Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works

Potential Impact	Assessment	Mitigation Commitments
		• Refer to Table 5.5 of the MNES Management Plan for further details on mitigation measures.
Reduced habitat quality or individual health due to dust emissions	Dust emissions may result following construction activities and affect adjacent habitat. Dust can settle on adjacent vegetation, coating leaves and reducing photosynthesis, respiration, and growth.	• Dust suppression measures including vehicles restricted to approved tracks, cover all loose loads and set speed limits (<40 km/hr) • Application of dust suppressants as required • Dust generating activities will be limited on days with strong winds blowing towards sensitive receptors or dust sensitive locations • Regular monitoring and visual surveillance to trigger management actions will be undertaken • Refer to Table 5.4 of the MNES Management Plan for further details on mitigation measures.
Alterations to fire regimes including uncontrolled fires	Changes to fire frequency within the Project Area may impact on habitat and lead to degradation. Construction activities are unlikely to significantly alter existing grazing pressure or the implementation of land management practices currently employed by the landholder. Although the increased plant and vehicle presence will result in an increased number of potential ignition sources, employment of standard construction protocols will ensure the risk of bushfire is actively managed.	• Bushfire Management Plan will be developed • Burning of vegetation strictly prohibited unless a permit is obtained • Designated parking areas for vehicles and machinery • During operation, vegetation within the Disturbance Footprint will be managed in accordance with Powerlink's vegetation specification • Refer to Table 5.9 of the MNES Management Plan for further details on mitigation measures.

Table 8.22 Significant Impact Assessment: *Polianthion minutiflorum*

Impact Criteria	Assessment
Lead to a long-term decrease in the size of an important population of a species	**Unlikely.** There are currently no known populations within the Disturbance Footprint or the Project Area. Therefore, no known important population are likely to be impacted by the Project. There are Wildnet records for this species between 1995 and 2006 surrounding the Callide Time Reserve and Callide Mine, located up to 2 km from the Project Area. During construction, the pre-clearance survey unexpected finds protocol will be followed to ensure any potential impacts to the species (if observed) are avoided or managed appropriately. As a population is currently not known to occur within the Disturbance Footprint or Project Area and avoidance and management measures will be implemented if it is recorded, the Project is unlikely to lead to a long-term decrease in the size of a population.
Reduce the area of occupancy of an important population	**Unlikely.** There are currently no known populations within the Disturbance Footprint or Project Area. Therefore, based on current field knowledge, the Project will not reduce the size of occupancy of an important population. Should the species be recorded during pre-clearance surveys- micro-siting will be undertaken to minimise impacts to the species. The pre-clearance survey unexpected finds protocol will then be followed to ensure any potential impacts are avoided or managed appropriately. As no individuals are proposed to be removed by the Project, the Project is unlikely to reduce the area of occupancy of an important population.
Fragment an existing important population into two or more populations	**Unlikely.** There are currently no known populations within the Disturbance Footprint or Project Area. Therefore, the Project is unlikely to fragment an existing population into two or more populations. If this species is identified within the Disturbance Footprint during preclearance surveys, the number of individuals and extent will be recorded and infrastructure micro-sited to minimise the potential for fragmentation of the population. The pre-clearance survey unexpected finds protocol will then be followed to ensure any potential impacts on the species are avoided or managed appropriately. The Disturbance Footprint is co-located adjacent to existing transmission infrastructure, therefore reducing the likelihood for further fragmentation. The Project is therefore unlikely to fragment an existing population into two or more populations.

Impact Criteria	Assessment
Adversely affect habitat critical to the survival of a species	**Unlikely.** Potential habitat within the Project Area is connected to a known, nearby recorded occurrences and therefore, it has been conservatively considered as habitat critical to the survival of the species, noting that a population or individuals have not been recorded within the Disturbance Footprint or the Project Area. While the Project may result in the loss of suitable habitat of 8.1 ha, the removal of vegetation ranges from 30–60 m in width and is of linear nature and positioned next to an existing transmission line reducing additional fragmentation. Additionally, based on field surveys, state vegetation mapping and aerial image interpolation, this vegetation community is widespread and abundant within the adjacent areas of existing species records. Indirect impacts on identified habitat will be managed via the implementation of the MNES Management Plan. Micro-siting will be undertaken, and the pre-clearance survey unexpected finds protocol will be followed. This will ensure any potential impacts are avoided or managed appropriately. It is considered unlikely that the Project will adversely affect habitat critical to the survival of the species.
Disrupt the breeding cycle of an important population	**Unlikely.** There are currently no known populations with the Disturbance Footprint or Project Area and the closest known records are 2 km east of Section B on grazing land adjacent to the Callide Timber Reserve. Information is limited on the pollination and dispersal mechanism of the species but the bright albeit small and inconspicuous (to human) flowers are typical adaptations to attract insect and vertebrate pollination and dispersal. The Project may disrupt the breeding cycle of the species through altered fire regimes, removal of potential habitat and exacerbating weed incursion. These risks will be managed through the implementation of the MNES Management Plan. Given a population of the species is not known from the Disturbance Footprint or Project Area, and the Project will manage potential threats to the species, it is unlikely that the Project will disrupt the breeding cycle of a population.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely.** A maximum of 8.1 ha of suitable habitat within the Disturbance Footprint is proposed to be impacted by the Project. Retained suitable habitat within the Project Area will not be subject to further degradation from dust and weed incursion during construction due to active monitoring and management as required through the MNES Management Plan. Therefore, the removal of 8.1 ha of suitable habitat for this species is unlikely to cause the species to decline.

Impact Criteria	Assessment
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**Unlikely.** Weeds aren't a recognised threat to this species; however, fire sensitivity is noted as a threat. Weeds were recorded throughout the Project Area, in varying degrees of severity. There is an inherent risk of weed dispersal with any infrastructure project. Specifically, the incursion of high-biomass exotic pasture grass species such as *Cenchrus ciliaris* and *Megathyrsus maximus* which may further increase fire risk. Therefore, the Project will follow best practice construction and operational methods throughout the Disturbance Footprint. Therefore, it is unlikely that the Project will result in an invasive species becoming established.
Introduce disease that may cause the species to decline	**Unlikely.** Disease is not an identified threat to the species. The Project will follow best practice construction and operational methods to prevent the spread of disease throughout the Disturbance Footprint. Therefore, it is unlikely that the Project will result in the introduction of a disease that may cause the species to decline.
Interfere substantially with the recovery of the species	**Unlikely.** Regional and local priority recovery and threat abatement actions presented in the Conservation Advice (Department of the Environment, Water, Heritage and the Arts, 2008d) include: • Avoiding habitat loss, disturbance and modification of *Polianthion minutiflorum* habitat. • Enable recovery of additional sites and/or populations. • Raise awareness within the local community. • Develop and implement suitable fire management strategies. No individuals have currently been recorded within the Disturbance Footprint or Project Area, and pre-clearance surveys will be undertaken across all 8.1 ha of suitable habitat for *Polianthion minutiflorum*. Up to 8.1 ha of area of suitable habitat would be cleared for the Project. The Project has been designed to co-locate with existing transmission line infrastructure, reducing ecological impacts. No populations were recorded within the Disturbance Footprint. Following pre-clearance surveys, if the species is identified within the Disturbance Footprint, the plants or population area, including a minimum 5 m buffer, will be demarcated and avoided via micro-siting where possible. Additionally, sections of the Disturbance Footprint including those associated with the temporary construction phase will be stabilised with native ground cover species. Indirect impacts on identified habitat will be managed via the implementation of the MNES Management Plan. Given the species is not known to occur in the Project Area and a suite of mitigation measures will be implemented which would reduce impacts to the area of potential occurrence, it is unlikely that the Project would interfere substantially with the recovery of the species.
Significant Residual Impact	**Unlikely to have a significant impact**

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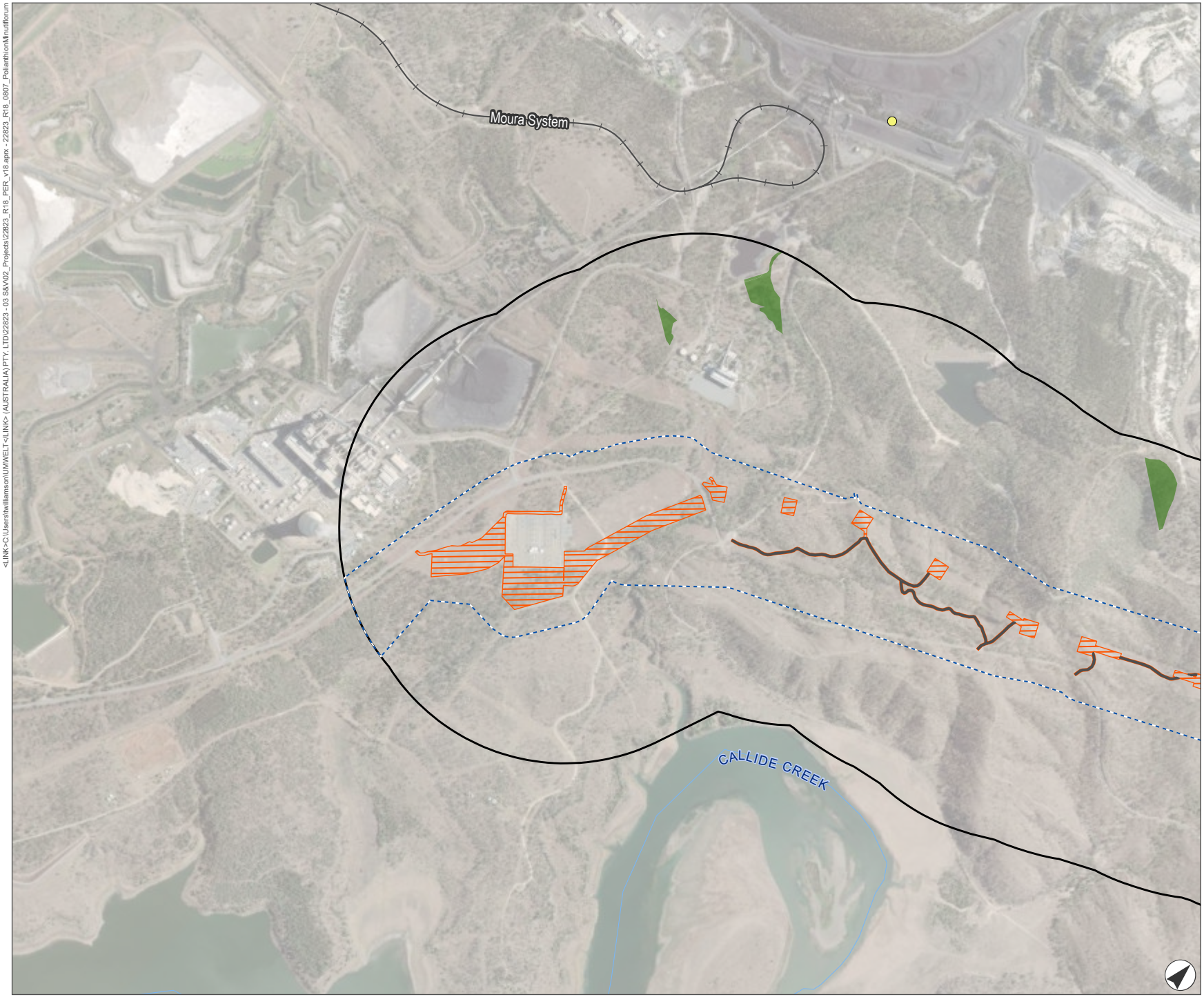


FIGURE 8.7-1

Polianthion minutiflorum Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

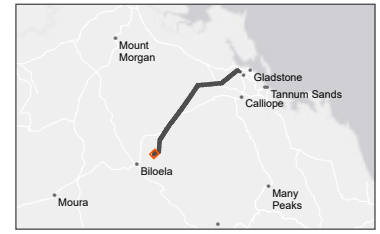
- Railway
- Watercourse
- Project Area
- Field Survey Extent
- *Polianthion minutiflorum* Records (ALA)

***Polianthion minutiflorum* Habitat**

- Suitable Habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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FIGURE 8.7-2

Polianthion minutiflorum Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

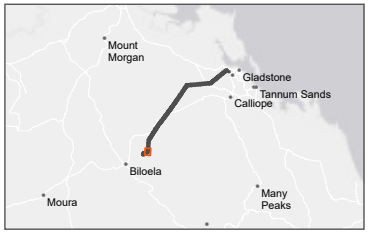
- Watercourse
- Project Area
- Field Survey Extent

***Polianthion minutiflorum* Habitat**

- Suitable Habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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Kilometres

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FIGURE 8.7-3

Polianthion minutiflorum Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

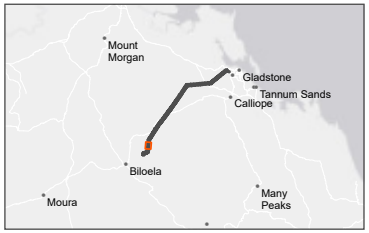
- Project Area
- Field Survey Extent

***Polianthion minutiflorum* Habitat**

- Suitable Habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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Kilometres

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FIGURE 8.7-4

Polianthion minutiflorum Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

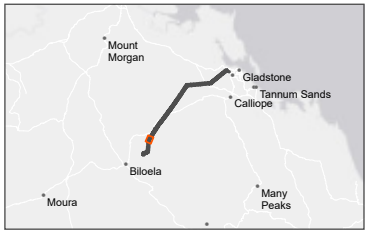
- Project Area
- Field Survey Extent

***Polianthion minutiflorum* Habitat**

- Suitable Habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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8.2.4.3 *Samadera bidwillii* (Quassia)

Table 8.23 *Samadera bidwillii*: Ecology and Relevance to the Project Area

Samadera bidwillii	
Profile	**Conservation status** Vulnerable **Distribution** *Samadera bidwillii* is endemic to Queensland and is currently known to occur in several localities between Scawfell Island near Mackay and Goomboorian, north of Gympie (Department of the Environment Water Heritage and the Arts, 2008b). **Important population** Important populations have not been defined for the species. Therefore, the generic definition within **Section 8.1.2** has been adopted. The populations within the Project Area occur *at* the western extent of the species range and is therefore considered an important population. Genetic diversity of the Callide populations is regarded as extremely low and lack allelic diversity, however individuals also contain the presence of private alleles indicating with the low diversity, these populations contain unique gene versions that are not found anywhere else in the species. Reproduction is entirely clonal via root suckering (no fruiting was observed) (Naik et al. 2016);therefore, the populations within the Project Area are considered necessary for maintaining genetic diversity. The Callide populations reproduce via root-suckering, therefore it is not considered a key source population. **Historical records within the desktop search extent** Two recent Wildnet records from 2021 occur within the desktop search extent, with one occurring 9 km north of Section D at Mt Larcom and the other situated 8 km west of Section A within the Callide Ranges. Additional ALA records occur as close as 200 m from the Project Area (dated 2018), near the Callide Mine (Atlas of Living Australia, 2025). An ALA record from 2025 occurs within 1 km of Section D. **Habitat** *Samadera bidwillii* commonly occurs in lowland rainforest or at rainforest margins, but it can also be found in other forest types, such as open eucalypt forest and woodland. It is commonly found in areas adjacent to both temporary and permanent watercourses in locations up to 510 m altitude (Department of the Environment Water Heritage and the Arts, 2008b). The species occurs on lithosols, skeletal soils, loam soils, sands, silts and sands with clay subsoils (Department of the Environment Water Heritage and the Arts, 2008b). Commonly associated tree species for *Samadera bidwillii* include *Blakella citriodora, Eucalyptus propinqua, E. acmenoides, E. tereticornis, Corymbia intermedia, E. siderophloia, E. moluccana, E. cloeziana* and *E. fibrosa*. **Habitat critical to the survival of the species** Habitat critical to the survival of *S. bidwillii* is not defined in the Conservation Advice (Department of Climate Change, Energy, the Environment and Water, 2008). Refer to **Section 8.1.1** for the generic definition that has been applied for this assessment.

Samadera bidwillii	
	Habitat critical to the survival of *S. bidwillii* will include any occupied (known) habitat for the species due to its importance in maintaining the genetic diversity and long-term evolutionary development of the species. Therefore, known habitat within the Project area is considered critical to the survival of the species. **Current threats to the species** The main identified and potential threats to *S. bidwillii*, as identified in the Conservation Advice for the species (Department of Climate Change, Energy, the Environment and Water, 2008) are soil erosion and habitat clearing resulting from a range of activities (forestry, urban development and recreational activities),inappropriate fire regimes and exotic shrubs and grasses (e.g. *Lantana camara**, *Megathyrsus maximus* var. *maximus** and *Chloris gayana**). Habitat fragmentation and insect attack from *Atteva albiguttata* has also been identified as a threat to this species (Naik et al. 2016). **Recovery plans** A recovery plan has not been adopted for this species.
In the Project Area	**Surveys** Field surveys have been undertaken within the Project Area from March 2023 to July 2025, which included four separate flora surveys. A total of 513 flora survey sites in line with relevant guidance material have been undertaken across the Project Area including quaternaries (394), secondaries (11), tertiaries (56), BioCondition assessments (55), TEC assessments (11) and opportunistic threatened species meanders. **Species occurrence** *S. bidwillii* was recorded within Section B of the Project Area, within and to the south of the Callide Timber Reserve. Within and adjacent to the Disturbance Footprint approximately 541 individual stems were recorded across two populations approximately 500 m from each other. A literature review of this species identified a study by Naik et al. (2016) discussing the population ecology, genetics and propagation methods of this species and includes stems observed during field surveys for the Project as a part of this Study. Surveys completed by Naik et al. (2016) denoted 3 separate Callide populations (A1, B1, C1) as part of the Study. In the study by Naik et al. (2016) surveys of the Callide populations were undertaken between December 2010 and December 2013. Populations in the Study by Naik et al. (2016) which fall within the Project's Disturbance Footprint were delineated as population B1 and population C1. An additional population, population A1 was identified by Naik et al. (2016) approximately 1 km to the east of population B1 (**Plate 8.1**). As it is difficult to determine a single individual due to the propensity of this species to coppice, Project field survey counts were completed by observing the number of stems and reflects population estimated completed by Naik et al.(2016). *S. bidwillii* populations as described by Naik et al. (2016) are as follows: • Population A1: ~3.34 ha with a plant density of 2,920 stems per hectare (population estimate of approximately 9,750 stems) • Population B1: ~3.84 ha with a plant density of 3,720 stems per hectare (population estimate of approximately 14,285 stems) • Population C1: ~0.84 ha with a plant density of 3,200 stems per hectare (population estimate of approximately 2,690 stems)

Samadera bidwillii

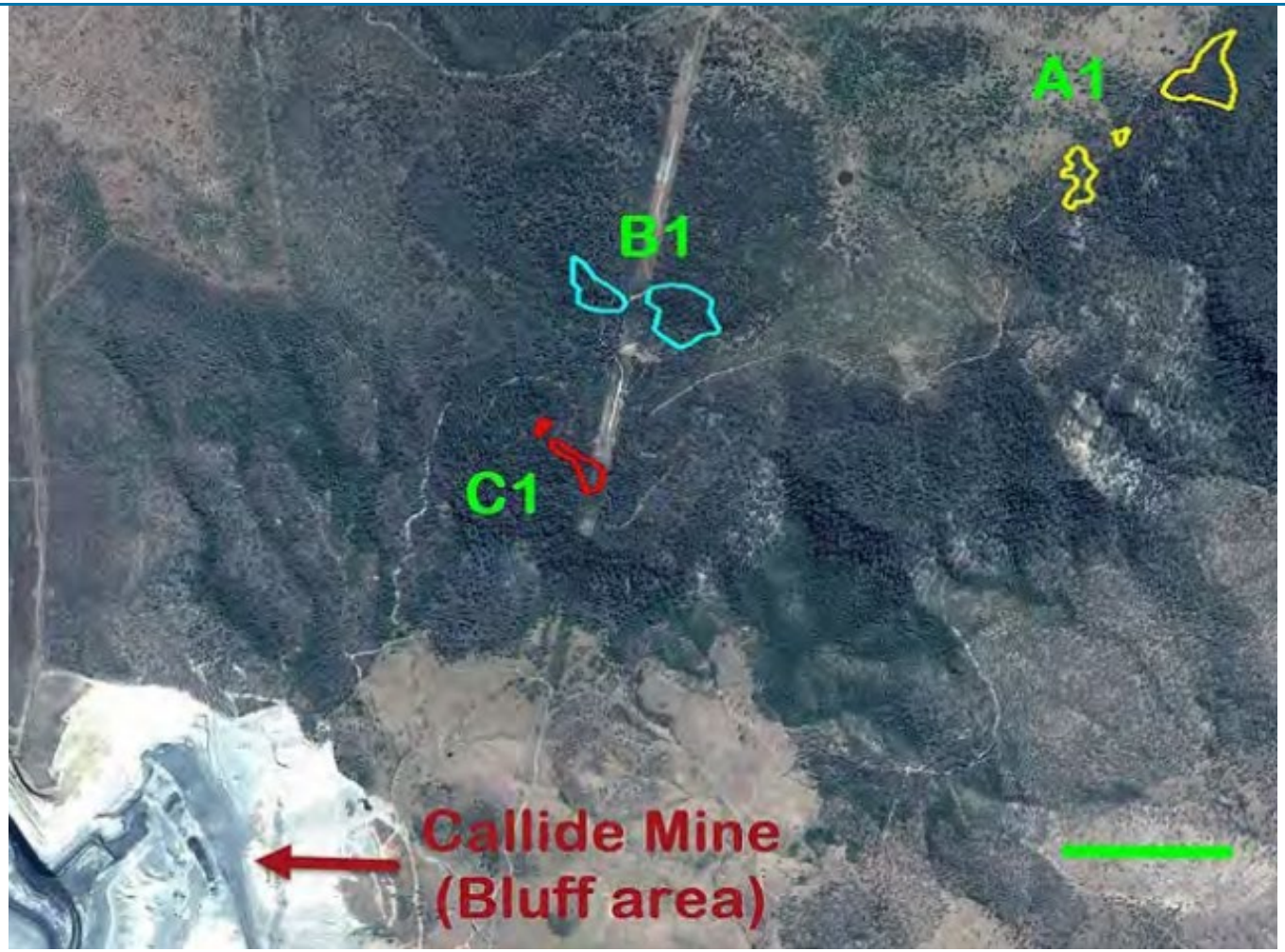


Plate 8.1 The Callide populations of *Samadera bidwillii* as identified by Naik et al. (2016)

During field surveys all stems were recorded within remnant RE 11.10.13, which is a eucalypt woodland dominated by *Eucalyptus cloeziana* to 18 m tall, with subdominant *Eucalyptus melanoleuca, Corymbia trachyphloia* and *Blakella citriodora*. A lower understorey up to 10m is dominated by closely spaced acacia species. The *S. bidwillii* stems observed during field surveys ranged from 0.2 m to 2.2 m in height.

Samadera bidwillii

Habitat within the Project Area				
Habitat type	**Habitat modelling criteria**	**Area (ha)**		
		Project Area	**Disturbance Footprint**	
			Full clearing	Selective clearing
Known habitat	A 10 m buffer around known records or patches. Literature of known populations of this species in the Callide area highlight that these individuals flower but appear not to fruit, with reproduction associated with coppicing (Naik et al. 2016). The Australian Standard 4970-2009 was reviewed to develop a suitable buffer to encompass known habitat based on a tree protection zone (TPZ). All individuals observed were less than 2 m tall and stem diameters at 1.4 m above the ground are estimated to be 2 cm, giving a TPZ radius of 2 m. A factor of 5 was applied to the Structural Root Zone (SRZ) to cover root structure and encompass the potential for coppicing. This provides a conservative 10 m buffer of known habitat around individuals or stems. Known habitat mapping has been confined to communities identified as suitable habitat for this species.	1.8	-	0.2
Suitable habitat	Remnant and regrowth RE 11.8.4, 11.10.3, 11.10.4, 11.10.8, 11.10.13, 11.11.10, 11.11.15, 11.11.3/c, 11.11.4/c, 11.11.18, 11.12.1, 11.12.6, 11.3.25 11.3.26, 11.3.4, 12.11.16, 12.11.6 and 12.3.3. *Samadera bidwillii* is a geographically widespread species being recorded at both ends of the Project Area. Suitable habitat includes all remnant and regrowth areas of eucalypt woodland and forests and semi-evergreen vine thicket. It excludes open woodland communities as they fall outside the habitat definition for this species. Areas already surveyed have been	6,503.0	96.7	19.0

Samadera bidwillii	
	excluded and includes a 5 m buffer associated with either side of field survey tracklogs for all vegetation communities.
Within the Disturbance Footprint, existing clearing along current access tracks totals 0.3 ha of suitable habitat. Individuals of this species are not present on the access tracks, but these areas fall within the buffer of known records. These access tracks are currently maintained and utilised for the existing transmission line and will continue as such with the Project in operation. As a consequence of the existing utilisation of the access tracks, areas that overlap with buffered suitable habitat along current access tracks have not been included in the calculations for impacts to this species.	

Table 8.24 Assessment of Potential Project Impacts and Mitigation and Management Commitments for *Samadera bidwillii*

Potential Impact	Assessment	Mitigation Commitments
Direct		
Vegetation clearing causing habitat loss and fragmentation	Vegetation clearing required for construction will result in direct impacts to 0.2 ha of known habitat and 115.7 ha of suitable habitat within the Disturbance Footprint.	• Identify MNES flora and TEC's through pre-clearance surveys • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Disturbance activities must be contained to Disturbance Footprint • 10 m protection zones will be maintained around MNES flora and TEC's where they are directly adjacent to disturbance activities • Refer to Table 5.1, MNES Management Plan for further details on mitigation measures.
Mortality	There are two patches of individuals/stems within the Disturbance Footprint / Project Area. Several individuals/stems are proposed to be removed associated with access track widening; however, the majority of individuals/stems will be retained in-situ with the selective removal of incompatible canopy species (species which or have the potential to grow into the safe	• Pre-clearance surveys will be undertaken within suitable habitat within the Disturbance Footprint and for protected plants under the *Nature Conservation Act 1992* • Obtain relevant permits • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Clearance protection zones in proximity to retained individuals to be maintained. Clearing will be in accordance with all approval conditions • Where new populations of MNES threatened flora are identified, refer to Unexpected Finds Protocol • Demarcate stems/individuals/populations within 10 m of the Disturbance Footprint

Potential Impact	Assessment	Mitigation Commitments
	electrical distance of the transmission line).	• Utilise spotter during clearing activity where clearing extent may be obscured • Refer to Table 5.2 of the MNES Management Plan for further details on mitigation measures.
Interruption to reproduction	The population within the Project Area is known to reproduce from root suckering only with low genetic diversity. Despite thousands of stems, these may represent very few genetic individuals, making the populations vulnerable to disturbance. The loss of taller stems and clearing of vegetation may interrupt reproduction.	• Long term monitoring to identify any increased mortality or health of retained individuals/stems associated with selective removal of incompatible canopy species, as noted in the MNES Management Plan.
Indirect		
Reduced habitat quality or individual health due to edge effects	The main environmental impacts of new edges created by the Project are considered to include: • The modification of microclimates where new edges are created due to a greater penetration of light and wind into the remaining vegetation. Microclimate changes should be expected in the creation of new edges as greater temperature extremes and lower air humidity are generally observed at edge communities, with this effect known to increase if vegetation is dense or cover is high.	• Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • Refer to Table 5.5 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
	• Changes to soil properties including greater compaction and erosion, and less organic matter. • The introduction of weeds and pathogens through mud and dirt falling off vehicles. • The physical disturbance of edge vegetation. Ongoing impacts on newly created edge vegetation may occur through the upkeep of access tracks (e.g., weed control, grading). • Changes in vegetation community composition.	
Reduced habitat quality due to the removal of canopy trees above existing occurrences of this species	To limit the removal of individuals/stems, mid span clearing will target the canopy above *S. bidwillii* leaving individuals/stems in-situ. This process is to ensure the Project can maintain a safe electrical distance to avoid flash over. The Project will selectively remove incompatible canopy species aiming to avoid direct impacts to *S. bidwillii*.	• Pre-clearance surveys will be undertaken within suitable habitat within the Disturbance Footprint and for protected plants under the *Nature Conservation Act 1992* • Obtain relevant permits • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Clearing in proximity to retained individuals to maintain protection zones where possible • Clearing will be in accordance with all approval conditions • Where new populations of MNES threatened flora are identified, refer to Unexpected Finds Protocol • Demarcate stems/individuals/populations within 10 m of the Disturbance Footprint • Utilise spotter during clearing activity where clearing extent may be obscured • Refer to Table 5.2 of the MNES Management Plan for further details on mitigation measures.
Reduced habitat quality or individual	Erosion and sedimentation can smother vegetation and alter soil structure, reducing the availability of	• Soil sampling and testing to inform both erosion and sediment control (ESC) and rehabilitation

Potential Impact	Assessment	Mitigation Commitments
health due to erosion and sedimentation	nutrients and suitable substrates for plant growth. Sediment deposition in nearby habitats can degrade water quality and disrupt microhabitats, leading to reduced habitat quality.	• Develop Erosion and Sediment Control Plan (ESCP) in accordance with the IECA Best Practice Erosion and Sediment Control Guidelines 2008 • Extent and duration of soil exposure will be minimised • Disturbed areas will be promptly stabilised • Site is monitored and controls adjusted to maintain required performance standard • Minimum personnel requirements will apply for ESCP development and verification • Refer to Table 5.4 of the MNES Management Plan for further details on mitigation measures.
Exotic flora species colonisation and encroachment	Across all vegetation communities within the Project Area, weed species are common particularly exotic grasses. Exotic flora species are competitors for nutrients and resources needed to sustain this species. Exotic grasses are often promoted by landholders as a source of fodder/stock feed further exacerbating exotic flora encroachment.	• Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • Refer to Table 5.5 of the MNES Management Plan for further details on mitigation measures.
Reduced habitat quality or individual health due to dust emissions	Dust emissions may result following construction activities and affect adjacent habitat. Dust can settle on adjacent vegetation, coating leaves and reducing photosynthesis, respiration, and growth.	• Dust suppression measures including vehicles restricted to approved tracks, cover all loose loads and set speed limits (<40 km/hr) • Application of dust suppressants as required • Dust generating activities will be limited on days with strong winds blowing towards sensitive receptors or dust sensitive locations • Regular monitoring and visual surveillance to trigger management actions will be undertaken

Potential Impact	Assessment	Mitigation Commitments
		• Refer to Table 5.4 of the MNES Management Plan for further details on mitigation measures.
Alterations to fire regimes including uncontrolled fires	Changes to fire frequency within the Project Area may impact on habitat and lead to degradation. Construction activities are unlikely to significantly alter existing grazing pressure or the implementation of land management practices currently employed by the landholder. Although the increased plant and vehicle presence will result in an increased number of potential ignition sources, employment of standard construction protocols will ensure the risk of bushfire is actively managed.	• Bushfire Management Plan will be developed • Burning of vegetation strictly prohibited unless a permit is obtained • Designated parking areas for vehicles and machinery • During operation, vegetation within the Disturbance Footprint will be managed in accordance with Powerlink's vegetation specification • Refer to Table 5.9 of the MNES Management Plan for further details on mitigation measures.

Table 8.25 Significant Impact Assessment: *Samadera bidwillii*

Impact Criteria	Assessment
Lead to a long-term decrease in the size of an important population of a species	**Likely.** A total of approximately 541 stems were recorded across two separate populations within the Project Area and reflect portions of population B1 and population C1 as identified in surveys completed by Niak (2016). The parameters of population B1 and population C1as detailed by Niak (2016) are 3.84 ha with 3,720 stems per hectare for population B1 (14, 285 total stems) and 0.84 ha with 3,200 stems per hectare for population C1 (2, 688 total stems). A total of 330 stems were recorded within population B1 and 211 stems within population C1 within the Project Area. Based on the Disturbance footprint *S. bidwillii* stems in population B1 will be directly removed or over spanned. Within population C1, *S. bidwillii* stems will be over-spanned, however there is potential for stems to be impacted due to vegetation required to be removed to manage fire risk associated with the terrain. As an estimate of the total of the populations this equates to 0.3% of population B1 and 4.5% of population C1 likely impacted. According to Naik et al. (2016), the populations within the Callide Mine area comprises three distinct populations (A1, B1, C1) and these populations reproduce via root suckering. The populations lack allelic diversity, but exhibit the presence of private alleles, have high clonality and are genetically isolated; therefore, the populations should be treated

Impact Criteria	Assessment
	with care to preserve genetic diversity. Additionally, the species is slow growing, and replenishment of the population would require a longer time period over other flora species. These populations are considered important populations as they are necessary for maintaining genetic diversity and their location is at the edge of the species range. The Project is proposing to clear or modify (in the mid span) 0.2 ha of known habitat (approximately 4% of the existing population B1 and C1 combined within the Disturbance Footprint), as well as 115.7 ha of suitable habitat for the species. Despite thousands of stems across each population, these represent very few genetic individuals making the populations highly vulnerable to disturbance. There is limited information associated with this species, and it is unknown how the in-situ stems will persist and in what condition over the longer term with the selective removal of incompatible canopy species. The microclimate change, potential introduction of weeds, susceptibility to insect attack and altered fire regime in response to weed incursions (as described in the conservation advice) will all contribute to a likely decline in the species. Within the C1 population in particular, which has an estimated population of 2,688 stems, this equates to an estimated 4.5% loss of stems in this population. Based on the information detailed within *Conservation ecology, genetics and propagation of the threatened species Samadera bidwillii (Hook.f.) Oliv* (Naik et al. 2016) regarding the importance of the populations within the Project Area; due to the removal individuals/stems, the removal/modification of 0.2 ha of known habitat and the unknown effects of canopy removal to in-situ stems, it is likely that the Project will lead to a long-term decrease in the size of an important population.
Reduce the area of occupancy of an important population	**Likely.** The area of occupancy is not published for this species. The estimated area of the Callide populations of this species intersecting the Disturbance Footprint as detailed by Naik et al. (2016) is 3.84 ha (B1) and 0.84 ha (C1). Under the mid-span where this species is recorded (population B1 and population C1) it is proposed that individuals/stems will remain in-situ with the canopy selectively cleared of incompatible species to ensure the Project can maintain a safe electrical distance to avoid flash over. It is unknown if individuals will survive in-situ with canopy alteration given this species observed preference for shadier conditions or commonly occurring in lowland rainforest, rainforest margins, as well as open forest and woodland. Information pertaining to this species does not suggest this species as occurring in open (non-remnant) areas. The Project is proposing to clear or modify 0.2 ha of known habitat, as well as 115.7 ha of suitable habitat for the species. The species is likely to already have a small area of occupancy, based on the small number of known populations. Therefore, the removal of the individuals, coupled with the assumption that the Project may render suitable habitat unusable due to an inability of the species to utilise open non-remnant areas it is likely that the Project will reduce the area of occupancy of the important population.

Impact Criteria	Assessment
Fragment an existing important population into two or more populations	**Potential**. The B1 population of this species exists within the Project Area and is currently fragmented by the existing transmission line. The Disturbance Footprint is to be co-located adjacent to the existing transmission infrastructure, therefore reducing the likelihood for further fragmentation of this population from the proposed transmission infrastructure. Population C1 is located across the Disturbance Footprint within the mid-span of the transmission infrastructure. Population B1 and C1 are separated by approximately 500 m and Project construction is unlikely to alter the separation of these populations. It is noted that the populations within the Project Area are known to reproduce by suckering, therefore, may be susceptible to the creation of narrow gaps or the removal of the tree canopy in mid span areas. The widening of the access track to 10 m in width traversing through population B1 may divide this population further based the current reproductive process of these individuals. However, it is unknown if a 10 m separation will fragment this population further than it is presently. The Disturbance Footprint will bisect the C1 population through the centre. The Disturbance Footprint at the location of the C1 population is within the mid-span, where individuals will be over-spanned and the canopy removed above with stems to remain in-situ. The mid-span width at this location is approximately 30 m. It is unknown if individuals will survive in-situ with canopy loss associated impacts including microclimate change, expansion of weeds, susceptibility to insect attack and altered fire regime in response to weed incursions (as described in the conservation advice). During the development of the original transmission line, the B1 population was also bisected through the centre. Surveys completed by Naik et al. (2016) outlines the B1 population as two separate entities (as shown in Plate 8.1) and termed sub-populations, which over time have the potential to become genetically distinct. The same process has the potential to occur with the C1 population, particularly if the in-situ stems are lost due to weed competition or and an inability to adapt to a non-remnant canopy free condition. As there is limited data regarding this species and there is uncertainty as to the ability of the species to adapt in-situ in an area with the canopy removed, there is a potential that the Project will fragment the existing C1 population and fragment the B1 population further than is presently occurring within the Project Area.
Adversely affect habitat critical to the survival of a species	**Potential.** Known habitat within the Project Area is considered habitat critical to the survival of the species. The Project will result in the loss or modification of 0.2 ha of habitat critical to the survival of the species, with areas lost for access track widening and a tower pad, as well as other areas modified by canopy removal in mid-span locations. In areas where the canopy is proposed to be removed, stems will remain in-situ. It is unknown if individuals will survive in-situ with canopy loss given this species observed preference for shadier conditions or commonly occurring in lowland rainforest, rainforest margins, as well as open forest and woodland. Information pertaining to this species does not suggest this species as occurring in open (non-remnant) areas.

Impact Criteria	Assessment
	The B1 population is estimated to encompass 3.84 ha (Naik et al. 2016) of which the project will modify or remove 0.19 ha which equates to approximately 4.9% of the habitat critical to this population. The C1 population covers an area of 0.84 ha (Naik et al. 2016) of which the Project will modify 0.12 ha which equates to approximately 14.2% of the habitat critical to this population. Indirect impacts during construction in identified habitat (exotic weed species, dust and erosion and sediment control) will be managed via the implementation of the MNES Management Plan. The loss or modification of 0.2 ha known habitat suggests the Project has the potential to adversely affect habitat critical to the survival of the species.
Disrupt the breeding cycle of an important population	**Unlikely.** Information is limited on the dispersal mechanism of the species, but the fruits have a fibrous structure at the base with a cavity between the endocarp that allows them to float in water (Naik et al. 2016). A fleshy fruit also suggest adaptations to attract vertebrate animals for dispersal. Little is known of the pollination of the species in the wider environment. It is suggested by Naik et al. (2016) that this species is likely insect-pollinated, but pollinator scarcity and possible self-incompatibility limit seed set occurs in some populations. If the species is self-incompatible, isolated populations (like those at Callide) may fail to produce seeds because there are no genetically different mates nearby. This may explain why all populations (A1, B1 and C1) within the Callide area are known to rely on clonal reproduction (root suckering) instead of seeds. Clearing may destroy the interconnected root systems that enable clonal spread, effectively killing sections of the original plant network. Further, unlike sexually reproducing populations, these populations cannot recover through seed dispersal after disturbance. Finally, loss of stems from clearing may eliminate entire genotypes or genetic make-up, further reduce genetic resilience and increasing local population extinction risk. The majority of clearing will leave individuals/stems in-situ under the mid-span locations; however, *S. bidwillii* stems may be directly impacted for access track expansion or selective canopy clearing from population B1. The estimated population of B1 is approximately 14,285 stems, therefore, as an estimate of the total of the population which may be impacted this equates to 0.3% of population B1. As highlighted the Callide populations rely on clonal reproduction rather than other forms of pollination; due to this preference, there is no reliance on pollination, and the presence of other stems continues the persistence of these populations. Similarly, the absence of fruit, avoids the loss of seeds and poor seed viability as clonal reproduction in the remaining stems will ensure the continuation of the population in the longer term. During construction, weed incursions will be managed through the MNES Management Plan limiting impacts.

Impact Criteria	Assessment
	Whilst there will be the removal of individuals/stems within the Disturbance Footprint, the remainder will be left in-situ and clonal reproduction in the remaining stems will ensure the continuation of the population in the longer term. Therefore, the Project is unlikely to disrupt the breeding cycle of an important population.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely.** The Project is proposing to remove or modify 0.2 ha of known habitat (from the B1 and C1 populations); the other larger Callide population (A1) will remain unaffected by the Project. The species can persist in remnant and regrowth vegetation and can be present in a broad range of vegetation types, highlighting a very general requirement of habitat, however, the species is not known to inhabit non-remnant areas. Existing potential habitat is already fragmented and modified with numerous weed species and active grazing occurs across large portions of the Project Area. Significant historical clearing has also occurred across much of the Project Area. Retained suitable habitat within the Project Area will not be subject to further degradation from dust and weed incursion during construction due to active monitoring and management as required through the MNES Management Plan. Therefore, it is unlikely that the Project will result in species decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**Likely.** Weeds incursion is a known threat to *Samadera bidwillii*, as is fire sensitivity. Weeds were recorded throughout the Disturbance Footprint, in varying degrees of severity. There is an inherent risk of weed dispersal with any infrastructure project. Specifically, the incursion of exotic pasture grass species such as *Cenchrus ciliaris** and *Megathyrsus maximus* var. *maximus** which increase species competition for resources and may further increase fire risk. The Project will follow best practice construction and operational methods, to limit the spread of weeds associated with Project construction. The existing easement contains multiple exotic ground cover and grass which will likely encroach into the over-span areas of the course of several seasons post construction, potentially impacting *S. bidwillii* stems. Following construction, with significant monitoring and adaptive weed control management actions would be required long term in the areas of selective canopy removal over-spanning stems of this species to ensure an unlikely significance outcome.
Introduce disease that may cause the species to decline	**Unlikely.** Disease is not an identified threat to the species. The Project will follow best practice construction and operational methods to prevent the spread of disease throughout the Disturbance Footprint. Therefore, it is unlikely that the Project will result in the introduction of a disease that may cause the species to decline.

Impact Criteria	Assessment
Interfere substantially with the recovery of the species	**Potential.** Recovery actions have been identified in the *Approved Conservation Advice for Quassia bidwillii (Quassia)* (Department of Climate Change, Energy, the Environment and Water, 2008). These actions include: • Identify sites of high conservation value, establish a protective buffer to exclude clearing, ensure road maintenance doesn't affect known populations. • Develop and implement a management plan for weeds that links with a fire management strategy. • Fire: implement a suitable fire management strategy, prevent fire on sites where Lantana camara is a threat. • Increase conservation awareness. • Establish additional populations. The Project will modify 0.2 ha of known habitat, as well as 115.7 ha of suitable habitat. The Project co-locates with existing transmission line infrastructure, reducing ecological impacts. Weed management protocols outlined in Table 5.5 of the MNES Management Plan would minimise the risk of introducing or causing the proliferation of weed infestations throughout the Disturbance Footprint during construction. Longer term adaptive weed management and monitoring would be required to ensure weed species did not encroach into in-situ *S. bidwillii* in the over-span areas. The Project will result in removal of individuals and clearance or modification of known habitat and suitable habitat; as a result, it does not work to support the recovery actions. The removal of these individuals and habitat, and the resultant impact to the population may substantially interfere with the recovery of the species.
Significant Residual Impact	**Likely to have a significant impact.**

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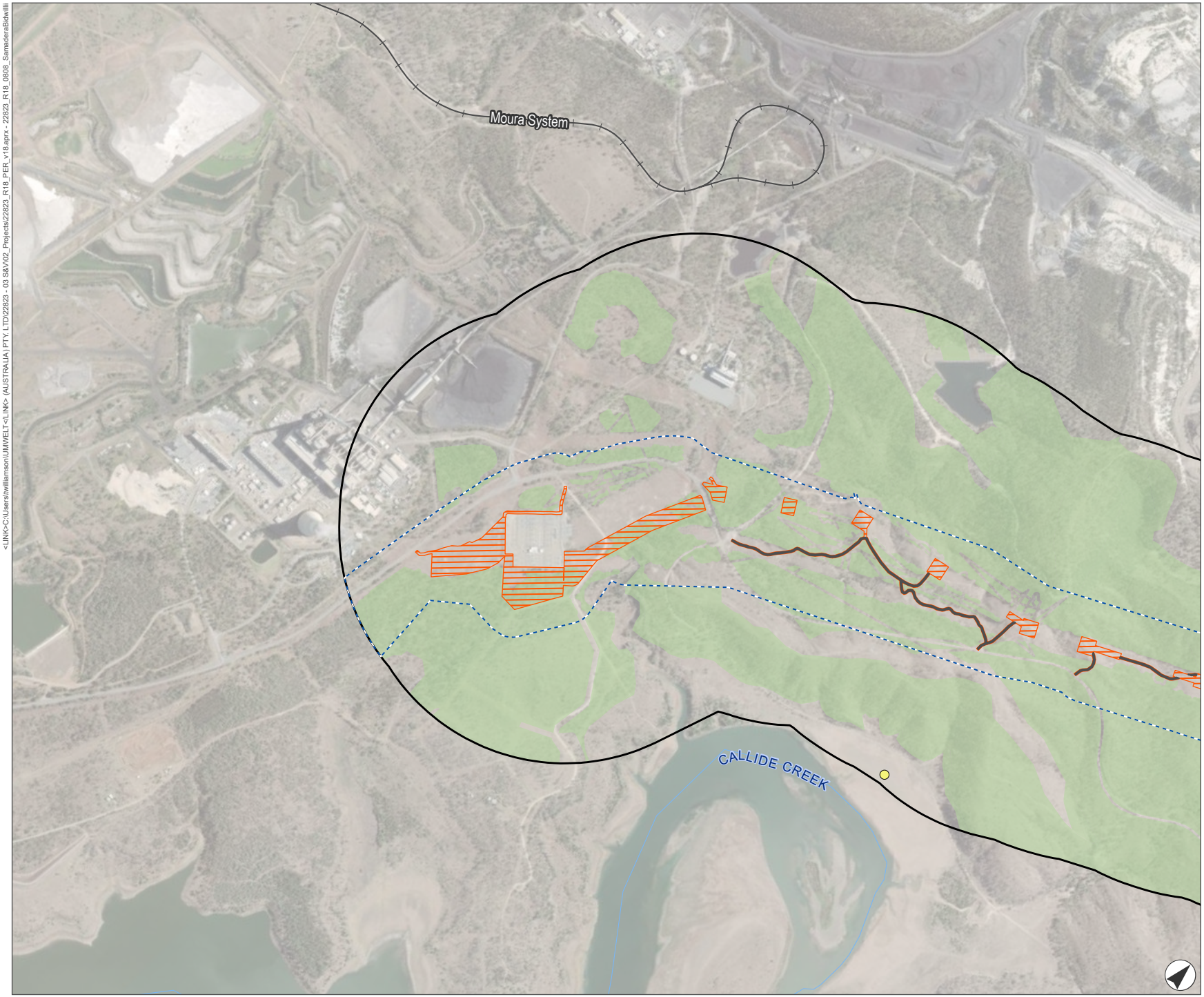


FIGURE 8.8-1

Samadera bidwillii Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

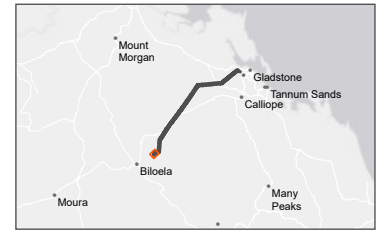
- Railway
- Watercourse
- Field Survey Extent
- Project Area
- *Samadera bidwillii* Records (ALA)

***Samadera bidwillii* Habitat**

- Suitable Habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



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Kilometres

Scale 1:20,000 at A4
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FIGURE 8.8-2

Samadera bidwillii Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

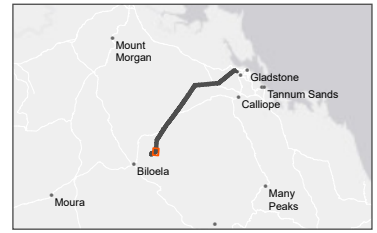
- Watercourse
- Field Survey Extent
- Project Area
- *Samadera bidwillii* Records (ALA)

***Samadera bidwillii* Habitat**

- Suitable Habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.8-3

Samadera bidwillii Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

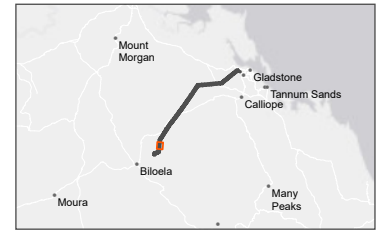
- Field Survey Extent
- Project Area
- *Samadera bidwillii* Records (ALA)
- *Samadera bidwillii* Records (Umwelt)
- *Samadera bidwillii* B1 Population (Naik, 2016)
- *Samadera bidwillii*C1 Population (Naik, 2016)

***Samadera bidwillii* Habitat**

- Known Habitat
- Suitable Habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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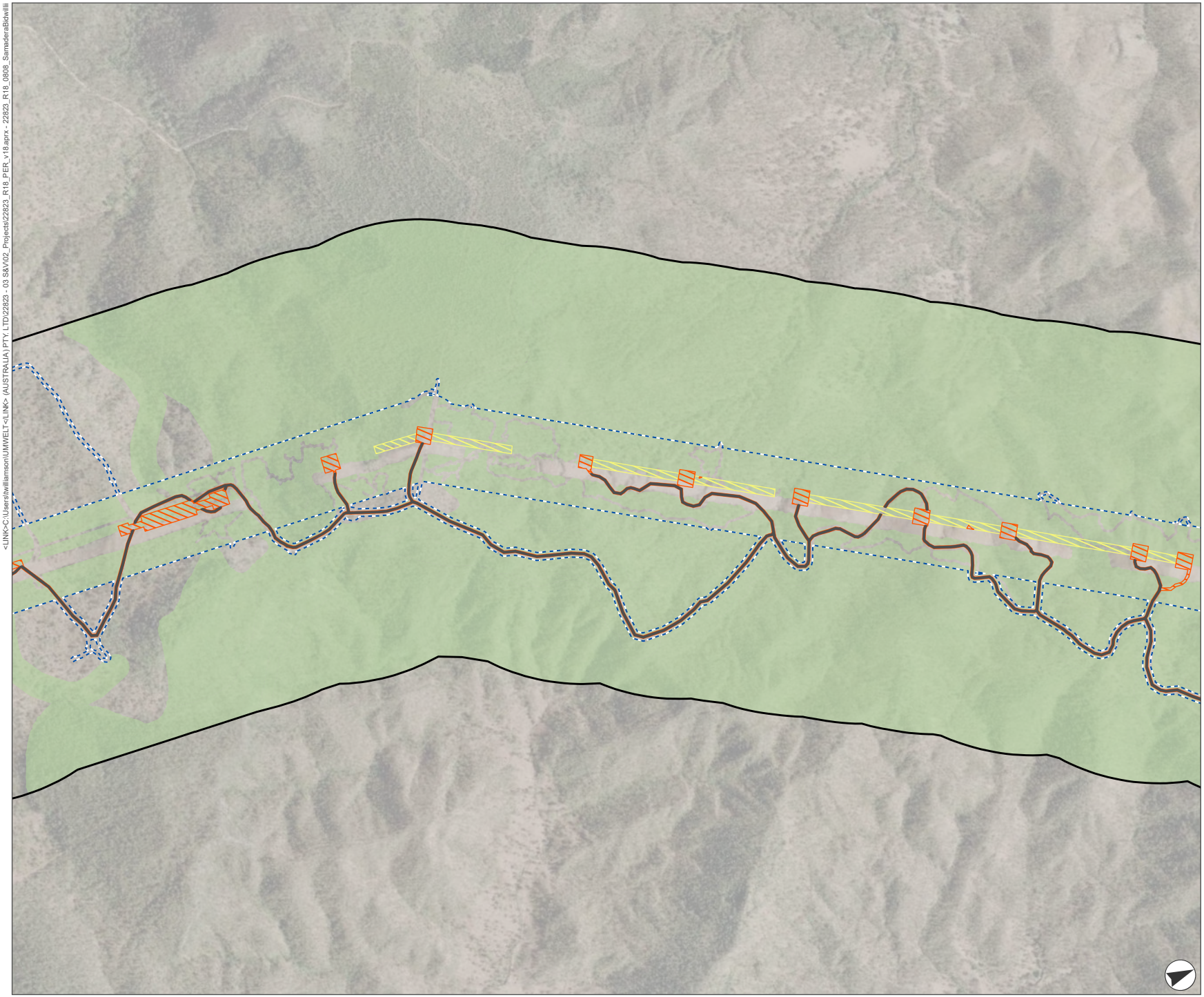


FIGURE 8.8-4

Samadera bidwillii Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

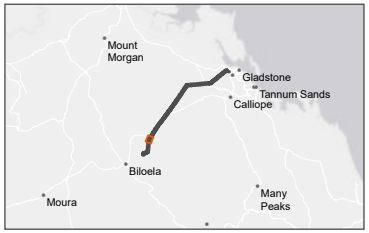
- Field Survey Extent
- Project Area

***Samadera bidwillii* Habitat**

- Suitable Habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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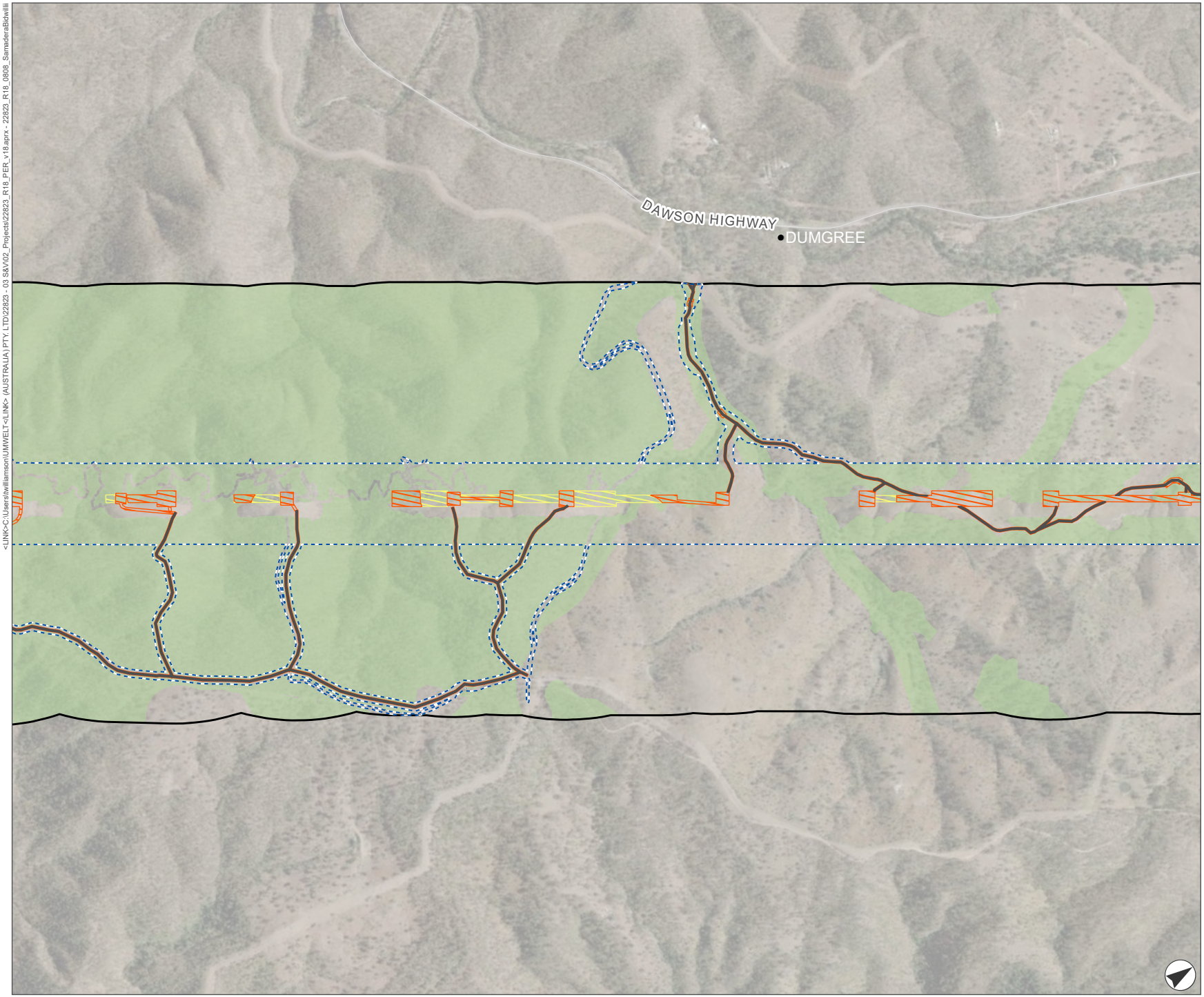


FIGURE 8.8-5

Samadera bidwillii Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

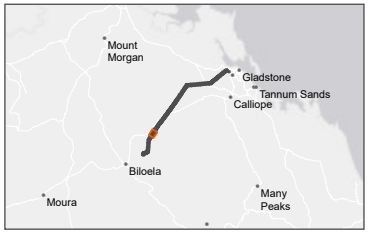
- Roads
- Field Survey Extent
- Project Area

***Samadera bidwillii* Habitat**

- Suitable Habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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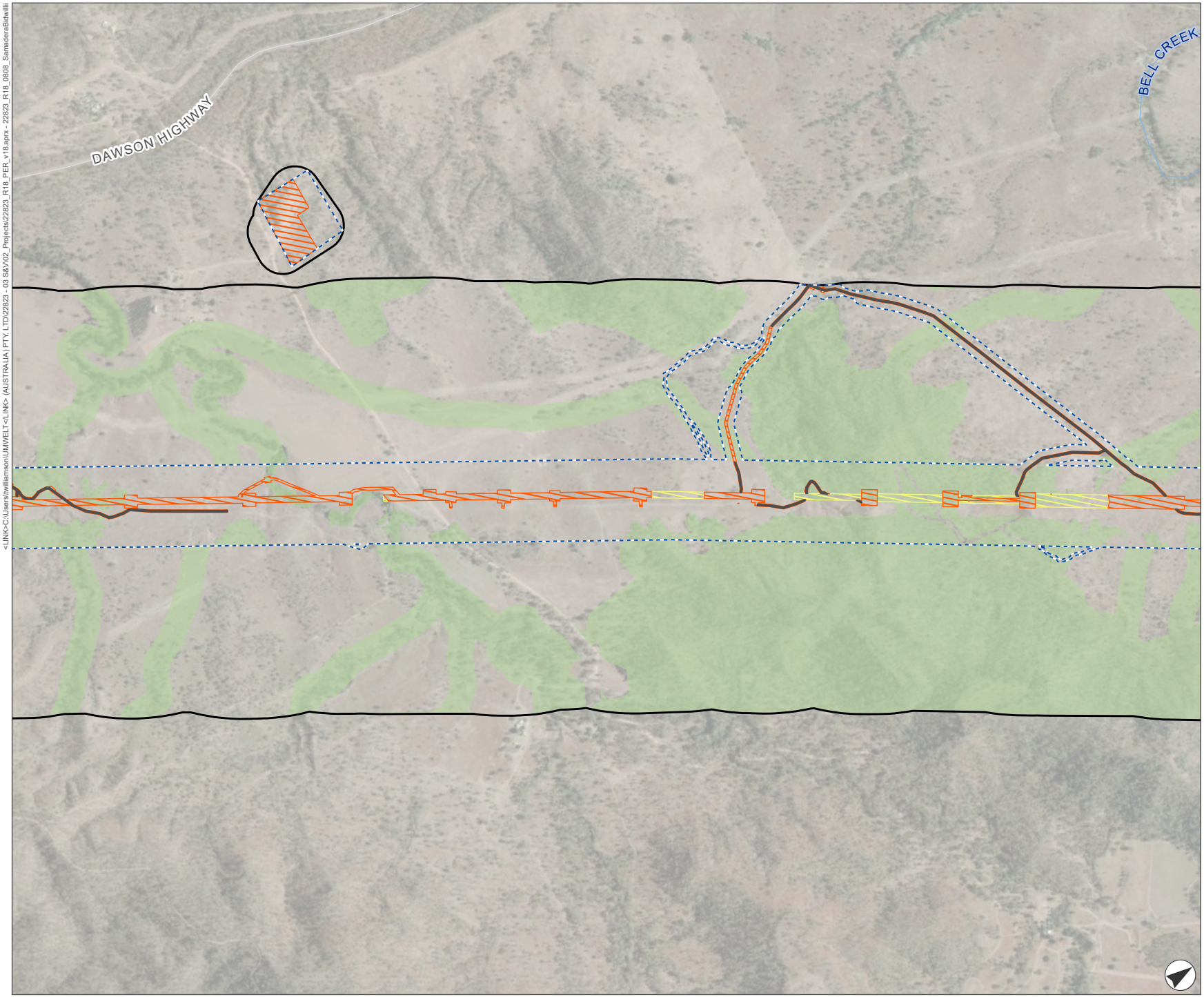


FIGURE 8.8-6

Samadera bidwillii Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

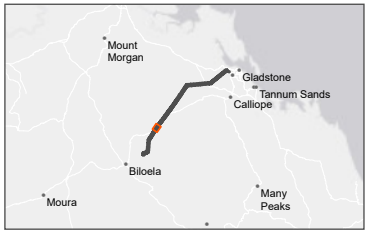
- Roads
- Watercourse
- Field Survey Extent
- Project Area

***Samadera bidwillii* Habitat**

- Suitable Habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



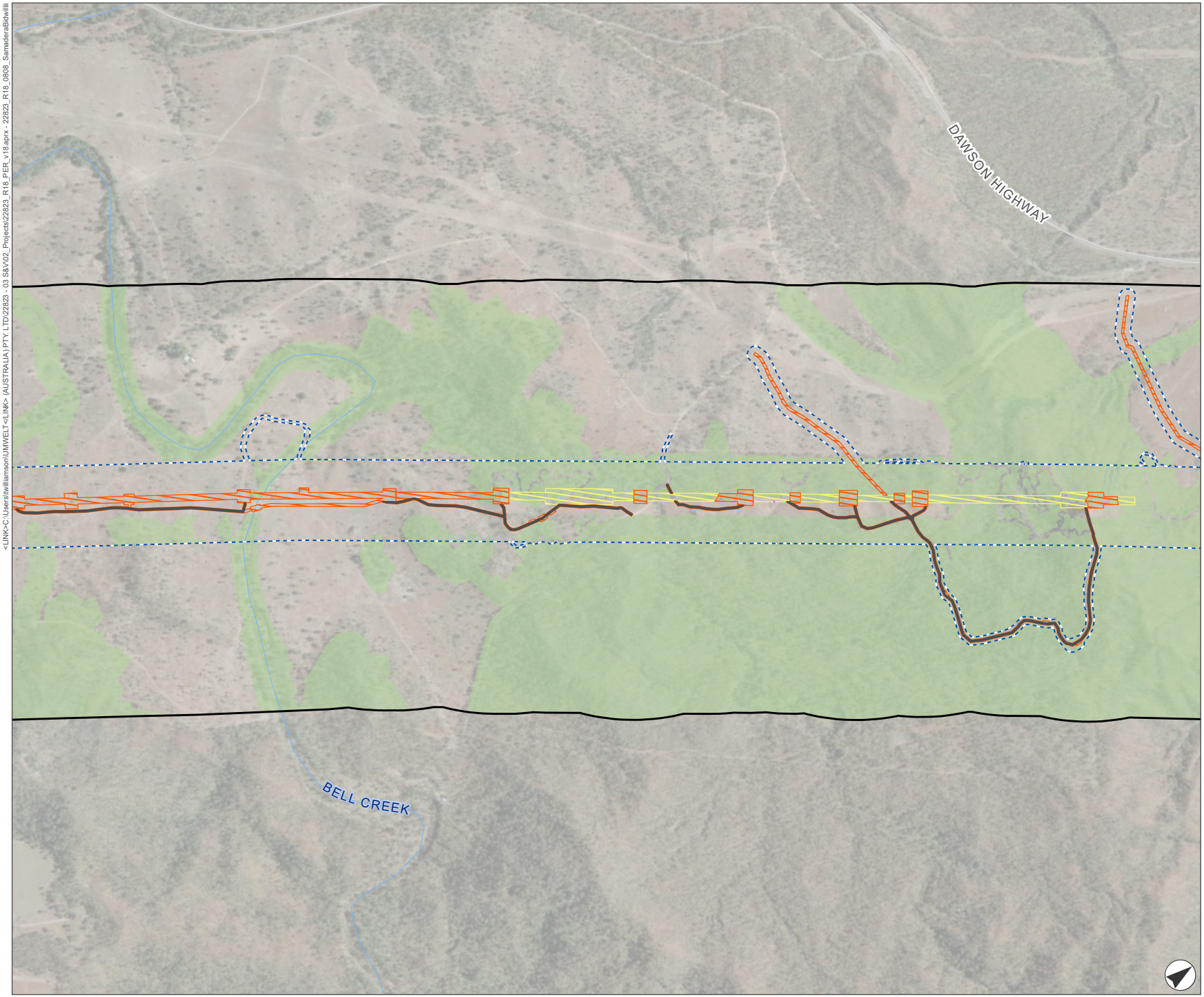
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FIGURE 8.8-7

Samadera bidwillii Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

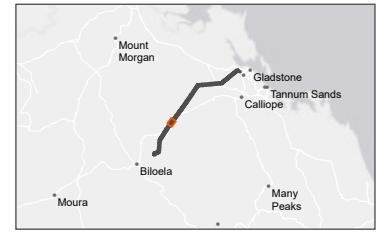
- Roads
- Watercourse
- Field Survey Extent
- Project Area

***Samadera bidwillii* Habitat**

- Suitable Habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

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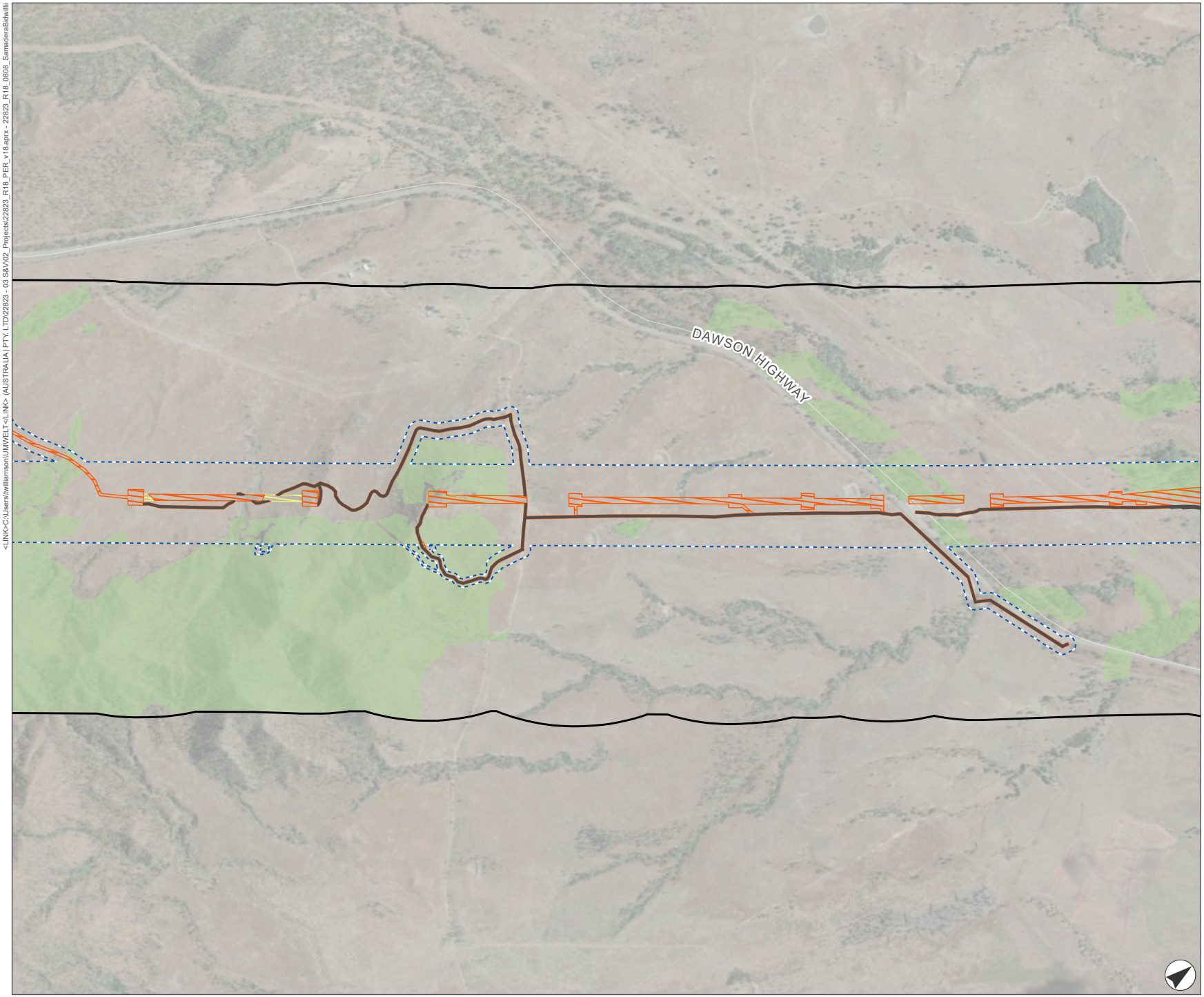


FIGURE 8.8-8

Samadera bidwillii Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

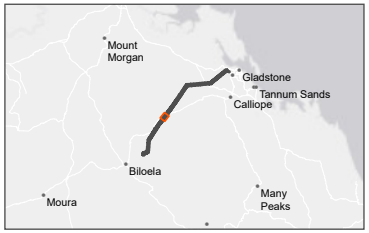
- Roads
- Field Survey Extent
- Project Area

***Samadera bidwillii* Habitat**

- Suitable Habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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Kilometres

Scale 1:20,000 at A4
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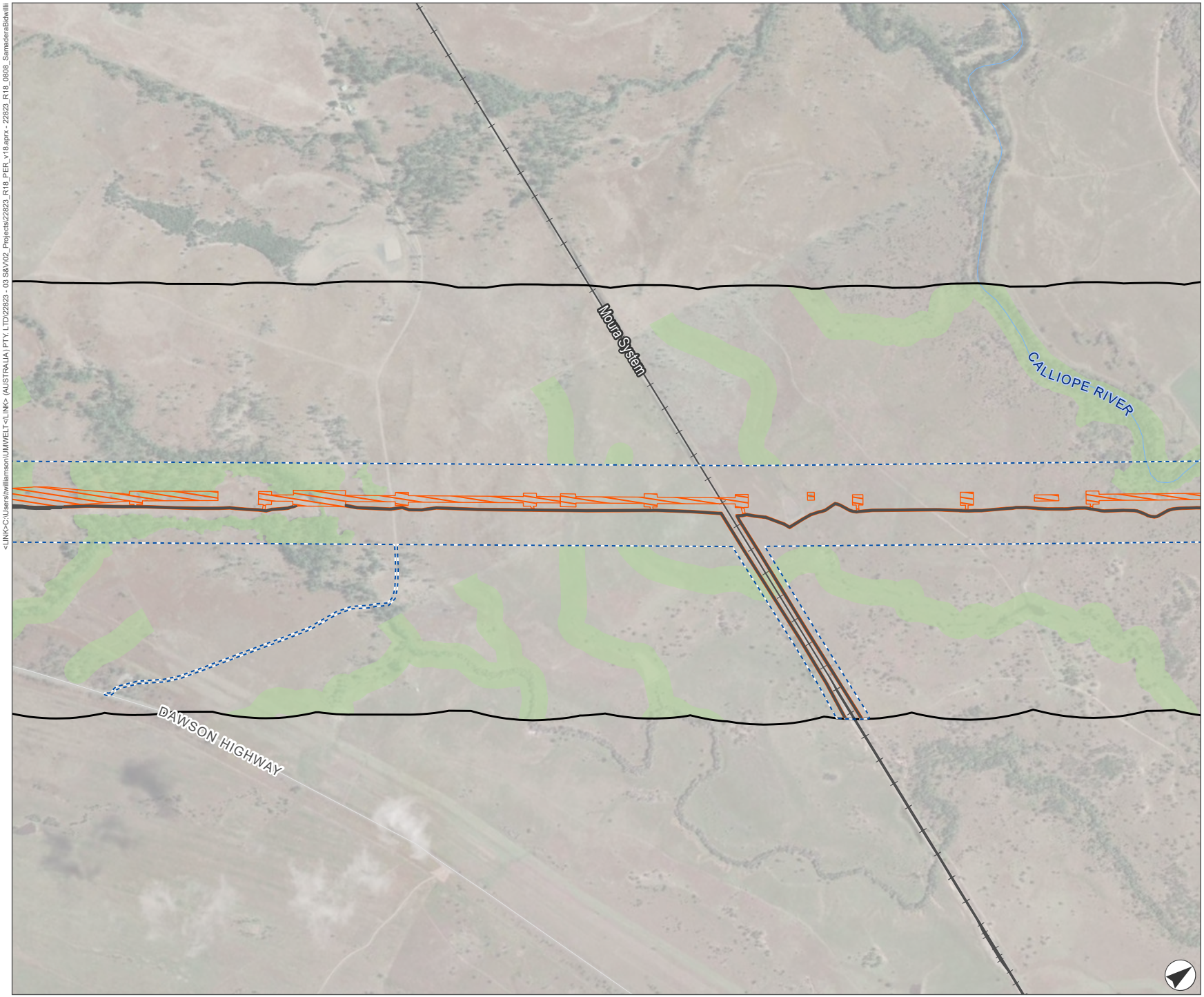


FIGURE 8.8-9

Samadera bidwillii Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

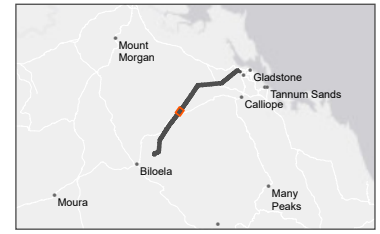
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area

***Samadera bidwillii* Habitat**

- Suitable Habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
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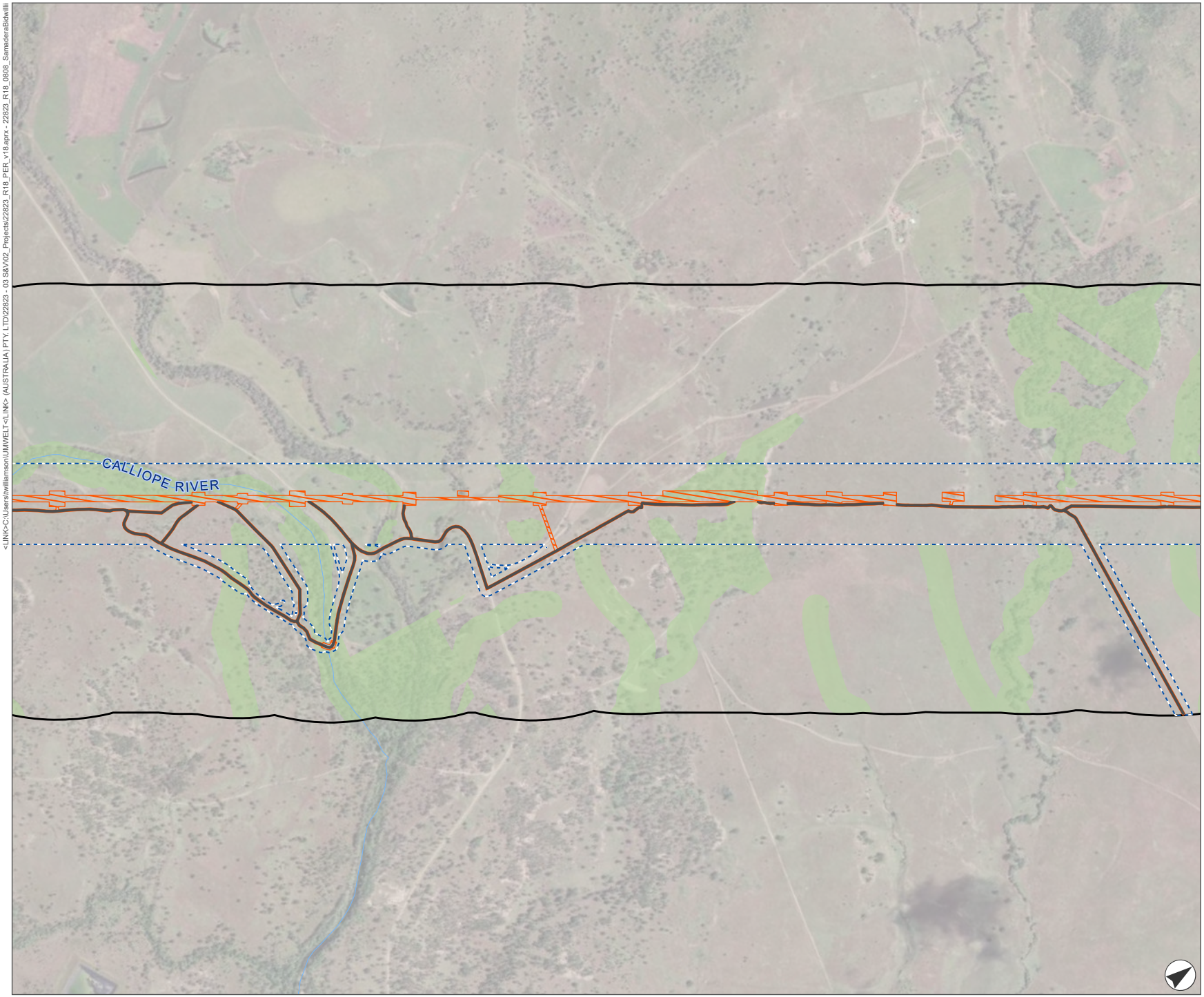


FIGURE 8.8-10

Samadera bidwillii Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

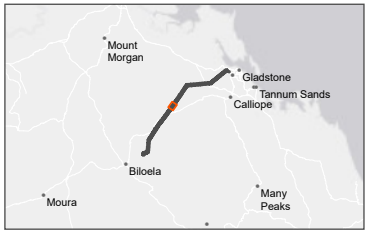
- Watercourse
- Field Survey Extent
- Project Area

***Samadera bidwillii* Habitat**

- Suitable Habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

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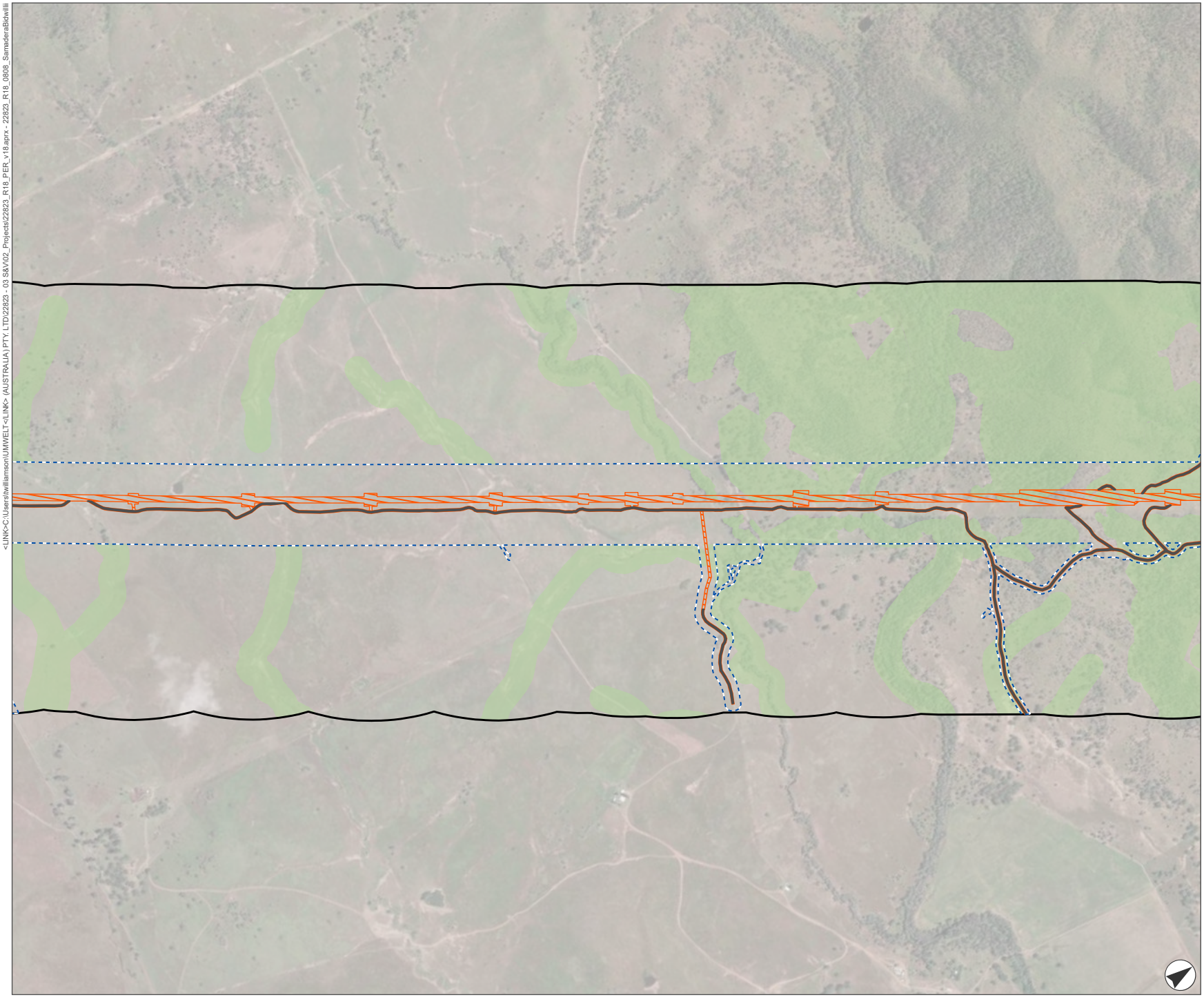


FIGURE 8.8-11

Samadera bidwillii Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

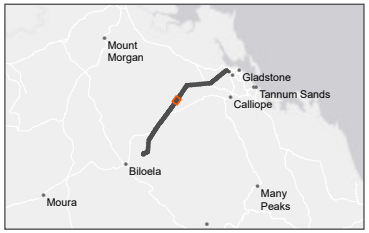
- Field Survey Extent
- Project Area

***Samadera bidwillii* Habitat**

- Suitable Habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.8-12

Samadera bidwillii Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

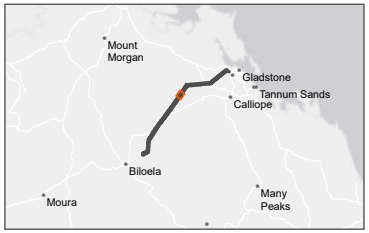
- Field Survey Extent
- Project Area

***Samadera bidwillii* Habitat**

- Suitable Habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.8-13

Samadera bidwillii Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

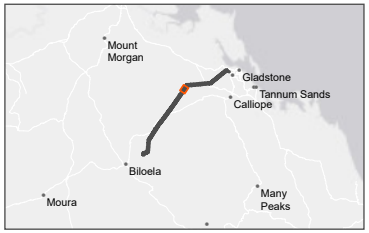
- Field Survey Extent
- Project Area

***Samadera bidwillii* Habitat**

- Suitable Habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.8-14

Samadera bidwillii Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

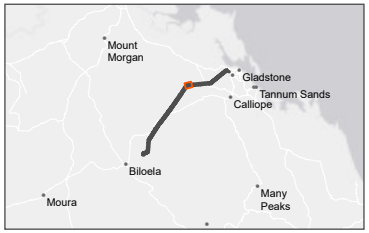
- Field Survey Extent
- Project Area

***Samadera bidwillii* Habitat**

- Suitable Habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.8-15

Samadera bidwillii Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

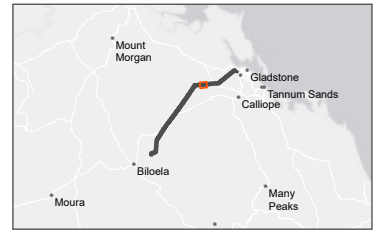
- Field Survey Extent
- Project Area

***Samadera bidwillii* Habitat**

- Suitable Habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



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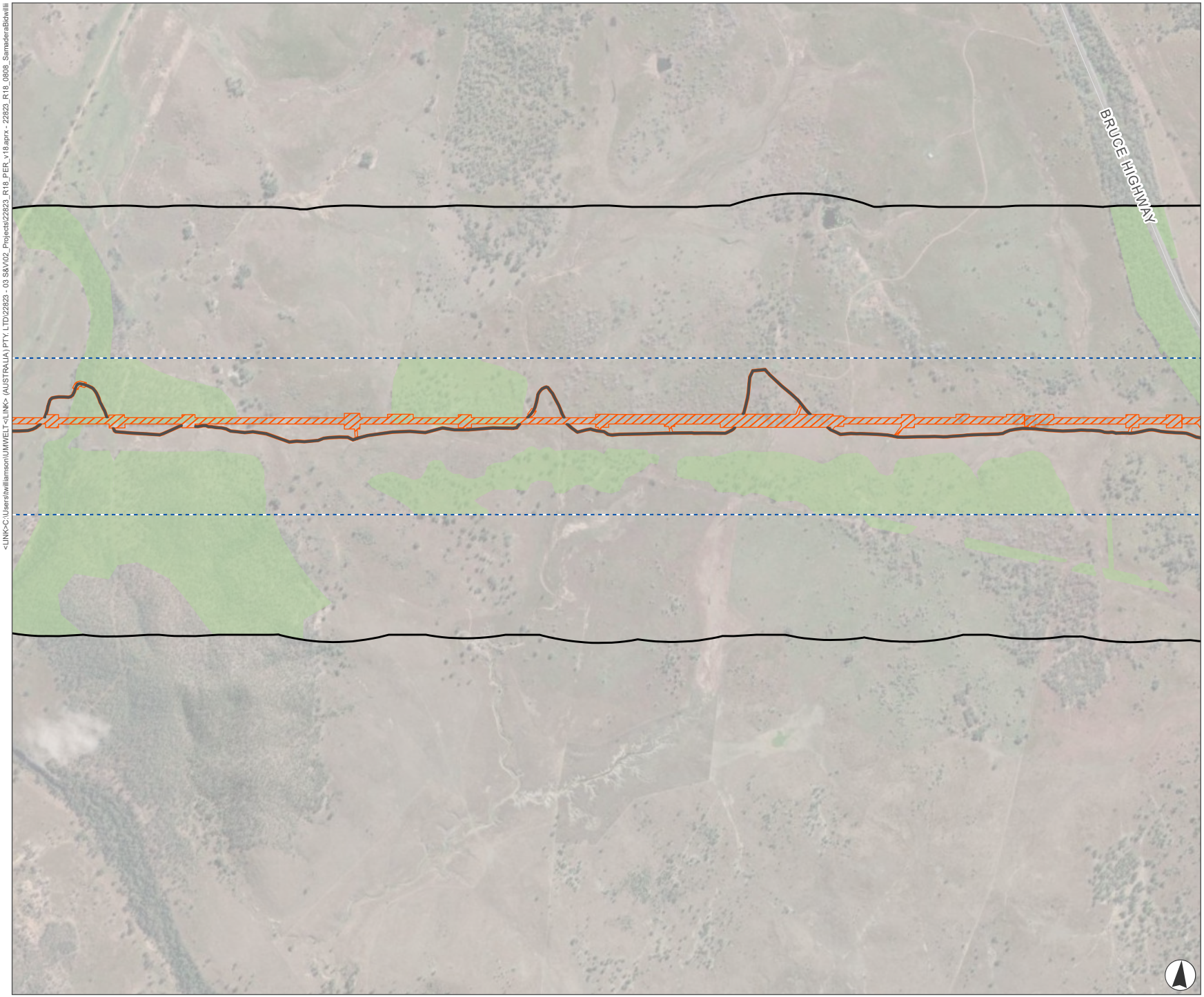


FIGURE 8.8-16

Samadera bidwillii Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

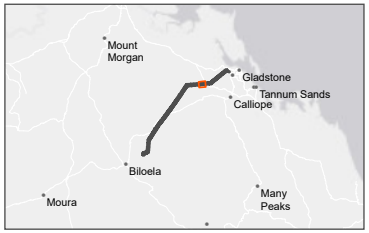
- Roads
- Field Survey Extent
- Project Area

***Samadera bidwillii* Habitat**

- Suitable Habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



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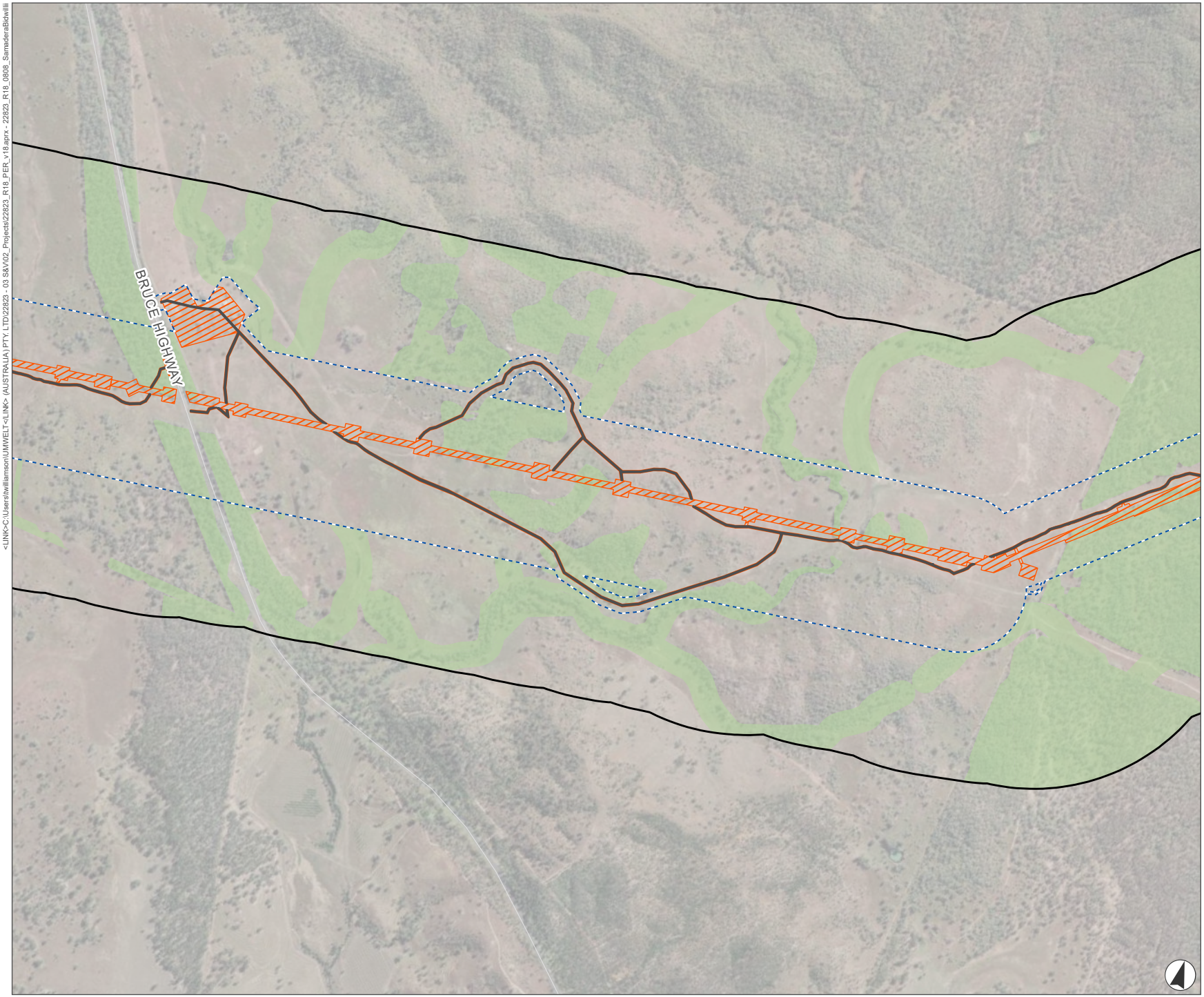


FIGURE 8.8-17

Samadera bidwillii Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

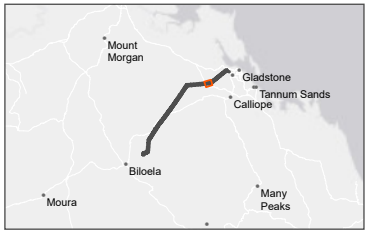
- Roads
- Field Survey Extent
- Project Area

***Samadera bidwillii* Habitat**

- Suitable Habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

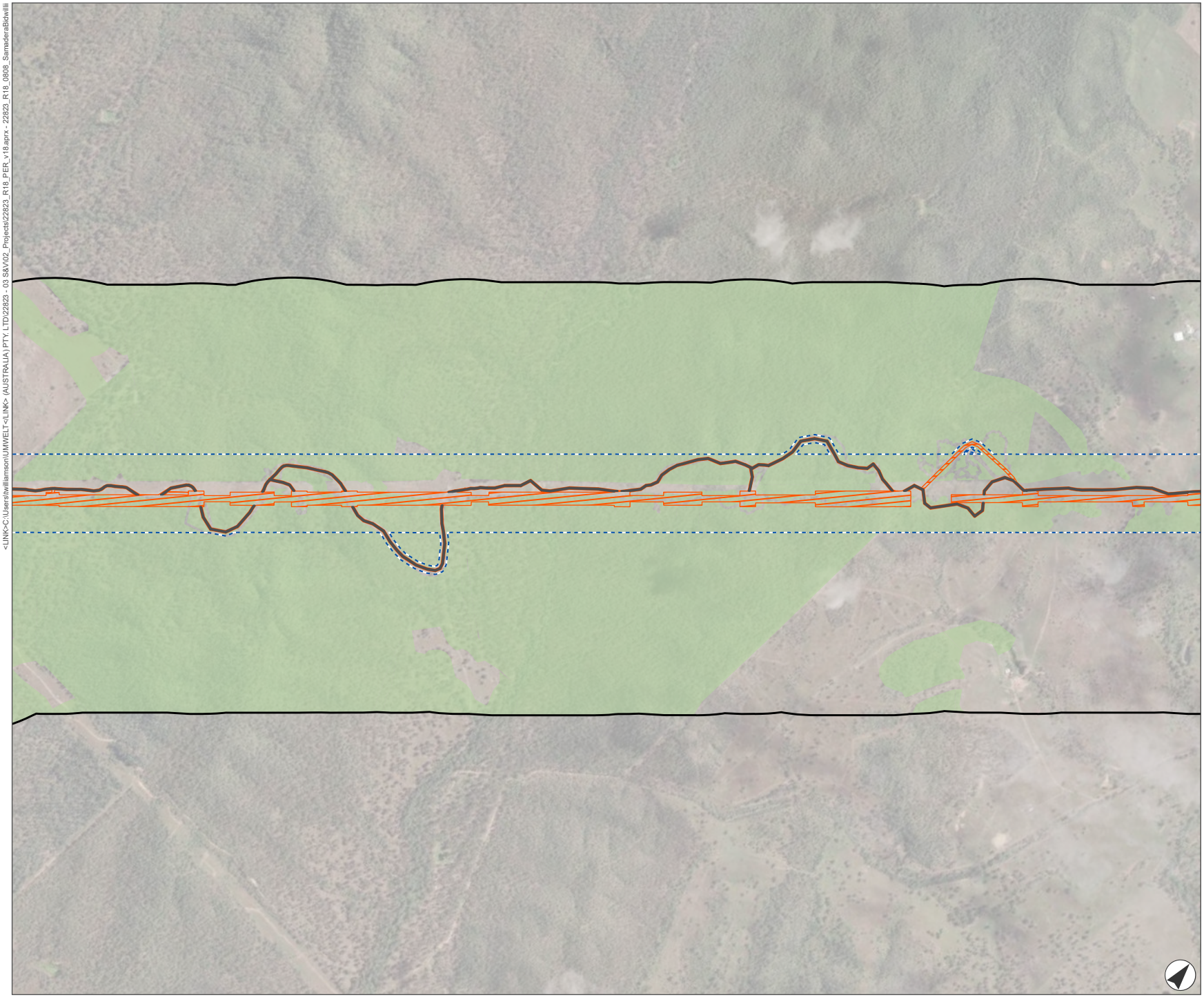
Kilometres

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FIGURE 8.8-18

Samadera bidwillii Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

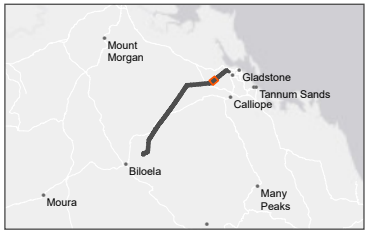
- Field Survey Extent
- Project Area

***Samadera bidwillii* Habitat**

- Suitable Habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



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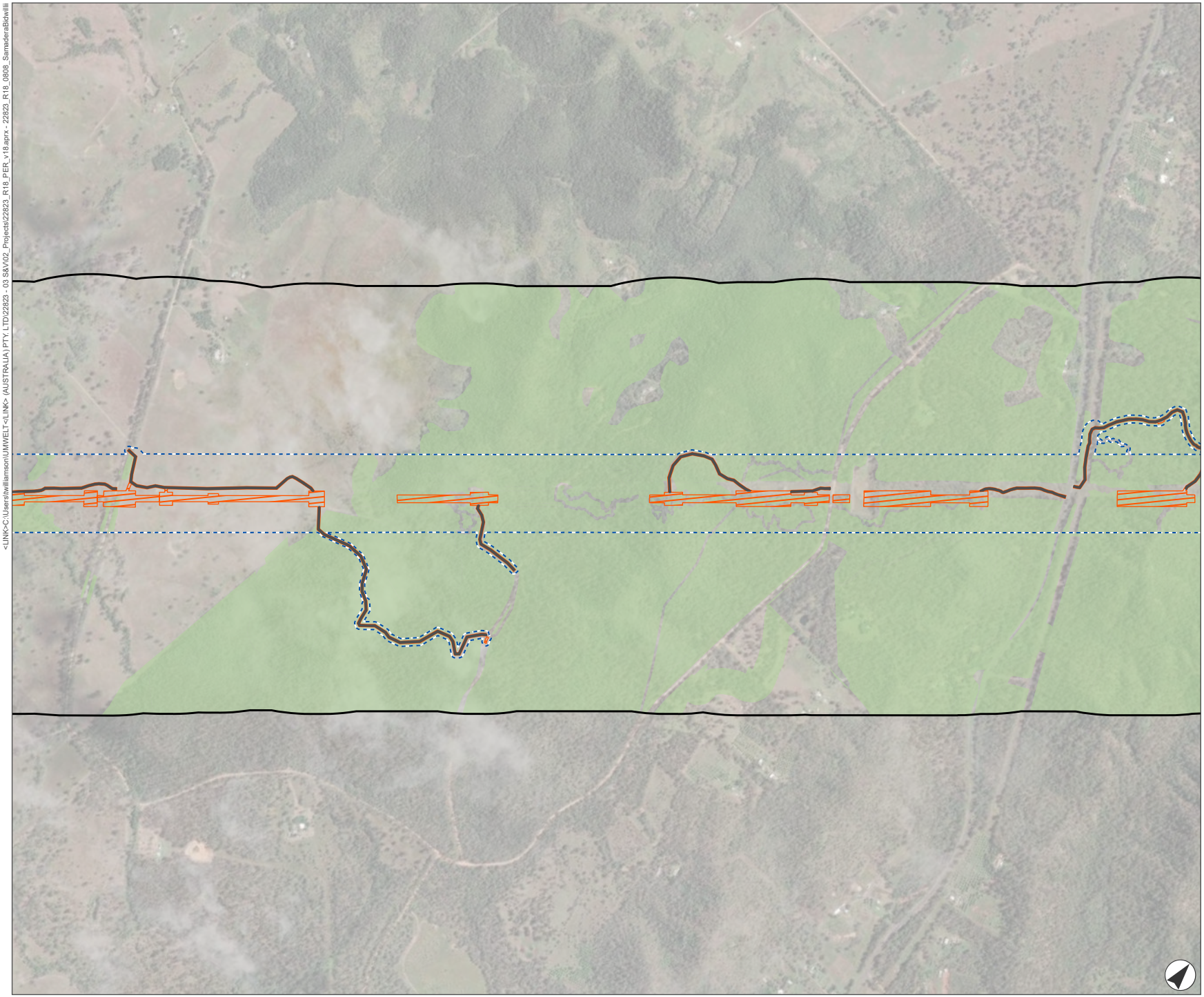


FIGURE 8.8-19

Samadera bidwillii Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

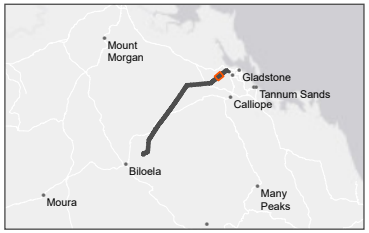
- Field Survey Extent
- Project Area

***Samadera bidwillii* Habitat**

- Suitable Habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.8-20

Samadera bidwillii Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

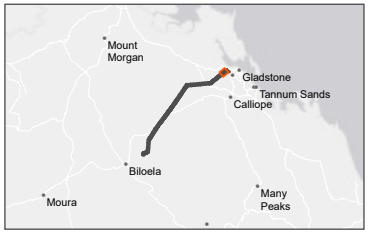
- Railway
- Watercourse
- Field Survey Extent
- Project Area

***Samadera bidwillii* Habitat**

- Suitable Habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

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FIGURE 8.8-21

Samadera bidwillii Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

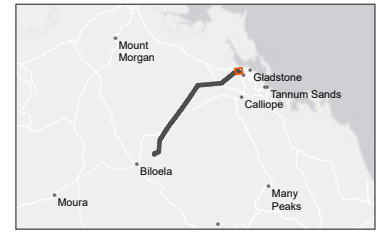
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area

***Samadera bidwillii* Habitat**

- Suitable Habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



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8.2.5 Threatened Migratory Shorebirds Species

8.2.5.1 Endangered and Critically Endangered Migratory Shorebirds

The following migratory shorebirds are listed as 'critically endangered' or 'endangered' under the EPBC Act and therefore require assessment utilising the significant impact criteria for 'critically endangered' and 'endangered' species:

- common greenshank (*Tringa nebularia*)
- curlew sandpiper (*Calidris ferruginea*)
- eastern curlew (*Numenius madagascariensis*)
- lesser sand plover (*Charadrius mongolus*)
- Nunivak bar-tailed godwit (*Limosa lapponica baueri*).

Given their similar habitat requirements and migratory behaviours, 'critically endangered' and 'endangered' species have been cumulatively assessed under one SIA.

Despite its migratory nature, Australian painted snipe has not been assessed alongside these species due to its tendency to breed when in Australia and its alternative habitat preferences (i.e. predominant use of freshwater wetlands) (**Section 8.2.6.1**).

Table 8.26 Endangered and Critically Endangered Migratory Shorebirds: Ecology and Relevance to the Project Area

Endangered & Critically Endangered Migratory Shorebird Profiles	
common greenshank	**Conservation status** Endangered, Migratory **Distribution** The common greenshank is one of Australia's most widespread migratory shorebirds; occurring in all types of wetlands across Australia's coastal regions (Higgins & Davies, 1996). In Queensland, it is widespread in the Gulf country and eastern Gulf of Carpentaria. There are also inland records from Dalby to Mount Guide. It spends its non-breeding months in Australia form August until March. Upon arrival into Australia, it passes through West Australia and Torres Strait and moves southward to disperse. Once dispersed for the non-breeding season it is not known to move long distances (Department of Climate Change, Energy, the Environment and Water, 2024e). **Population** Important populations aren't generally applicable to species listed as Endangered under the EPBC Act and no specific populations are highlighted as important in the Conservation Advice for *Tringa nebularia* (common greenshank) (Department of Climate Change, Energy,

the Environment and Water, 2024e). However, the occurrence of known 'important habitat' can be used as a surrogate for an 'important population' for migratory shorebirds. While the Australian population was estimated at 23,700 mature individuals in 2020, according to the Conservation Advice, no individuals have been recorded in or near the Project Area in significant numbers and the area is not known to support a national or international population of the species. Since the Project does not support any important habitat or large aggregations of the species, it is not considered to support any important populations.

Habitat

The species forages within wetlands in soft mud around the periphery of mudflats or at the edges of channels, shallows and other waterbodies. These locations are often situated adjacent to mangroves, sedges or saltmarsh; where their preferred food sources are known to occur (including insects, larvae, crustaceans, annelids, molluscs, amphibians, small fish and rodents). common greenshanks roost in coastal and inland areas amongst estuaries, mudflats, mangrove swamps, lagoons, billabongs, sewage farms and flooded crops (Department of Climate Change, Energy, the Environment and Water, 2024e).

Historical records within the desktop search extent

The most recent WildNet record within the search extent dates from 1999, approximately 7.5 km north-west of Section E of the Project in former Targinie State Forest. Other ALA records are scattered along the coast of Gladstone near Section E of the Project, with records of singular individuals as recent as 2019 (ALA, 2025).

Habitat Critical to the Survival of the Species

The Conservation Advice for *the species* (Department of the Environment, 2015) provides guidance on what habitat should be considered habitat critical to the survival of the species. This habitat is suggested to include a mosaic of feeding and roosting habitat due to the species' tendency to frequent a variety of freshwater, marine and artificial wetlands. While no critical habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat, the Conservation Advice defers to the internationally and nationally important habitat for migratory shorebird definitions as measures of critical habitat.

Internationally important habitat encompasses areas that regularly support:

- 1% of the individuals in a population; or,
- A total abundance of at least 20,000 waterbirds

Nationally important habitat for migratory shorebirds regularly supports:

- 0.1% of the flyway population; or,
- 2,000 migratory shorebirds; or,
- 15 migratory shorebird species.

The habitat within the Project Area is within the known or likely to occur distribution for the species. However, it should be noted that these areas have experienced significant land use changes and exist within non-remnant vegetation, often dominated by invasive grass species subject to grazing by cattle, and regular maintenance under the existing transmission line. For common greenshank, 1% of the Flyway Population equates to 1,100 individuals and 0.1% of the Flyway Population equates to 110 individuals. Detailed shorebird surveys

	undertaken by Wildlife Unlimited throughout the summer of 2019 included multiple surveys at the mouth of the Calliope River, adjacent to the Project Area. While low numbers of shorebird species were recorded at the sites adjacent to the Project Area, the surveys found no important shorebird roosts or sites of national significance along the Calliope River or at the mouth of the Calliope River (Wildlife Unlimited, 2020). All publicly available records of common greenshank in the Project Area (WildNet, eBird and ALA) are of single individuals only. It is therefore considered that the habitat within the Project Area does not meet the definition of important habitat as it does not support an ecologically significant proportion of the population and is therefore not considered to be critical to the survival for common greenshank. **Current Threats to the Species** The key threat to the species is the reduction in the extent or quality of habitat in certain parts of their flyway for residential and commercial development, which has consequent impacts on subsequent stages of the bird's life cycle. Additional threats listed in the Conservation Advice (Department of Climate Change, Energy, the Environment and Water, 2024e) include: • habitat loss due to industrial aquaculture • anthropogenic disturbance at feeding and roosting sites (e.g. visitation for recreational or fishing purposes) • sea level rise • invasion of mudflats and coastal saltmarshes by mangroves and cordgrass • hunting • fishing bycatch • chronic and acute pollution. **Recovery Plans** A recovery plan is not considered essential for the species due to the efficacy of the approved Conservation Advice, which ensures that management actions can be implemented, key threats can be mitigated and species recovery can be supported.
curlew sandpiper	**Conservation status** Critically Endangered, Migratory **Distribution** Curlew sandpipers occur in abundance in far south-eastern and north-western Australia amongst coastal and suitable wetland habitat. In Queensland, scattered records occur in the Gulf of Carpentaria and is widespread along the coast south of Cairns. Scattered records are known inland, with regular sightings at Mount Isa (Department of Climate Change, Energy, the Environment and Water 2023a). **Population** Important populations aren't generally applicable to species listed as Critically Endangered under the EPBC Act and no specific populations are highlighted as important in the Conservation Advice for *Calidris ferruginea* (curlew sandpiper) (Department of Climate Change, Energy, the Environment and Water, 2023b). The mature curlew sandpiper population in Australia was estimated at

approximately 40,100 individuals. The Australian population is known to mix freely across breeding sites and is therefore considered a single population. The occurrence of known 'important habitat' can be used as a surrogate for an 'important population' of migratory shorebirds. No individuals have been recorded in or near the Project Area in significant numbers and the area is not known to support a national or internationally important population of the species. Since the Project does not support any important habitat or large aggregations of the species, it is not considered to support any important populations.

Historical records within the desktop search extent

The most recent WildNet record within the search extent dates from 1999, approximately 7.5 km north-west of Section E in former Targinie State Forest. Other ALA records are scattered along the coast of Gladstone near Section E of the Project Area, with records as recent as 2024 from Port Curtis (7 km east of Project Area) (ALA, 2025).

Habitat

Curlew sandpipers inhabit mudflats and nearby shallow water for foraging, especially in intertidal areas amongst shallow pools, drains and sandy shores. At high tide they forage amongst low, sparse saltmarsh and flooded paddocks or inundated salt flats (Higgins & Davies, 1996). They roost around intertidal mudflats in sheltered estuaries, bays, inlets and lagoons as well as non-tidal coastal swamps, lakes and lagoons.

Habitat critical to the survival of the species

The *Conservation Advice for Calidris ferruginea (curlew sandpiper)* (Department of Climate Change, Energy, the Environment and Water 2023a) provides guidance on what habitat should be considered habitat critical to the survival of the species. This habitat is suggested to include a mosaic of feeding and roosting habitat due to the species' tendency to frequent a variety of freshwater, marine and artificial wetlands. While no critical habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat, the Conservation Advice defers to the internationally and nationally important habitat for migratory shorebird definitions as measures of critical habitat. Internationally important habitat encompasses areas that regularly support:

- 1% of the individuals in a population; or,
- A total abundance of at least 20,000 waterbirds.

Nationally important habitat for migratory shorebirds regularly supports:

- 0.1% of the flyway population; or,
- 2,000 migratory shorebirds; or,
- 15 migratory shorebird species.

The habitat within the Project Area is within the known or likely to occur distribution for the species. However, it should be noted that these areas have experienced significant land use changes and exist within non-remnant vegetation, often dominated by invasive grass species subject to grazing by cattle, and regular maintenance under the existing transmission line. For curlew sandpiper, 1% of the Flyway Population equates to 1,900 individuals and 0.1% of the Flyway Population equates to 190 individuals. Detailed shorebird surveys undertaken by Wildlife Unlimited throughout the summer of 2019 included multiple surveys at the mouth of the Calliope River, adjacent

	to the Project Area. While low numbers of shorebird species were recorded at the sites adjacent to the Project Area, the surveys found no important shorebird roosts or sites of national significance along the Calliope River or at the mouth of the Calliope River (Wildlife Unlimited, 2020). All publicly available records of lesser sand plover in the Project Area (WildNet, eBird and ALA) are of single individuals only. It is therefore considered that the habitat within the Project Area does not meet the definition of important habitat as it does not support an ecologically significant proportion of the population and is therefore not considered to be critical to the survival for curlew sandpiper. **Current threats to the species** Key threats to curlew sandpiper in Australia include: • increased frequency and length of droughts • habitat loss and disturbance (caused by residential and commercial development, industrial aquaculture) • invasion of mudflats and coastal saltmarshes by mangroves and cordgrass • downstream effects of large dams • anthropogenic disturbance at feeding and roosting sites • hunting • pollution • sea level rise. **Recovery plans** A recovery plan is not considered essential for the species due to the efficacy of the approved Conservation Advice, which ensures that management actions can be implemented, key threats can be mitigated, and species recovery can be supported.
eastern curlew	**Conservation status** Critically Endangered, Migratory **Distribution** Far eastern curlews are endemic to the East Asian–Australasian Flyway. They breed in Siberia and far eastern Russia, with a breeding range of approximately 727,000 km^2, and are also reported in north-eastern China. During migration, they pass through Mongolia, Japan, Korea, China, and the Yellow Sea, with smaller numbers recorded in South-east Asia and Papua New Guinea. Their non-breeding range covers around 1,450,000 km^2 (Department of Climate Change, Energy, the Environment and Water, 2023d). During the non-breeding season (austral summer), about 73% of the global population occurs in Australia. They are mostly coastal, rarely found inland, and occur in all States and Territories, particularly in northern, eastern, and south-eastern regions, including Tasmania. Distribution is continuous along northern and eastern coasts and patchy elsewhere (Department of Climate Change, Energy, the Environment and Water, 2023d).

Population

Important populations aren't generally applicable to species listed as Critically Endangered under the EPBC Act and no specific populations are highlighted as important in the *Conservation Advice for Numenius madagascariensis (far eastern curlew)* (Department of Climate Change, Energy, the Environment and Water, 2023d). However, the occurrence of known 'important habitat' can be used as a surrogate for an 'important population' of migratory shorebirds. No individuals have been recorded in or near the Project Area in significant numbers and the area is not known to support a national or international population of the species. Since the Project does not support any important habitat or large aggregations of the species, it is not considered to support any important populations.

Historical records within the desktop search extent

The most recent WildNet record within the search extent dates from 1999, approximately 7.5 km north-west of Section E in former Targinie State Forest. Other ALA records are scattered along the coast of Gladstone near Section E of the Project Area, with records as recent as 2024 from Port Curtis (7 km east of Project Area) (ALA, 2025).

Habitat

During the non-breeding season, eastern curlews forage around sheltered intertidal sandflats and mudflats with limited vegetation or seagrass. They are also known to forage amongst mangroves, salt flats, saltmarsh, rockpools, coral reef rubble and ocean beachlines. They exhibit a preference for soft substrates with limited hard material, enabling optimal prey access(Department of Climate Change, Energy, the Environment and Water, 2023d).

Habitat critical to the survival of the species

The *Conservation Advice for Numenius madagascariensis (far eastern curlew)* (Department of Climate Change, Energy, the Environment and Water 2023) provides guidance on what habitat should be considered habitat critical to the survival of the species. This habitat is suggested to include a mosaic of feeding and roosting habitat due to the species' tendency to frequent a variety of freshwater, marine and artificial wetlands. While no critical habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat, the Conservation Advice defers to the internationally and nationally important habitat for migratory shorebird definitions as measures of critical habitat. Internationally important habitat encompasses areas that regularly support:

Internationally important habitat encompasses areas that regularly support:

- 1% of the individuals in a population; or,
- A total abundance of at least 20,000 waterbirds.

Nationally important habitat for migratory shorebirds regularly supports:

- 0.1% of the flyway population; or,
- 2,000 migratory shorebirds; or,
- 15 migratory shorebird species.

Endangered & Critically Endangered Migratory Shorebird Profiles

	The habitat within the Project Area is within the known or likely to occur distribution for the species. However, it should be noted that these areas have experienced significant land use changes and exist within non-remnant vegetation, often dominated by invasive grass species subject to grazing by cattle, and regular maintenance under the existing transmission line. For eastern curlew, 1% of the Flyway Population equates to 350 individuals and 0.1% of the Flyway Population equates to 35 individuals. Detailed shorebird surveys undertaken by Wildlife Unlimited throughout the summer of 2019 included multiple surveys at the mouth of the Calliope River, adjacent to the Project Area. While low numbers of shorebird species were recorded at the sites adjacent to the Project Area, the surveys found no important shorebird roosts or sites of national significance along the Calliope River or at the mouth of the Calliope River (Wildlife Unlimited, 2020). All publicly available records of eastern curlew in the Project Area (WildNet, eBird and ALA) are of single individuals only. It is therefore considered that the habitat within the Project Area does not meet the definition of important habitat as it does not support an ecologically significant proportion of the population and is therefore not considered to be critical to the survival for eastern curlew. **Current Threats to the Species** Key threats to eastern curlew in Australia include: • loss or degradation of intertidal flats (caused by residential and commercial development, industrial aquaculture and off-leash dogs) • invasion of mudflats and coastal saltmarshes by mangroves and cordgrass • downstream effects of large dams • anthropogenic disturbance at feeding and roosting sites • hunting • pollution • sea level rise. **Recovery Plans** A recovery plan is not considered essential for the species due to the efficacy of the approved Conservation Advice, which ensures that management actions can be implemented, key threats can be mitigated and species recovery can be supported.
lesser sand plover	**Conservation status** Endangered, Migratory **Distribution** The lesser sand plover breeds in the northern hemisphere and annually migrates to and from southern feeding grounds during the austral summer. Four of the five subspecies occur in the East Asian-Australasian Flyway. The species is widespread amongst Australia's coastal regions and is known from all States. However, it predominantly occurs in northern and eastern Australia, in south-eastern parts of the Gulf of Carpentaria, western Cape York Peninsula, Torres Strait islands and along the entire east coast. It occurs in high numbers in Queensland and New South Wales (Threatened Species Scientific Committee, 2016b).

Endangered & Critically Endangered Migratory Shorebird Profiles

Population

Important populations aren't generally applicable to species listed as Endangered under the EPBC Act and no specific populations are highlighted as important in the *Conservation Advice Charadrius mongolus lesser sand plover* (Threatened Species Scientific Committee, 2016b). The global population is estimated at 130,000–330,000 birds, with approximately 7.5% occurring in Australia, representing 18–19% of the East Asian–Australasian Flyway population. The species is not considered globally threatened and is listed as least concern. However, the occurrence of known 'important habitat' can be used as a surrogate for an 'important population' of migratory shorebirds. No individuals have been recorded in or near the Project Area in significant numbers and the area is not known to support a national or international population of the species. Since the Project does not support any important habitat or large aggregations of the species, it is not considered to support any important populations.

Historical Records

WildNet records occur within the search extent, with the most recent dating from 1956, approximately 7.7 km east of Section E of the Project at Barney Point. Additional ALA records are known from the Gladstone area, with records as recent as 2015, and numerous records from 2019 at Heron Island (ALA, 2025).

Habitat

During the non-breeding season, the lesser sand plover is almost strictly coastal in its habitat use, with a preference for sandy beaches, mudflats of coastal bays and estuaries, sand flats and dunes near the coast. It occasionally frequents mangrove mudflats in Australia (BirdLife International, 2015). It feeds on extensive, freshly exposed areas of intertidal sandflats and mudflats in estuaries or beaches or in shallow ponds in saltworks. It also occasionally forages on coral reefs and sandy or muddy river margins and at inland sites. It roosts near foraging areas on beaches, banks, spits and banks of sand or shells (Threatened Species Scientific Committee, 2016b).

Habitat Critical to the Survival of the Species

The *Conservation Advice Charadrius mongolus lesser sand plover* (Threatened Species Scientific Committee 2016) does not provide guidance on what habitat should be considered habitat critical to the survival of the species. Since no critical habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat, deferral to the internationally and nationally important habitat for migratory shorebird definitions as measures of critical habitat will be utilised.

Internationally important habitat encompasses areas that regularly support:

- 1% of the individuals in a population; or,
- A total abundance of at least 20,000 waterbirds.

Nationally important habitat for migratory shorebirds regularly supports:

- 0.1% of the flyway population; or,
- 2,000 migratory shorebirds; or,
- 15 migratory shorebird species.

Endangered & Critically Endangered Migratory Shorebird Profiles

	The habitat within the Project Area is within the known or likely to occur distribution for the species. However, it should be noted that these areas have experienced significant land use changes and exist within non-remnant vegetation, often dominated by invasive grass species subject to grazing by cattle, and regular maintenance under the existing transmission line. For lesser sand plover, 1% of the Flyway Population equates to 1,800 individuals and 0.1% of the Flyway Population equates to 180 individuals. Detailed shorebird surveys undertaken by Wildlife Unlimited throughout the summer of 2019 included multiple surveys at the mouth of the Calliope River, adjacent to the Project Area. While low numbers of shorebird species were recorded at the sites adjacent to the Project Area, the surveys found no important shorebird roosts or sites of national significance along the Calliope River or at the mouth of the Calliope River (Wildlife Unlimited, 2020). All publicly available records of lesser sand plover in the Project Area (WildNet, eBird and ALA) are of single individuals only. It is therefore considered that the habitat within the Project Area does not meet the definition of important habitat as it does not support an ecologically significant proportion of the population and is therefore not considered to be critical to the survival for lesser sand plover. **Current threats to the species** Key threats to lesser sand plover and other migratory shorebird in eastern and southern Australia include ongoing human disturbance, habitat loss and degradation from pollution, changes to the water regime and invasive plants (Threatened Species Scientific Committee, 2016b). **Recovery plans** A recovery plan is not considered essential for the species due to the efficacy of the approved Conservation Advice, which ensures that management actions can be implemented, key threats can be mitigated and species recovery can be supported.
Nunivak bar-tailed godwit	**Conservation status** Endangered, Migratory **Distribution** Nunivak bar-tailed godwits (also referred to as the Alaskan bar-tailed godwit) breed in north-east Siberia and western and northern Alaska, including the Yukon-Kuskokwim Delta, Kuskokwim Shoals, and from Wales to Barrow in western Alaska. They overwinter in China, Australia, New Zealand and some Pacific islands. During northward migration, they stage in the Yellow Sea region and may use inland wetlands, sandy beaches, swampy lowlands near lakes, and short-grass meadows (Department of Climate Change, Energy, the Environment and Water, 2024d). In Australia, the subspecies mainly occurs along northern and eastern coasts, including the Torres Strait and the east and south-east coasts of Queensland, New South Wales and Victoria. Smaller populations are found in Tasmania (mainly the south-east coast) and South Australia (Lake Alexandrina to Denial Bay). Northern populations occur from Darwin east to the Gulf of Carpentaria. At the species level, bar-tailed godwits are also recorded on Christmas Island, Norfolk Island, Lord Howe Island, and subantarctic islands such as Macquarie Island, the Snares, Auckland, and Campbell Islands (Department of Climate Change, Energy, the Environment and Water, 2024d).

Population

Important populations aren't generally applicable to species listed as Endangered under the EPBC Act and no specific populations are highlighted as important in the *Conservation Advice for Limosa lapponica baueri* (Alaskan bar-tailed godwit) (Department of Climate Change, Energy, the Environment and Water, 2024d). However, the occurrence of known 'important habitat' can be used as a surrogate for an 'important population' of migratory shorebirds. No individuals have been recorded in or near the Project Area in significant numbers and the area is not known to support a national or international population of the species. Since the Project does not support any important habitat or large aggregations of Nunivak Bar-Tailed Godwit, it is not considered to support any important populations.

Historical Records

The most recent WildNet record within the search extent dates from 1999, approximately 7.5 km north-west of Section E in former Targinie State Forest. Other ALA records are scattered around Gladstone near Section E of the Project Area, with records as recent as 2016 from Boyne Island (ALA, 2025).

Habitat

Bar-tailed godwits forage at the water's edge or in shallow tidal estuaries and harbours, mainly on exposed sandy or soft mud flats. They wade or probe rapidly with their long bills, often on upper tidal flats for longer feeding periods. Their diet primarily includes molluscs, crustaceans, worms, aquatic insects and some plant material. Feeding groups may include up to 30 individuals, including juveniles and non-breeding migrants. They typically feed during the day, but sometimes at night by moonlight (Department of Climate Change, Energy, the Environment and Water, 2024d).

Roosting occurs on large intertidal sandflats, spits, and banks, less often on mudflats, estuaries, lagoons, and bays, often near seagrass beds or saltmarsh. They may also use artificial wetlands such as aquaculture ponds, saltworks, and port or wastewater areas. Roosting and foraging movements are often tide-driven, with birds foraging at low tide and roosting at high tide, sometimes in large aggregations (Department of Climate Change, Energy, the Environment and Water, 2024d).

Nesting occurs on dry, elevated tundra sites such as ridges or hummocks, often between grass clumps or under thickets. The species does not breed in Australia.

Habitat critical to the survival of the species

The *Conservation Advice for Limosa lapponica baueri (Alaskan bar-tailed godwit)* (Department of Climate Change, Energy, the Environment and Water, 2024d) provides guidance on what habitat should be considered habitat critical to the survival of the species. This habitat is suggested to include a mosaic of feeding and roosting habitat due to the species' tendency to frequent a variety of freshwater, marine and artificial wetlands. While no critical habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat, the Conservation Advice defers to the internationally and nationally important habitat for migratory shorebird definitions as measures of critical habitat.

Internationally important habitat encompasses areas that regularly support:

- 1% of the individuals in a population; or,

- A total abundance of at least 20,000 waterbirds.

Nationally important habitat for migratory shorebirds regularly supports:

- 0.1% of the flyway population; or,
- 2,000 migratory shorebirds; or,
- 15 migratory shorebird species.

The habitat within the Project Area is within the known or likely to occur distribution for the species. However, it should be noted that these areas have experienced significant land use changes and exist within non-remnant vegetation, often dominated by invasive grass species subject to grazing by cattle, and regular maintenance under the existing transmission line. For Nunivak bar-tailed godwit, 1% of the Flyway Population equates to 3,250 individuals and 0.1% of the Flyway Population equates to 325 individuals. Detailed shorebird surveys undertaken by Wildlife Unlimited throughout the summer of 2019 included multiple surveys at the mouth of the Calliope River, adjacent to the Project Area. While low numbers of shorebird species were recorded at the sites adjacent to the Project Area, the surveys found no important shorebird roosts or sites of national significance along the Calliope River or at the mouth of the Calliope River (Wildlife Unlimited, 2020). All publicly available records of Nunivak bar-tailed godwit in the Project Area (WildNet, eBird and ALA) are of single individuals only. It is therefore considered that the habitat within the Project Area does not meet the definition of important habitat as it does not support an ecologically significant proportion of the population and is therefore not considered to be critical to the survival for Nunivak bar-tailed godwit.

Current threats to the species

Key threats to Nunivak bar-tailed godwit in Australia include habitat loss and disturbance within roosting and feeding sites, tourist activities such as fishing, power boating, jet skiing, four-wheel driving, dogs and night lighting. Other threats include:

- Habitat loss due to industrial aquaculture
- Anthropogenic disturbance at feeding and roosting sites (e.g. visitation for recreational or fishing purposes)
- Sea level rise
- Invasion of mudflats and coastal saltmarshes by mangroves and cordgrass
- Hunting
- Chronic and acute pollution.

Recovery plans

A recovery plan is not considered essential for the species due to the efficacy of the approved Conservation Advice, which ensures that management actions can be implemented, key threats can be mitigated, and species recovery can be supported.

Endangered & Critically Endangered Migratory Shorebird Profiles				
In the Project Area	**Surveys** 28 habitat assessments were conducted, diurnal bird surveys were undertaken throughout all field surveys, and opportunistic surveys of wetlands were undertaken. Survey adequacy aligns with relevant guidelines for these species. Refer to **Section 4.5** for further details. **Species occurrence** These threatened migratory shorebirds are considered to have a moderate likelihood of occurrence within the Project Area, with the presence of suitable habitat indicated by both State mapping and the findings of the field survey program.			
	Habitat within the Project Area			
	Habitat type	**Habitat modelling criteria**	**Area (ha)**	
			Project Area	**Disturbance Footprint**
	Roosting and foraging	Coastal lagoons, intertidal mudflats or sandflats exposed at low tide and with soft substrate provide foraging habitat. At high tide lakes, sewage ponds and flood waters provide suitable foraging habitat. Terrestrial wetlands are also sometimes suitable. Modelled habitat included all freshwater wetlands and farm dams, intertidal areas, near-coastal wetlands and dams, tidal flats dominated by mangroves, sedges and grasses, and areas adjacent to or including REs 12.1.2 and 12.1.3.	107.8	1.1

Table 8.27 Assessment of Potential Project Impacts and Mitigation and Management Commitments for Endangered and Critically Endangered Migratory Shorebirds

Potential Impact	Assessment	Mitigation Commitments
Direct		
Vegetation clearing causing habitat loss and fragmentation	Vegetation clearing is unlikely to directly impact these species, as much of the Project sits within already disturbed areas or alongside the existing transmission line.	• Identify MNES fauna habitat and individuals through pre-clearance surveys • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Disturbance activities must be contained to Disturbance Footprint subject to minor micro-siting within the Field Survey Extent • Refer to Table 5.1 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Direct injury or mortality	The risk of direct injury or mortality is low but possible during construction activities. Minimal impact to shorebird habitat and flushing surveys prior to works will minimise these risks.	• Appropriately qualified fauna spotter catcher to undertake pre-clearance habitat assessment and be present during clearing and disturbance to habitat features • Flushing surveys • Clearing must be staged, with non-habitat trees felled first • Tampering with an animal breeding place to be carried out in accordance with an approved Species Management Program • Clear delineation of habitat features to be retained • Restrict vehicles to approved access tracks • Vehicle travelling speed restricted to <40 km/hr • Excavations must be secured (e.g. covered) • Refer to Table 5.3 of the MNES Management Plan for further details on mitigation measures.
Disturbance to foraging behaviours due to increased noise and activity during construction	Construction-related noise and activity may disturb shorebirds, causing them to flush from foraging areas, though these will be temporary and localised. Minimal shorebird habitat is expected to be disturbed.	• Plant and equipment to be fitted with appropriate noise attenuation and maintained • Deliveries and removal of material and equipment to and from site within approved hours for construction • Plant to be turned off when not in use • No unnecessary use of horns or other audible signals on mobile plant or equipment • Machinery and equipment will be maintained in good working condition • Refer to Table 5.10 of the MNES Management Plan for further details on mitigation measures.
Indirect		
Soil exposure resulting in an increased risk of erosion and sedimentation of water bodies, reducing water quality and degrading aquatic habitats	Soil exposure resulting in an increased risk of erosion and sedimentation of water bodies, reducing water quality and degrading aquatic habitats.	• Soil sampling and testing to inform both erosion and sediment control (ESC) and rehabilitation • Develop Erosion and Sediment Control Plan (ESCP) in accordance with the IECA Best Practice Erosion and Sediment Control Guidelines 2008 • Extent and duration of soil exposure will be minimised • Disturbed areas will be promptly stabilised • Site is monitored and controls adjusted to maintain required performance standard • Minimum personnel requirements will apply for ESCP development and verification

Potential Impact	Assessment	Mitigation Commitments
		• A Water Quality Monitoring Plan must be developed by an appropriately qualified person • Dewatering Management Plan will be developed • Acid Sulphate Soil Management Plan will be developed • Awareness training for identification and management of ASS will be undertaken • Water extraction activities will be strictly controlled and monitored to ensure no waterbodies are completed drained • Erosion and sediment control measures in accordance with IECA 2008 • Refer to Table 5.4 and Table 5.12 of the MNES Management Plan for further details on mitigation measures.
Increased risk of contamination associated with activities such as refuelling or storage of chemicals	Construction activities, including refuelling and chemical storage, present a risk of soil and water contamination. With appropriate handling, storage, and spill management procedures implemented, the impact is expected to be low and readily manageable.	• Hazardous materials must be stored and handled appropriately • An Emergency Response Plan will be developed • Spill kits will be available during construction • Hazardous materials locations will be bunded • All waste disposed of in accordance with legislative requirements • No refuelling within 50 m of a watercourse • Application of herbicides in accordance with legislative requirements • Refer to Table 5.4 of the MNES Management Plan for further details on mitigation measures.
Temporary changes in hydrology from installation of infrastructure creating a barrier to surface flow and increasing stormwater run-off	Temporary changes in hydrology from installation of infrastructure creating a barrier to surface flow and increasing stormwater run-off.	• A Water Quality Monitoring Plan must be developed by an appropriately qualified person • Dewatering Management Plan will be developed • Acid Sulphate Soil Management Plan will be developed • Awareness training for identification and management of ASS will be undertaken • Water extraction activities will be strictly controlled and monitored to ensure no waterbodies are completed drained • Erosion and sediment control measures in accordance with IECA 2008 • Refer to Table 5.12 of the MNES Management Plan for further details on mitigation measures.
Removal of water from existing constructed wetlands and farm dams leading to changes in hydrology / habitat extent	Removal of water from existing constructed wetlands and farm dams leading to changes in hydrology / habitat extent	

Potential Impact	Assessment	Mitigation Commitments
and water quality. Increased activity at these locations resulting in avoidance and potentially altered foraging and breeding behaviour	and water quality. Increased activity at these locations resulting in avoidance and potentially altered foraging and breeding behaviour.	
Periodic burst of elevated noise levels may startle and disorientate individuals within proximity	Periodic bursts of elevated noise may temporarily startle or disorient individuals nearby, though impacts are expected to be minor and short-lived.	• Plant and equipment to be fitted with appropriate noise attenuation and maintained • Deliveries and removal of material and equipment to and from site within approved hours for construction • Plant to be turned off when not in use • No unnecessary use of horns or other audible signals on mobile plant or equipment • Machinery and equipment will be maintained in good working condition • Refer to Table 5.10 of the MNES Management Plan for further details on mitigation measures.
Increased pest levels, notably those which may predate upon individuals	The Project is not expected to increase pest levels within the Project Area beyond existing levels.	• All waste to be secured • Biosecurity Instrument Permit to be obtained for moving materials out of or within different biosecurity zones • Educate workforce in the identification of pest fauna species • Avoid inclusion of any water retaining voids or pits • Refer to Table 5.6 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Minor increases in the noise and light levels at the Calliope River substation during the operational phase due to the substation upgrade	Given the substation's existing Disturbance Footprint and the fact that operational activities will not significantly exceed current baseline conditions, the additional noise and light are unlikely to result in measurable impacts to shorebirds. Potential disturbance will be localised to the immediate vicinity of the substation and is not expected to affect foraging or roosting habitat within the broader area.	• Plant and equipment to be fitted with appropriate noise attenuation and maintained • Deliveries and removal of material and equipment to and from site within approved hours for construction • Plant to be turned off when not in use • No unnecessary use of horns or other audible signals on mobile plant or equipment • Machinery and equipment will be maintained in good working condition • Refer to Table 5.10 of the MNES Management Plan for further details on mitigation measures.
Degradation of habitat adjacent to the Project Area	Degradation of intertidal or estuarine habitats through sedimentation, pollution, or human disturbance could reduce prey availability and limit foraging efficiency. This is expected to be minimal with appropriate mitigation measures.	• Restrict vehicles to approved access tracks • Hazardous materials must be stored and handled appropriately • An Emergency Response Plan will be developed • Spill kits will be available during construction • Hazardous materials locations will be bunded • All waste disposed of in accordance with legislative requirements • No refuelling within 50 m of a watercourse • Application of herbicides in accordance with legislative requirements • Refer to Table 5.3 and Table 5.4 of the MNES Management Plan for further details on mitigation measures.

Table 8.28 Significant Impact Assessment: Endangered and Critically Endangered Migratory Shorebirds

Impact Criteria	Assessment
Lead to a long-term decrease in the size of a population	**Unlikely** Direct impacts to potential habitat are limited to clearing of 1.1 ha of roosting and foraging habitat for threatened migratory shorebird species. This loss of habitat is considered unlikely to significantly reduce the species' ability to persist in the local area given habitat within the adjacent areas and offshore islands is likely to be preferred, as it is less disturbed. While suitable foraging habitat is found within and adjacent to the Project Area, the site is not known to support significant numbers of these species and therefore they are expected to occur as infrequent individuals only. Implementation of the MNES Management Plan will assist to minimise potential indirect impacts of the Project, such as habitat degradation, weed invasion and temporary alterations to hydrology. The Project is therefore unlikely to lead to a long-term decrease in the size of the population.
Reduce the area of occupancy of the species	**Unlikely** These species are widespread throughout Australia's east coast. A total of 1.1 ha of direct habitat clearing will occur as a result of the Project. Given their widespread nature and broad habitat requirements, the removal of 1.1 ha of suitable roosting and foraging habitat is unlikely to reduce the area of occupancy of these species.
Fragment an existing population into two or more populations	**Unlikely** These species are highly mobile and undergo large seasonal movements. Potential habitat within the Project Area is highly fragmented as a result of historical clearing and the existing transmission lines and substations. The habitat is considered marginal in quality due to the existing disturbances and human activity. Given the ability for these species to readily disperse across the landscape, vegetation clearance associated with the Project is unlikely to present barriers to local movement, to the extent that it fragments any population within the Project Area.
Adversely affect habitat critical to the survival of a species	**Unlikely** As described above, the potential habitat within the Project Area is not considered critical to the survival of the species as it is not considered to be important habitat for these species. It is unlikely that the species will depend on the habitat within the Project Area, due to its small patch size and the existing human disturbances that occur there, such as clearing for the existing transmission line, the presence of feral predators, litter, and noise and activity from the existing roads and substations. Direct impacts to potential habitat are limited to clearing of 1.1 ha of roosting and foraging habitat. This loss of habitat is considered unlikely to significantly reduce the ability of these species to persist in the local area given habitat within the adjacent areas is likely to be preferred. Indirect impacts on potential habitat will be actively managed in accordance with the MNES Management Plan. Therefore, the Project is unlikely to adversely affect habitat critical to the survival of the species.

Impact Criteria	Assessment
Disrupt the breeding cycle of a population	**Unlikely** Given that these species are non-breeding visitors to Australia, the Project is unlikely to disrupt the breeding cycle of the population.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely** The suitable habitat within the Project Area is already fragmented and disturbed by exotic grass, grazing and human disturbances. A maximum of 1.1 ha of roosting and foraging habitat will be directly impacted as a result of the Project. The roosting and foraging habitat is not considered highly unique or important for refuge and habitat with similar characteristics, quality and condition occurs widely within the region. It is recognised that potential indirect impacts on habitat that will be retained, may occur as a result of the Project, including sediment contamination, erosion, acid sulfate soil disturbance, hydrology alteration, waste disposal, noise, light and vibration. These indirect impacts will be managed via the implementation of the measures, outlined in the MNES Management Plan. While minor increases in the noise and light levels at the Calliope River substation during the operational phase are expected due to the substation upgrade, these are not expected to be significant in relation to the existing impacts. Given the infrequent use of the Project Area by these species as well as their high mobility, the Project is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species are likely to decline.
Result in invasive species that are harmful to an Endangered species becoming established in the Endangered or Critically Endangered species' habitat	**Unlikely** Invasion of intertidal mudflats by weeds such as cord grass (*Spartina species*) and predation have been identified as threats to migratory shorebirds (Department of the Environment and Energy, 2017a). Historical clearing has occurred in discrete locations across the Project Area primarily for cattle grazing purposes, and ongoing maintenance currently occurs within the existing transmission line. It is considered likely that these areas already act as conduits for pest movement in the landscape. Appropriate biosecurity controls and weed washdown procedures will be adhered limiting the introduction or proliferation of pest and weed species as outlined in Table 5.5 of the MNES Management Plan. Based on this, it is unlikely the Project will result in invasive species that are harmful to these species becoming established.
Introduce disease that may cause the species to decline	**Unlikely** There are no known diseases affecting these species. The Project will employ best practice biosecurity protocols during construction and operation; therefore, introduction of a disease that may cause the species to decline is unlikely.

Impact Criteria	Assessment
Interfere with the recovery of the species	**Unlikely** There are currently no recovery plans for any threatened shorebird species. However the *Wildlife Conservation Plan for Migratory Shorebirds* (Department of the Environment, 2015e) outlines national activities to support the Flyway shorebird conservation initiatives and provides a strategic framework to ensure these activities and future research and management actions are integrated and remain focused on the long-term survival of migratory shorebird populations and their habitats. Additionally, the East Asian-Australasian Flyway Site Network, which is part of the broader Flyway Partnership, promotes the identification and protection of key sites for migratory shorebirds. Australia has 17 sites in the network (Partnership for the East Asian-Australasian Flyway, 2008). The Queensland sites include: • Moreton Bay, Queensland • Bowling Green Bay, Queensland • Shoalwater Bay, Queensland • Great Sandy Strait Queensland • Currawinya National Park, Queensland. None of these sites are located within or adjacent to the Project Area. Therefore, the Project is unlikely to interfere with the recovery of these threatened migratory shorebird species.
Significant Residual Impact	**Unlikely to have a significant impact**

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FIGURE 8.9-1

Endangered and Critically Endangered Migratory Shorebirds Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

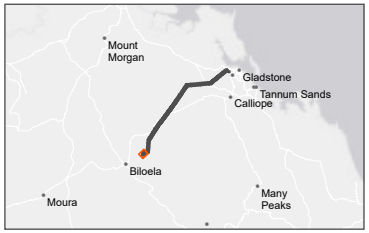
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Migratory Shorebirds Habitat

- Roosting and foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



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Kilometres

Scale 1:20,000 at A4
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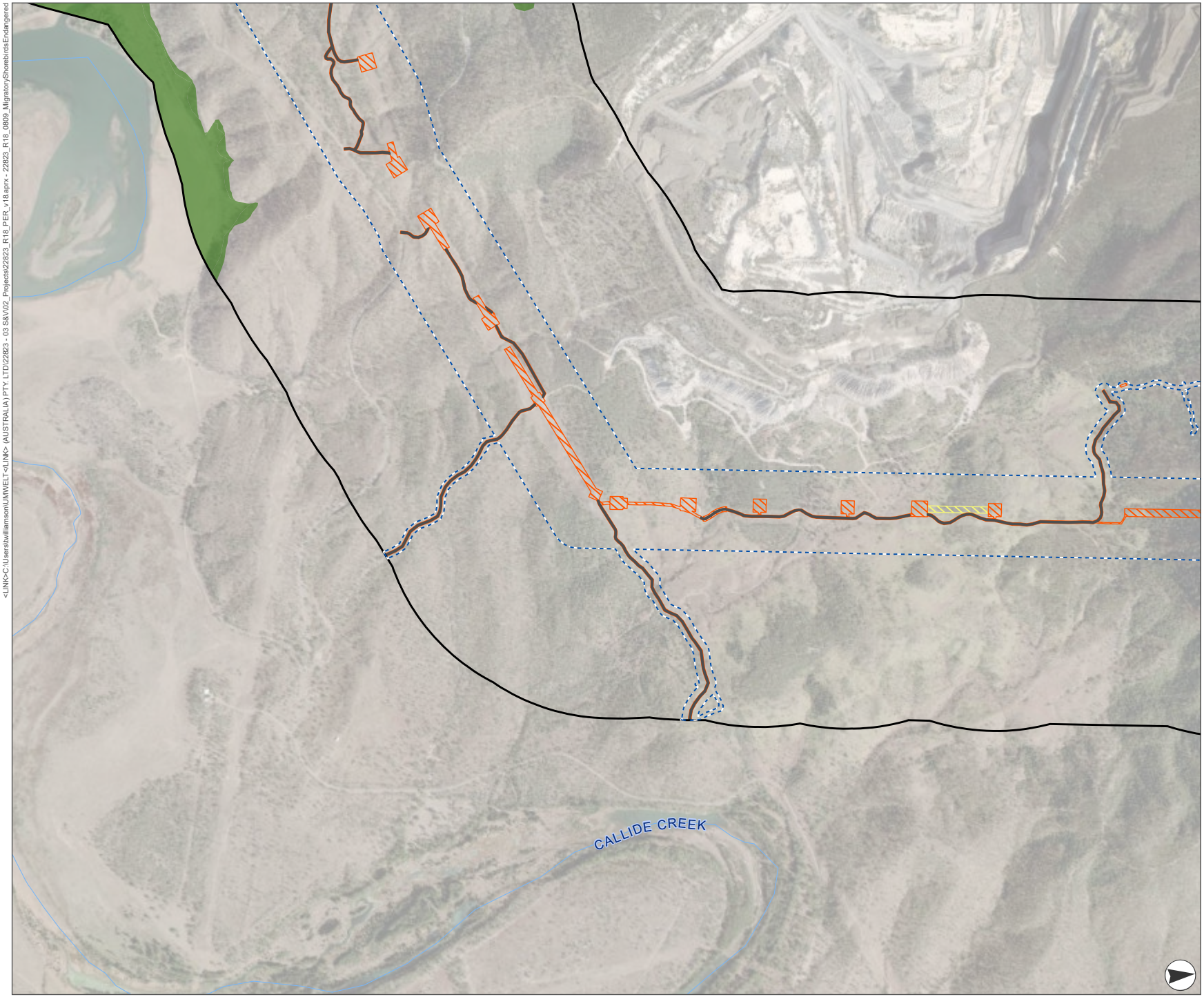


FIGURE 8.9-2

Endangered and Critically Endangered Migratory Shorebirds Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

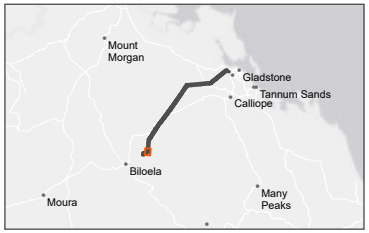
- Watercourse
- Field Survey Extent
- Project Area

Migratory Shorebirds Habitat

- Roosting and foraging

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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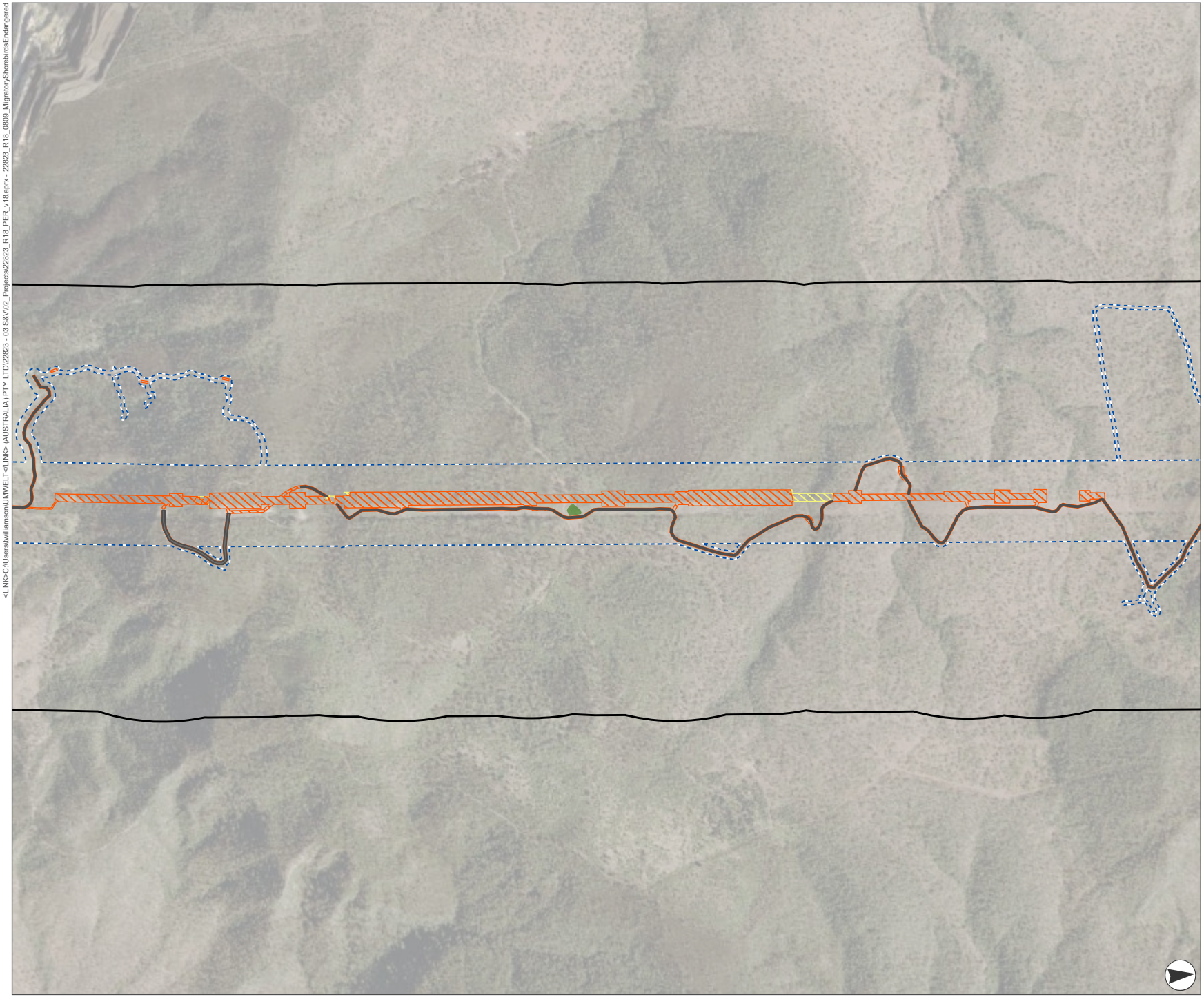


FIGURE 8.9-3

Endangered and Critically Endangered Migratory Shorebirds Records and Habitat within the Field Survey Extent and Disturbance Footprint

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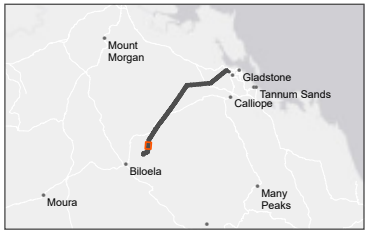
- Field Survey Extent
- Project Area

Migratory Shorebirds Habitat

- Roosting and foraging

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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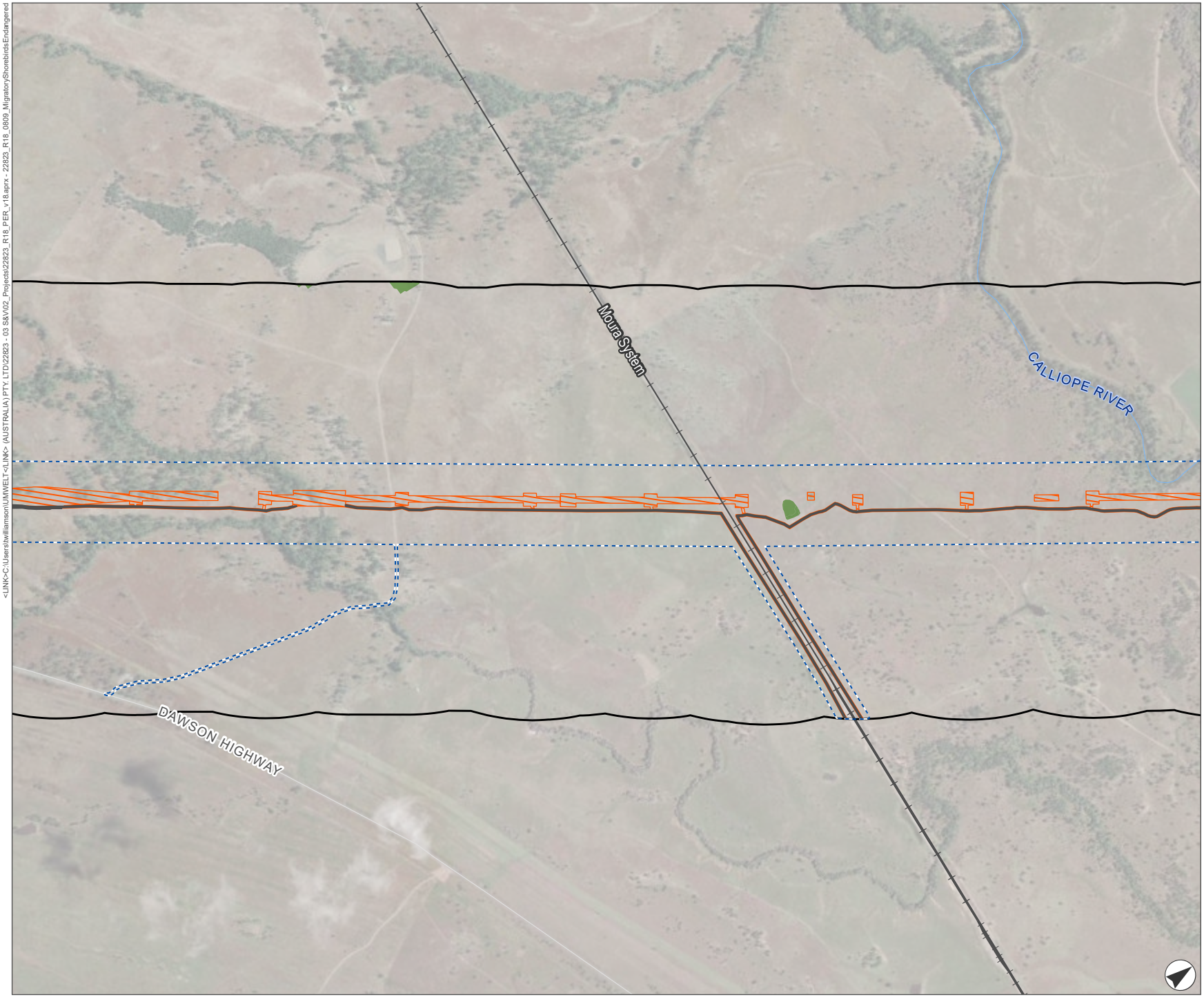


FIGURE 8.9-9

Endangered and Critically Endangered Migratory Shorebirds Records and Habitat within the Field Survey Extent and Disturbance Footprint

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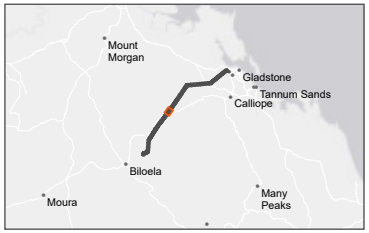
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Migratory Shorebirds Habitat

- Roosting and foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



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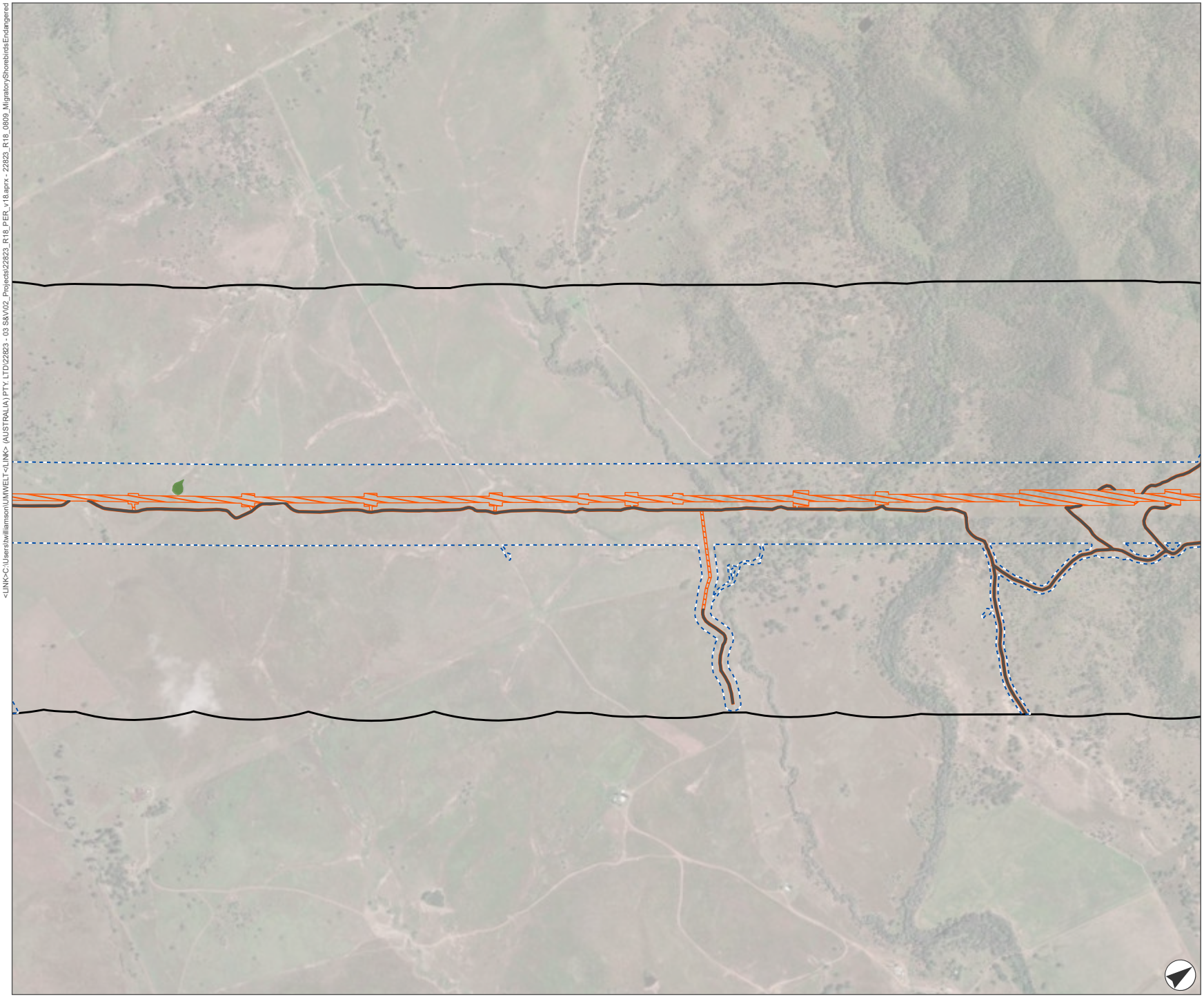


FIGURE 8.9-11

Endangered and Critically Endangered Migratory Shorebirds Records and Habitat within the Field Survey Extent and Disturbance Footprint

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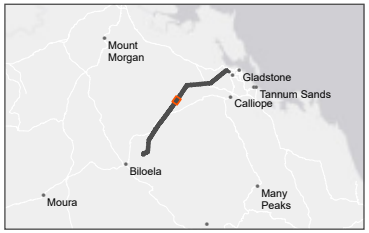
- Field Survey Extent
- Project Area

Migratory Shorebirds Habitat

- Roosting and foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



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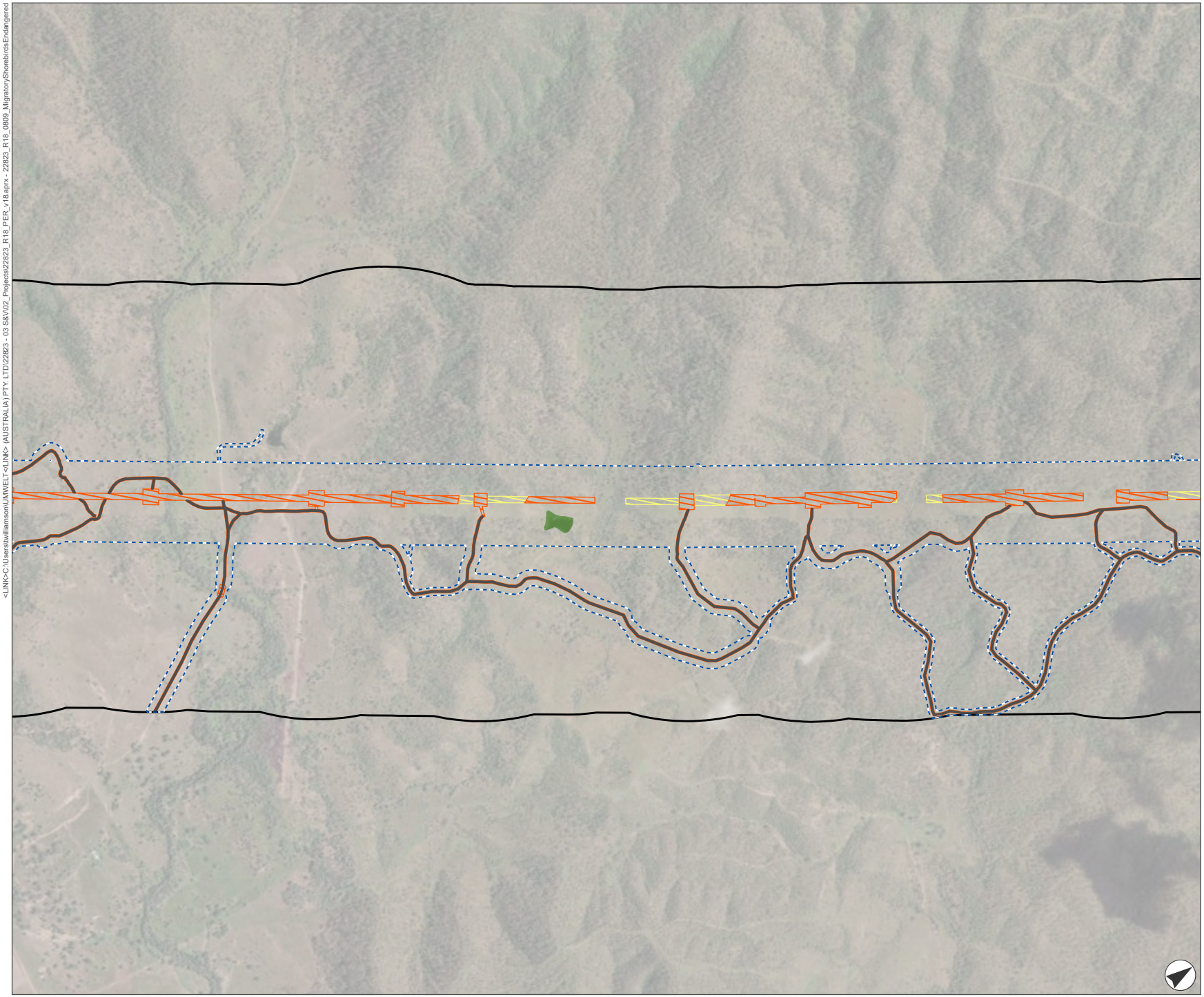


FIGURE 8.9-12

Endangered and Critically Endangered Migratory Shorebirds Records and Habitat within the Field Survey Extent and Disturbance Footprint

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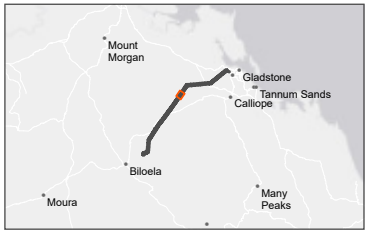
- Field Survey Extent
- Project Area

Migratory Shorebirds Habitat

- Roosting and foraging

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.9-14

Endangered and Critically Endangered Migratory Shorebirds Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

- Field Survey Extent
- Project Area

Migratory Shorebirds Habitat

- Roosting and foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance

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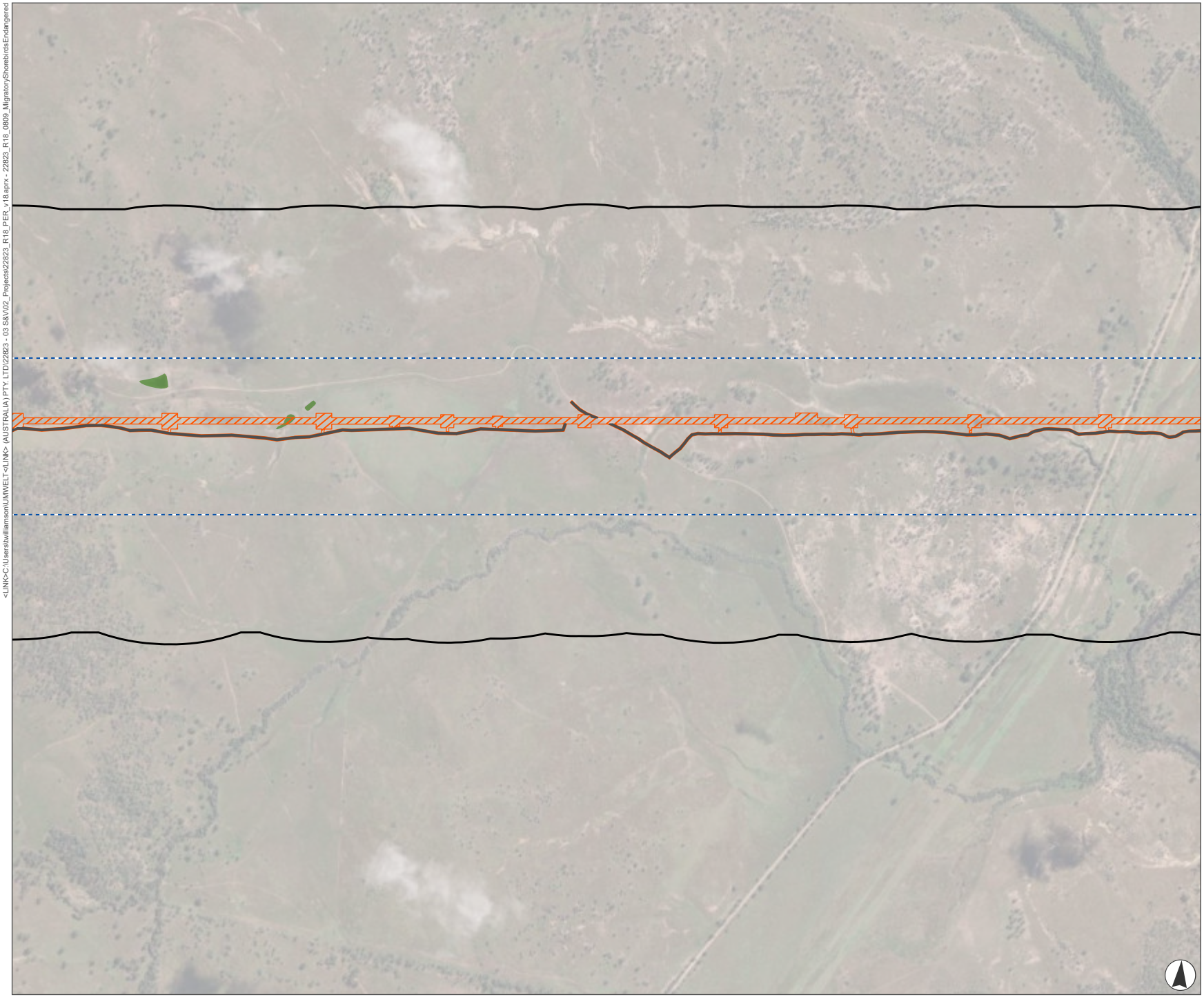


FIGURE 8.9-15

Endangered and Critically Endangered Migratory Shorebirds Records and Habitat within the Field Survey Extent and Disturbance Footprint

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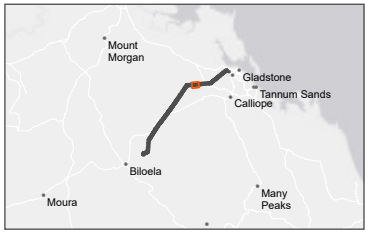
- Field Survey Extent
- Project Area

Migratory Shorebirds Habitat

- Roosting and foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

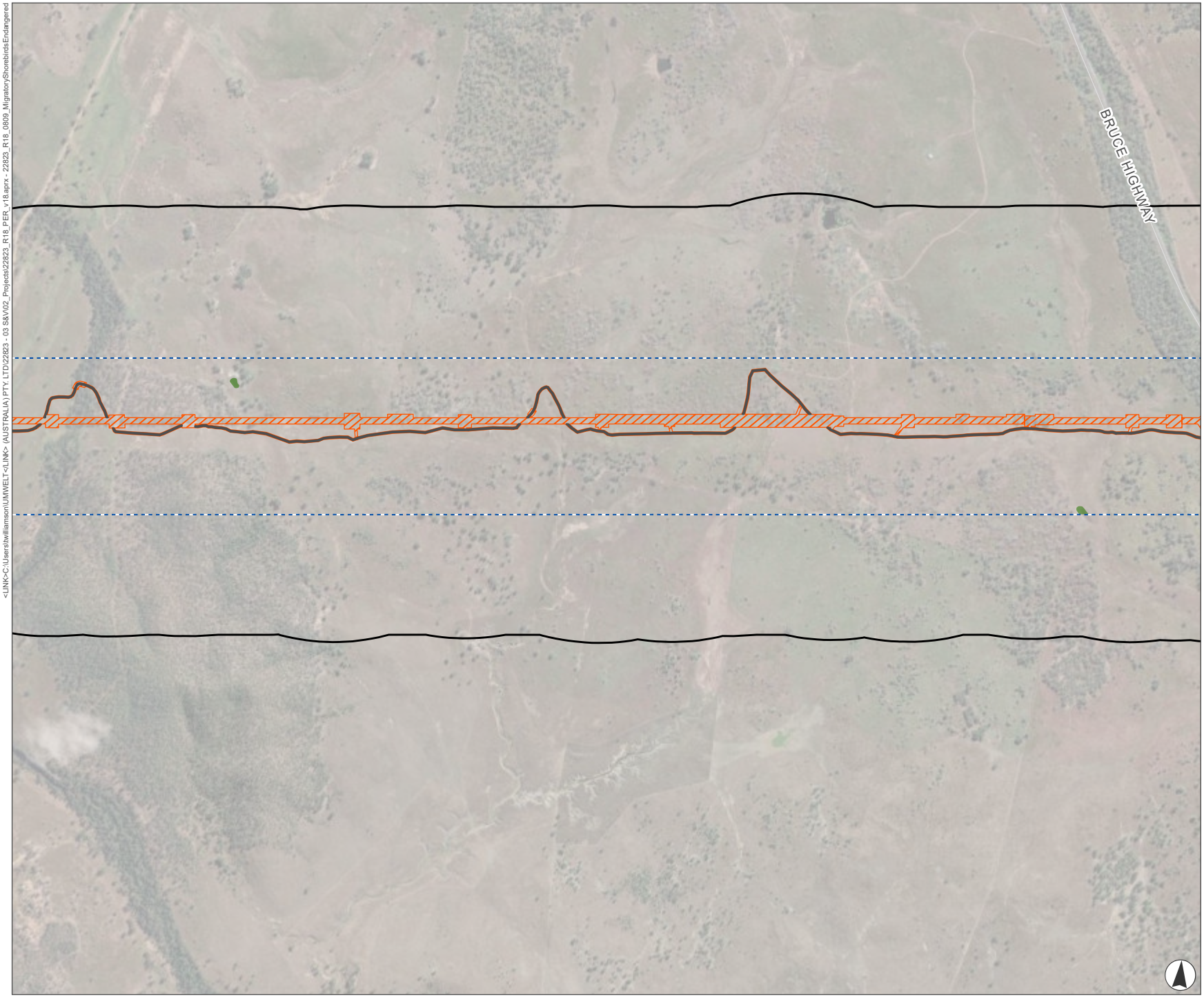
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FIGURE 8.9-16

Endangered and Critically Endangered Migratory Shorebirds Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

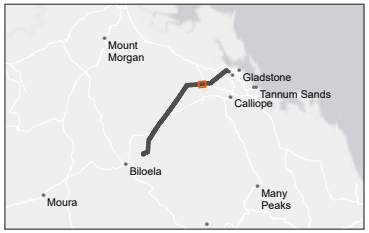
- Roads
- Field Survey Extent
- Project Area

Migratory Shorebirds Habitat

- Roosting and foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



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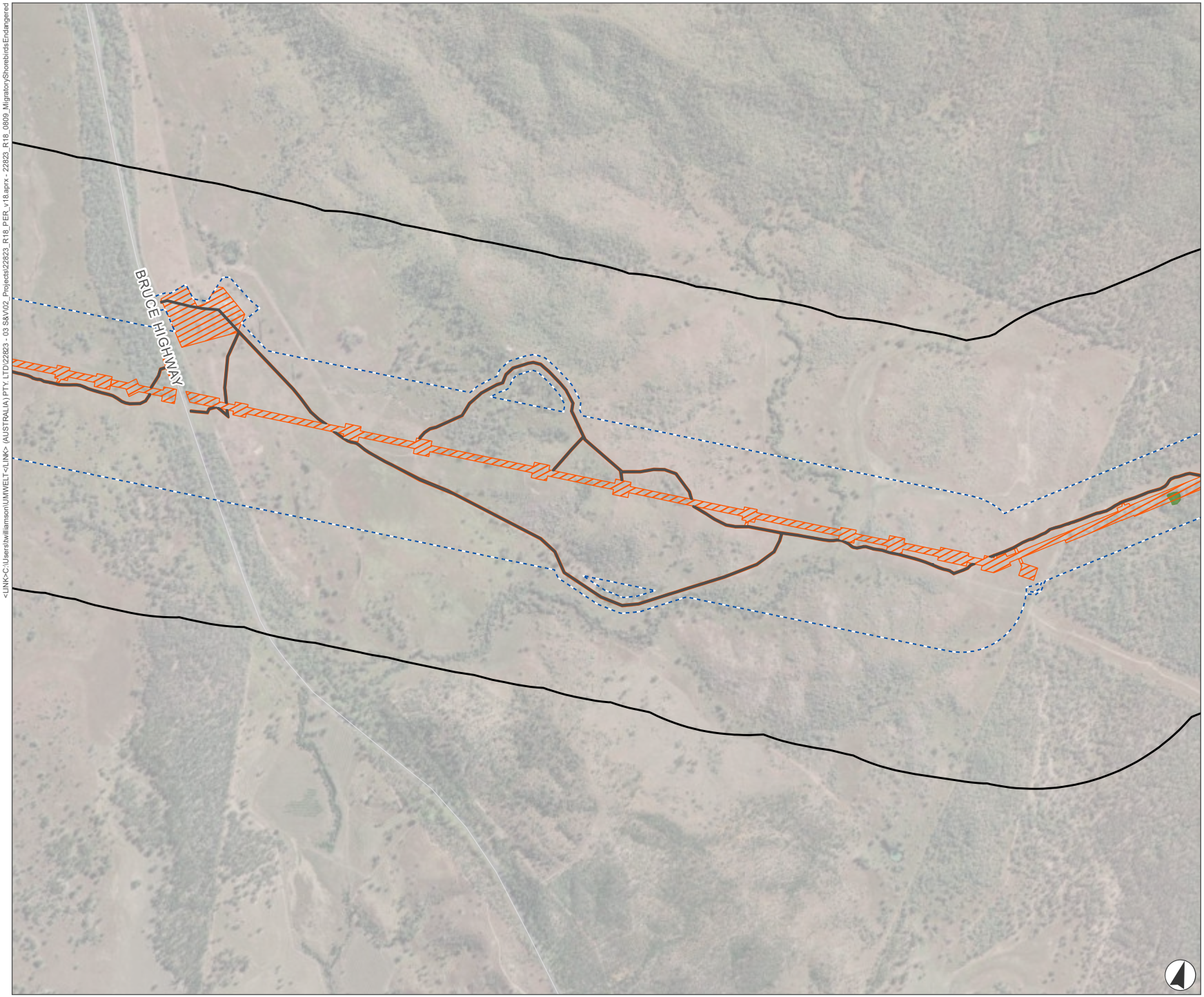


FIGURE 8.9-17

Endangered and Critically Endangered Migratory Shorebirds Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

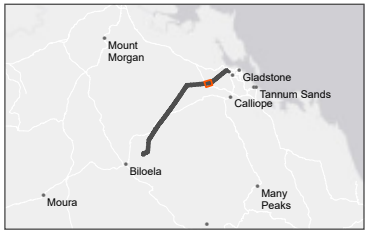
- Roads
- Field Survey Extent
- Project Area

Migratory Shorebirds Habitat

- Roosting and foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



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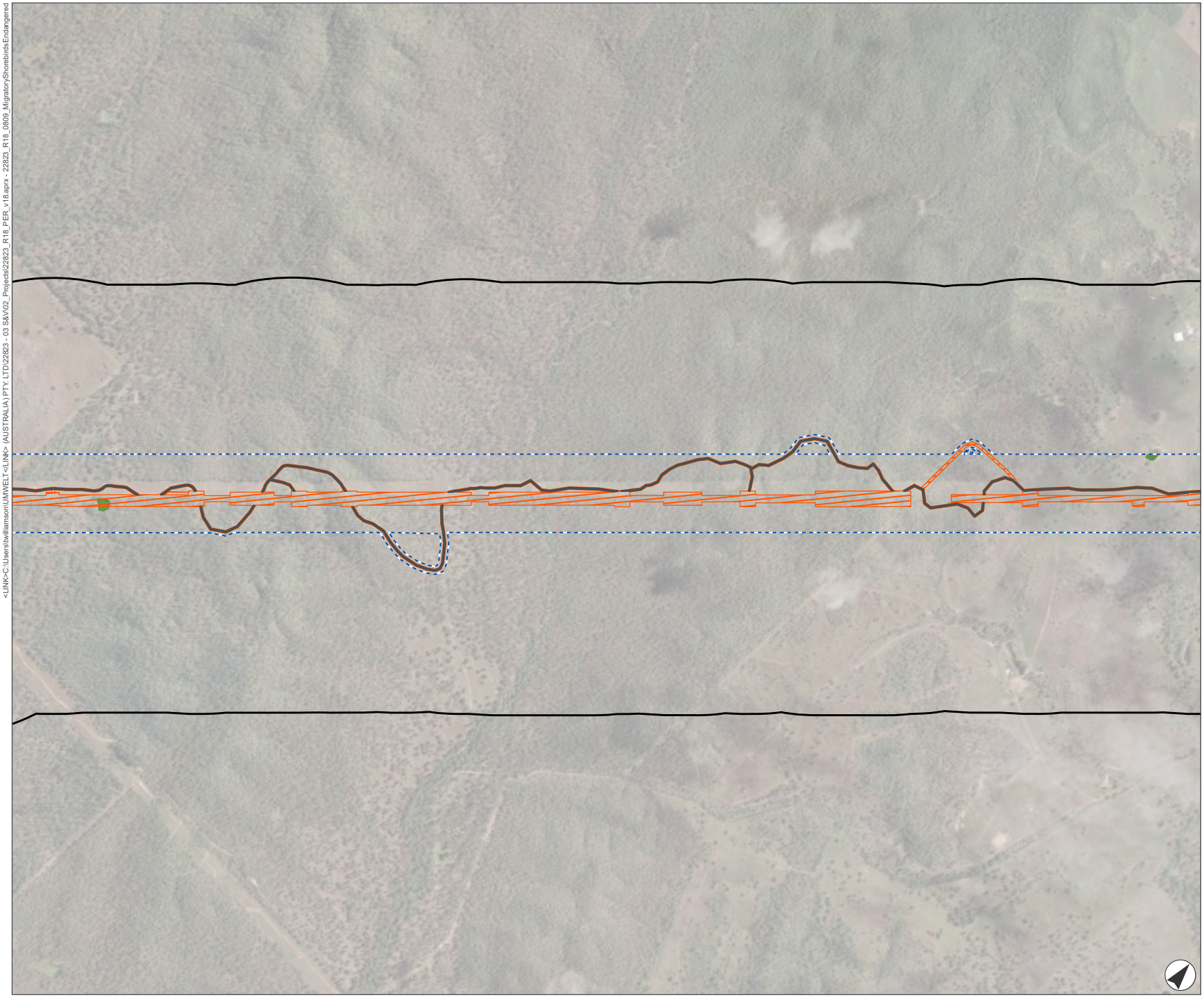


FIGURE 8.9-18

Endangered and Critically Endangered Migratory Shorebirds Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

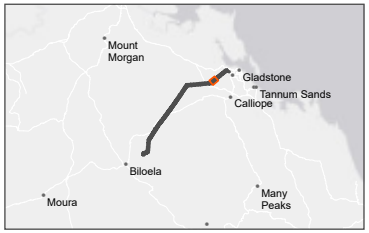
- Field Survey Extent
- Project Area

Migratory Shorebirds Habitat

- Roosting and foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



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Kilometres

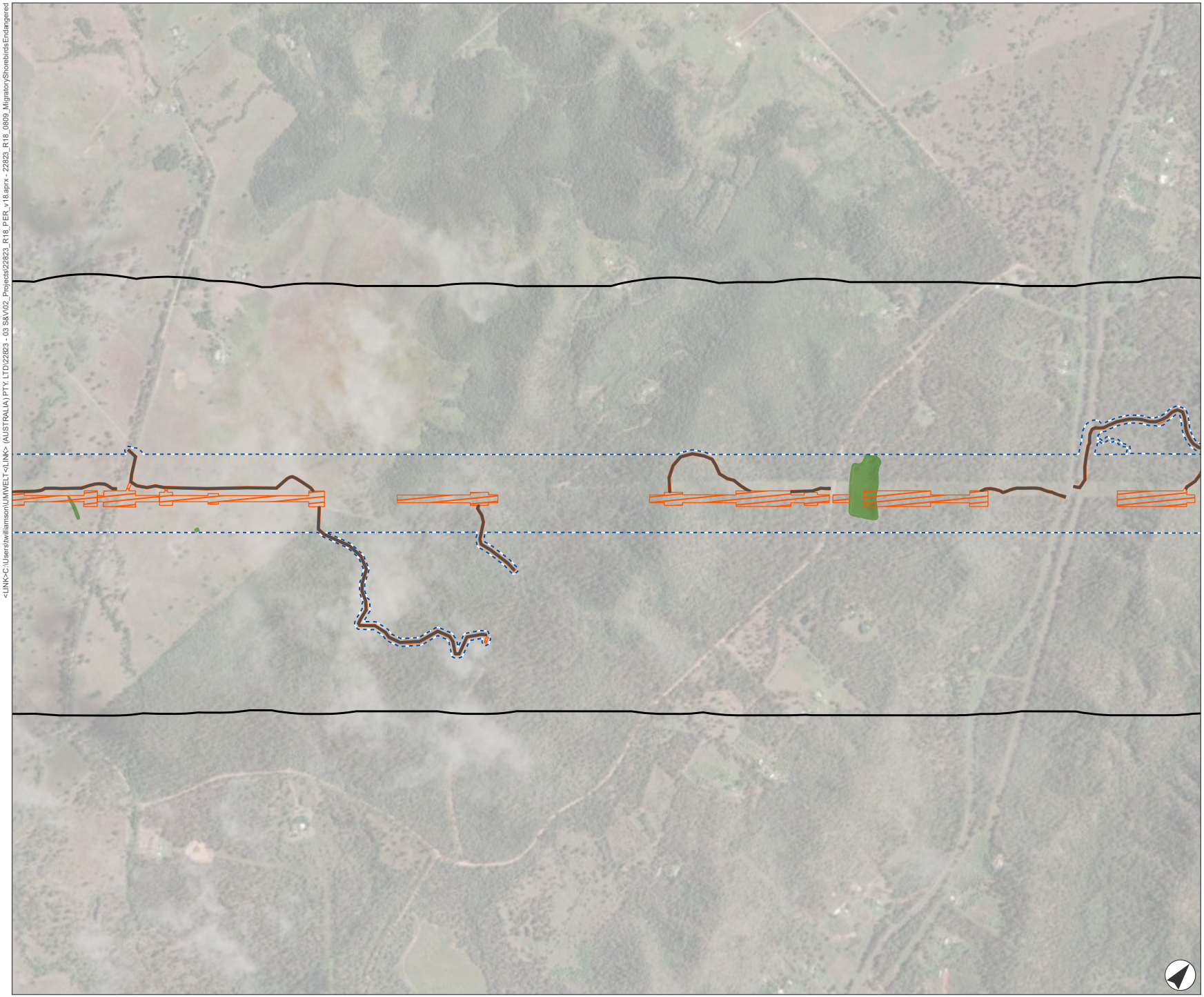
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FIGURE 8.9-19

Endangered and Critically Endangered Migratory Shorebirds Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

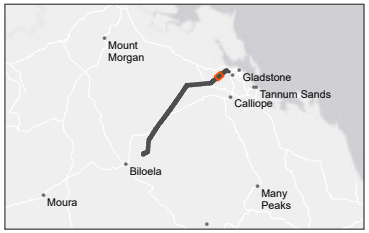
- Field Survey Extent
- Project Area

Migratory Shorebirds Habitat

- Roosting and foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



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Kilometres

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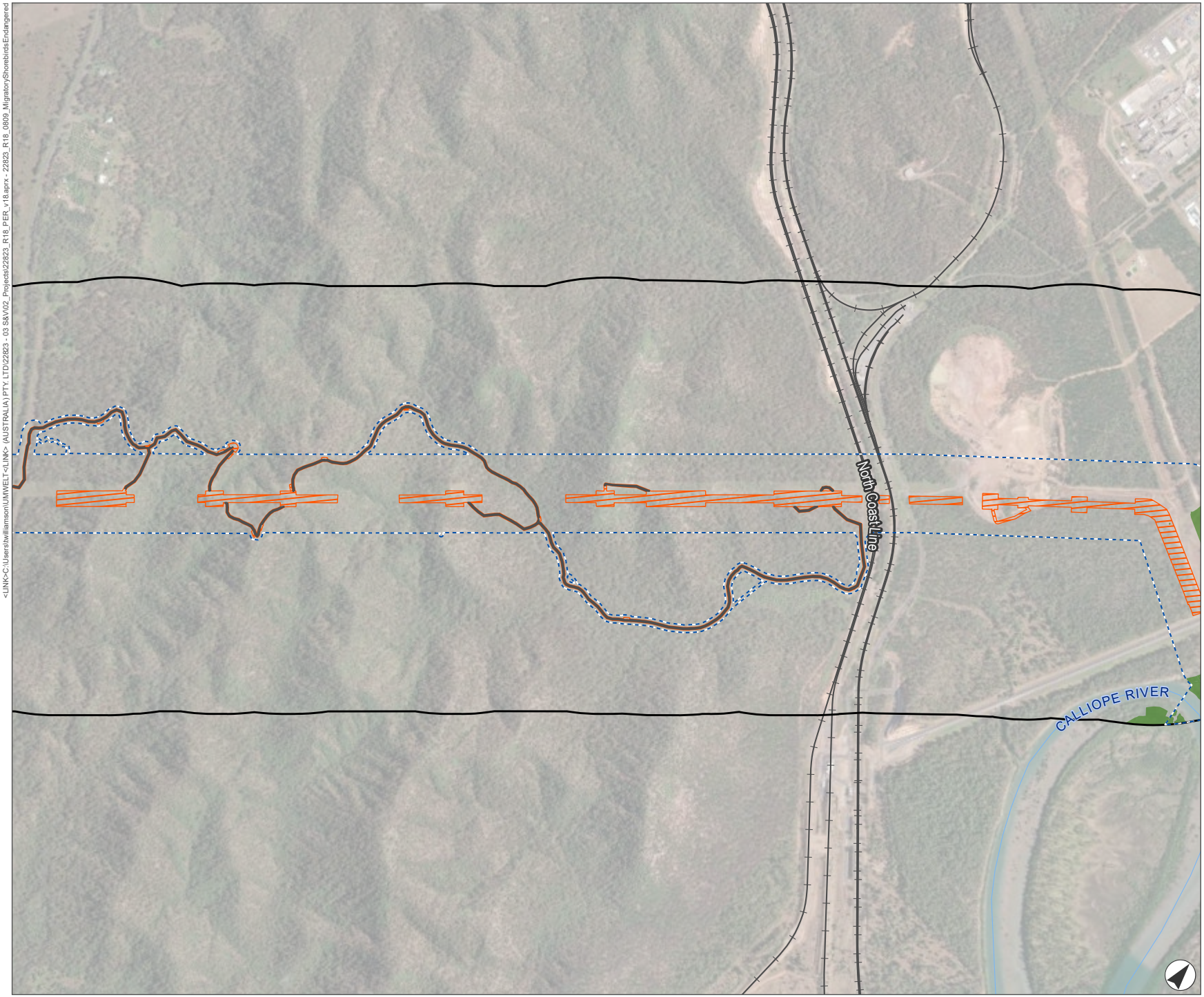


FIGURE 8.9-20

Endangered and Critically Endangered Migratory Shorebirds Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

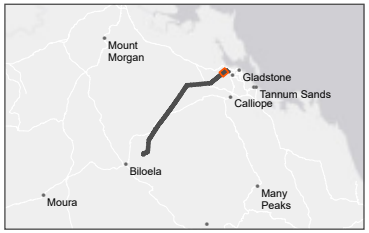
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Migratory Shorebirds Habitat

- Roosting and foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



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Kilometres

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FIGURE 8.9-21

Endangered and Critically Endangered Migratory Shorebirds Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

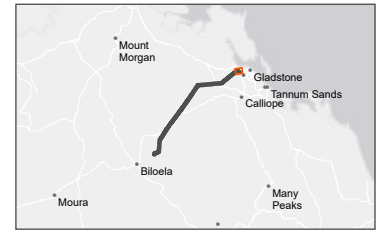
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area
- Common Greenshank Records (ALA)
- Curlew Sandpiper Records (ALA)
- Eastern Curlew Records (ALA)

Migratory Shorebirds Habitat

- Roosting and foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

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8.2.5.2 Vulnerable Migratory Shorebirds

The following migratory shorebirds are listed as 'vulnerable' under the EPBC Act and therefore require assessment utilising the significant impact criteria for 'vulnerable' species:

- great knot (*Calidris tenuirostris*)
- greater sand plover (*Charadrius leschenaultia*)
- red knot (*Calidris canutus*)
- ruddy turnstone (*Arenaria interpres*)
- sharp-tailed sandpiper (*Calidris acuminata*)
- terek sandpiper (*Xenus cinereus*).

Given their similar habitat requirements and migratory behaviours, 'vulnerable' species have been cumulatively assessed under one SIA.

Table 8.29 Vulnerable Migratory Shorebirds: Ecology and Relevance to the Project Area

Vulnerable Migratory Shorebird Profiles	
great knot	**Conservation status** Vulnerable, Migratory **Distribution** The great knot breeds in north-east Siberia and migrates along the East Asian–Australasian Flyway, with the Yellow Sea providing critical staging habitat for up to 80% of the population during northward migration. Smaller numbers also stop in South-East Asia, with occasional records across the Middle East, Indian Ocean, New Zealand and north-west Europe (Department of Climate Change, Energy, the Environment and Water, 2025d). In Australia, which supports most of the global non-breeding population, the species occurs around the coast but is concentrated in the north. Key sites include Eighty Mile Beach in Western Australia, Roebuck Bay, the south-east Gulf of Carpentaria, and Roper River. Other important areas include Shoalwater Bay–Broad Sound, Mackay, Fog Bay, Boucat Bay, Castlereagh Bay and Moreton Bay. The species is less common in southern and south-western Australia (Department of Climate Change, Energy, the Environment and Water, 2025d). **Important Population** The occurrence of known 'important habitat' can be used as a surrogate for an 'important population' for migratory shorebirds. Since the Project does not support any important habitat or large aggregations of the species, it is not considered to support any important populations. **Historical records within the desktop search extent** WildNet records occur within the desktop search extent. The most recent record dating from 1999, occurs approximately 7.3 km north-

west of Section E, near former Targinie State Forest. Additional ALA records are known from the Gladstone area, with records as recent as 2019.

Habitat

In Australasia, the great knot primarily occupies sheltered coastal environments with extensive intertidal mudflats and sandflats, including inlets, bays, estuaries, harbours and lagoons. It is occasionally recorded on exposed reefs, rocky shorelines, mangrove-lined coasts, saltworks ponds, coastal swamps, salt lakes and non-tidal lagoons, but is rarely observed inland (Department of Climate Change, Energy, the Environment and Water, 2025d).

The species typically roosts communally in open areas at the water's edge or in shallow water near feeding grounds. Roost selection is influenced by temperature, with birds favouring damp substrates that reduce heat stress in hot conditions. Large flocks are known, including a record of ~8,610 birds roosting at an inland claypan near Roebuck Bay, north-west Western Australia.

Historical records within the desktop search extent

WildNet records occur within the desktop search extent. The most recent record dating from 1999, occurs approximately 7.3 km north-west of Section E, near former Targinie State Forest. Additional ALA records are known from the Gladstone area, with records as recent as 2019.

Habitat critical to the survival of the species

While no critical habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat, the Conservation Advice defers to the internationally and nationally important habitat for migratory shorebird definitions as measures of critical habitat.

Internationally important habitat encompasses areas that regularly support:

- 1% of the individuals in a population; or,
- A total abundance of at least 20,000 waterbirds.

Nationally important habitat for migratory shorebirds regularly supports:

- 0.1% of the flyway population; or,
- 2,000 migratory shorebirds; or,
- 15 migratory shorebird species.

The habitat within the Project Area is within the known or likely to occur distribution for the species. However, it should be noted that these areas have experienced significant land use changes and exist within non-remnant vegetation, often dominated by invasive grass species subject to grazing by cattle, and regular maintenance under the existing transmission line. For great knot, 1% of the Flyway Population equates to 4,250 individuals and 0.1% of the Flyway Population equates to 425 individuals. Detailed shorebird surveys undertaken by Wildlife Unlimited throughout the summer of 2019 included multiple surveys at the mouth of the Calliope River, adjacent to the Project Area. While low numbers of shorebird species were recorded at the sites adjacent to the Project Area, the surveys found no

Vulnerable Migratory Shorebird Profiles

	important shorebird roosts or sites of national significance along the Calliope River or at the mouth of the Calliope River (Wildlife Unlimited, 2020). All publicly available records of the great knot in the Project Area (WildNet, eBird and ALA) are of single individuals only. It is therefore considered that the habitat within the Project Area does not meet the definition of important habitat as it does not support an ecologically significant proportion of the population and is therefore not considered to be critical to the survival for great knot. **Current threats to the species** The great knot is threatened primarily by habitat loss and degradation across the East Asian–Australasian Flyway, particularly large-scale reclamation of tidal flats in the Yellow Sea, where up to 80% of the population stages during northward migration. Since the 1960s, up to 65% of tidal flats have been lost, with severe population declines recorded, including ~90,000 birds after reclamation in South Korea in 2006. The species is especially vulnerable due to its specialised shellfish diet (Department of Climate Change, Energy, the Environment and Water, 2025d). Other pressures include altered sediment and water flows, disturbance from human activity, hunting in parts of Asia, and pollution. Climate change and sea level rise are expected to compound these impacts, with modelling predicting significant population declines from intertidal habitat loss. In Australia, predators, vehicles and recreation contribute to roost site disruption on a local scale (Department of Climate Change, Energy, the Environment and Water, 2025d). **Recovery Plans** There is no adopted or made Recovery Plan for this species.
greater sand plover	**Conservation status** Vulnerable, Migratory **Distribution** The greater sand plover occurs widely around the Australian coastline, with the largest concentrations recorded in northern and north-western Australia, particularly between North West Cape and Roebuck Bay in Western Australia, the Top End region of the Northern Territory, and the south-eastern Gulf of Carpentaria in Queensland. Smaller numbers occur along the east coast into northern New South Wales and at select sites in Victoria, South Australia, Tasmania and southern Western Australia. The estimated area of occupancy in Australia is approximately 35,600 km^2, representing 27–38% of the global population. The global population is estimated at 190,000–360,000 individuals, and the species is currently listed as Least Concern (Department of Climate Change, Energy, the Environment and Water, 2025f). **Important populations** The SPRAT database does not identify 'important populations' of any shorebird species. However, the occurrence of known 'important habitat' can be used as a surrogate for an 'important population'. As stated above, no records of these species in significant numbers have been recorded in or near the Project Area. The Gladstone Harbour and its surrounds have been extensively surveyed by shorebird/wader groups over time. The area is not known to support a national or international population or any shorebird species. Since the Project does not support any important habitat, it is considered not to support any important populations. If roosting and foraging was

to occur within the Project Area, this would only be from vagrant individuals, rather than significant population numbers. No records of this species in significant numbers have been recorded in or near the Project Area, and the existing human disturbances are likely to impact on these species' likelihood within the site.

Historical records within the desktop search extent

WildNet records occur within the desktop search extent. The closest and most recent record, dating from 1999, occurs approximately 7.3 km north-west of Section E, near former Targinie State Forest. Additional ALA records are known from the Gladstone coast, with records as recent as 2019.

Habitat

In Australasia, the species is almost entirely coastal, occupying littoral and estuarine habitats. It predominantly occurs on sheltered sandy, shelly, or muddy beaches with extensive intertidal flats or sandbanks, as well as sandy estuarine lagoons, inshore reefs, rock platforms, and small islands. Occasional records exist from saltworks, saltlakes, and brackish swamps, but use of freshwater wetlands is rare (Department of Climate Change, Energy, the Environment and Water, 2025f).

Feeding habitat primarily consists of open intertidal flats within sheltered embayments, lagoons, and estuaries, where the species forages on firm sandy substrates. Roosting typically occurs on sandspits and tidal banks, with occasional use of rocky points, saltmarsh, or claypans. Birds often roost further up the beach, including above the high-tide mark. The species does not breed in Australia. Breeding occurs in deserts and semi-arid regions within its northern range, typically in barren areas or those with sparse xerophytic vegetation (Department of Climate Change, Energy, the Environment and Water, 2025f).

Habitat critical to the survival of the species

Habitat critical to the survival of the greater sand plover is defined within the conservation advice for the species (Department of Climate Change, Energy, the Environment and Water, 2023c) as any areas necessary for foraging, roosting, dispersal, and long-term maintenance of the species and the ecological communities it depends on. In Australia, the species relies on a network of coastal sites during the non-breeding season to cope with environmental variability. Feeding habitat comprises sandy or muddy intertidal flats and beaches, while roosting occurs primarily on large sandflats, spits, and banks, with occasional use of mudflats, lagoons, and estuaries.

No Critical Habitat has been declared under the EPBC Act, but internationally and nationally important sites (supporting ≥1% and ≥0.1% of the flyway population, respectively) are considered habitat critical. Loss or degradation of such habitat can disproportionately affect population viability. Actions that remove, modify, or indirectly impact these areas (e.g., through disturbance, light pollution, weeds, or predators) may adversely affect the species and interfere with its recovery (Department of Climate Change, Energy, the Environment and Water, 2023c).

Current threats to the species

The greater sand plover is exposed to significant pressures across the East Asian-Australasian Flyway, primarily from direct and indirect habitat loss. Critical staging and stopover sites, particularly in the Yellow Sea, have been extensively reclaimed for land development and aquaculture, while water regulation and diversion have reduced sediment and freshwater inflows, further degrading intertidal habitats.

Vulnerable Migratory Shorebird Profiles

Additional threats include pollution, anthropogenic disturbance, industrial activities such as oil exploration, and climate change, including sea-level rise, which may alter the availability and quality of breeding, staging, and non-breeding habitats.

Within Australia, habitat loss and modification from urban, industrial, agricultural, and aquaculture activities represent the principal threat. Habitat quality may also be compromised by siltation, nutrient enrichment, pollution, and invasive flora and fauna. Increased human recreational activity in coastal areas, including vehicle access, fishing, and domestic animals, can disturb roosting and foraging, reducing energetic efficiency. The species' long-distance migratory behaviour renders it particularly sensitive to cumulative pressures along its migratory flyway.

Recovery plans

There is no adopted or made recovery plan for this species, nor has one been determined as required.

red knot

Conservation status

Vulnerable, Migratory.

Distribution

Red knot is widespread across suitable coastal habitats in Australia, with highest abundances in north-west Australia, particularly at Eighty Mile Beach and Roebuck Bay. It is less common in south-west Australia, the northern Great Australian Bight, and parts of the New South Wales and Victorian coasts. The species occurs in all States and Territories, including Tasmania and offshore islands such as Norfolk Island, Lord Howe, and Macquarie Island. Key internationally important Australian sites include Eighty Mile Beach, south-east Gulf of Carpentaria, Roebuck Bay, Corner Inlet, and Port Pirie coast (Department of Climate Change, Energy, the Environment and Water, 2025c).

Red knot breeds across the Arctic, including North America, Greenland, Russia, and northern Eurasia. During migration, it passes through North and South America, Europe, Africa, and East Asia, including the Philippines, Malaysia, Indonesia, and Australasia. Non-breeding areas extend to southern South America, parts of West Africa, and Australasia. Red knot migrates along extensive flyways connecting Arctic breeding grounds to non-breeding sites across multiple continents, including stopover sites in East Asia and Australasia (Department of Climate Change, Energy, the Environment and Water, 2025c).

Important populations

The SPRAT database does not identify 'important populations' of any shorebird species. However, the occurrence of known 'important habitat' can be used as a surrogate for an 'important population'. As stated above, no records of these species in significant numbers have been recorded in or near the Project Area. The Gladstone Harbour and its surrounds have been extensively surveyed by shorebird/wader groups over time. The area is not known to support a national or international population or any shorebird species. Since the Project does not support any important habitat, it is considered not to support any important populations. If roosting and foraging was to occur within the Project Area, this would only be from vagrant individuals, rather than significant population numbers. No records of this species in significant numbers have been recorded in or near the Project Area, and the existing human disturbances are likely to impact on these species' likelihood within the site.

Historical records within the desktop search extent

WildNet records occur within the desktop search extent. The closest and most recent record, dating from 1989, occurs approximately 1.2 km north of Section E along the Calliope River. Additional ALA records are known from the Gladstone area as recently as 2019.

Habitat

In Australasia, red knot primarily inhabit intertidal mudflats, sandflats, and sandy beaches of sheltered coasts, including estuaries, bays, lagoons, and harbours, and occasionally shallow pools, reefs, saline wetlands, ponds, and saltworks, but rarely use freshwater or inland lakes. They feed on soft substrates on intertidal flats at low tide and in nearby lakes, ponds, algal mats, or reef pools at high tide. Roosting occurs on sandy beaches, spits, islets, mudflats, and shallow saline ponds near feeding areas, often in open sites with damp substrates preferred in hot conditions. The species also moves to sheltered areas during extreme weather events (Department of Climate Change, Energy, the Environment and Water, 2025c).

Habitat critical to the survival of the species

Habitat critical to the survival of the species is defined in the conservation advice (Department of Climate Change, Energy, the Environment and Water, 2024c) as: refers to areas necessary for foraging, roosting, dispersal, maintenance of populations (including prey species such as macrobenthos), genetic diversity, and potential recovery or reintroduction.

In Australia, red knot requires a network of non-breeding sites to buffer natural and anthropogenic environmental changes. Feeding habitat consists of exposed sandy or soft mud intertidal flats and beaches, used across the tidal range, with upper tidal flats often particularly important. Roosting occurs primarily on intertidal sandflats, spits, and banks, and less frequently in mudflats, estuaries, lagoons, or bays. Birds may select damp substrates to reduce heat stress and move to sheltered areas during cyclones.

No habitat has been formally designated as Critical Habitat under section 207A of the EPBC Act. However, internationally and nationally important sites, as defined by EPBC Act criteria, support key portions of the flyway population. Sites are considered:

- Internationally important: regularly support >1% of the species' flyway population (~1,100 birds).
- Nationally important: regularly support >0.1% of the flyway population (~110 birds).

All such sites are considered habitat critical. Loss or degradation of these areas disproportionately affects population viability. Management should avoid direct destruction or modification and minimise indirect impacts, including human disturbance, light pollution, introduction of disease, invasive species, or predators.

Current threats to the species

Red knot face multiple threats across their range. Globally, the greatest threat is habitat loss and degradation along the East Asian-Australasian Flyway, particularly from reclamation of intertidal mudflats for development or aquaculture, notably in the Yellow Sea, where at least 40% of intertidal areas have been lost. Water regulation, pollution, human disturbance, hunting, and industrial activities such as oil exploration further threaten staging and non-breeding sites. Sea-level rise associated with climate change is projected to reduce available intertidal habitat, potentially decreasing population flow by up to 15% under a 1.5 m rise. Within Australia, habitat loss and degradation reduce foraging and roosting sites, affecting energy accumulation for migration and breeding. Threats include land

Vulnerable Migratory Shorebird Profiles

clearing, infilling, hydrological changes, pollution, invasive plants (e.g., cord grass), and loss of marine vegetation. Disturbance from recreational and residential activities, as well as direct mortality from hunting, collisions, or chemical spills, further compromise survival.

Recovery plans

There is no adopted or made recovery plan for this species, nor has one been determined as required.

ruddy turnstone

Conservation status

Vulnerable, Migratory.

Distribution

The ruddy turnstone is widespread in Australia during the non-breeding season, occurring along most coastal regions from Tasmania to Darwin, with occasional inland records. It prefers rocky shores or beaches with large deposits of decaying seaweed. Australia supports a significant proportion of the Flyway population, with an estimated 14,000 birds using Australian sites annually and approximately 73% of the global non-breeding population occurring in Australia and New Zealand. Important Australian sites include Eighty Mile Beach, Roebuck Bay, Boullanger Bay/Robbins Passage, Ashmore Reef, Barrow Island, King Island, Lacepede Islands, Rivoli Bay, Hunter Estuary, Castlereagh Bay, and other key coastal areas, with maximum counts ranging from 350 to 3,480 birds per site (Department of Climate Change, Energy, the Environment and Water, 2025a).

Globally, the ruddy turnstone has a near-cosmopolitan non-breeding distribution across Australasia, North and South America, Europe, Africa, and Asia, with breeding concentrated in high-latitude regions of Europe, Asia, and North America, including the Arctic coasts and islands of Canada, Greenland, and northern Russia. Important international Flyway sites include the Pribilof Islands (USA), Yalu Jiang (China), Farewell Spit (New Zealand), Namyang Bay (South Korea), and multiple sites in Japan, Russia, Indonesia, and Vietnam, supporting hundreds to thousands of birds at each location. Australia hosts a population distinct from the High Arctic subspecies (A. i. morinella), contributing to global conservation of the species (Department of Climate Change, Energy, the Environment and Water, 2025a).

Important populations

The SPRAT database does not identify ‘important populations’ of any shorebird species. However, the occurrence of known ‘important habitat’ can be used as a surrogate for an ‘important population’. As stated above, no records of these species in significant numbers have been recorded in or near the Project Area. The Gladstone Harbour and its surrounds have been extensively surveyed by shorebird/wader groups over time. The area is not known to support a national or international population or any shorebird species. Since the Project does not support any important habitat, it is considered not to support any important populations. If roosting and foraging was to occur within the Project Area, this would only be from vagrant individuals, rather than significant population numbers. No records of this species in significant numbers have been recorded in or near the Project Area, and the existing human disturbances are likely to impact on these species’ likelihood within the site.

Historical records within the desktop search extent

Vulnerable Migratory Shorebird Profiles

A single WildNet record occurred within the desktop search extent, dating from 1956 approximately 7.6 km east of Section E, at Barney Point. Numerous ALA records occur along the coast near the eastern extent of the Project Area, with the closest occurring 5 km east of Section E in 2020.

Habitat

In Australasia, the ruddy turnstone primarily occupies coastal habitats, including rocky shorelines, coral reefs, gravel or shingle beaches, sand and shell beaches, shoals, cays, and tidal pools. It also occurs in estuaries, bays, lagoons, saltmarsh, seagrass beds, and occasionally inland at lakes, riverbeds, and farmland. Feeding typically occurs in intertidal zones, particularly among stranded seaweed, rocky platforms, mudflats, and occasionally in saltmarsh, seagrass, or short pasture. Roosting sites include beaches above the tideline, rocky islets, shell banks, debris, mudflats, and sandflats (Department of Climate Change, Energy, the Environment and Water, 2025a).

Habitat critical to the survival of the species

Habitat critical to the survival of the ruddy turnstone is defined in the conservation advice (Department of Climate Change, Energy, the Environment and Water, 2024b) as a mosaic of intertidal feeding and coastal roosting areas. The species relies on rocky shores, gravel or shingle beaches, sand and coral cays, and estuaries, with regional variation across northern, southern, and Tasmanian coasts. Feeding habitat is typically associated with intertidal zones containing accumulations of rotting seaweed, where birds forage extensively on the upper tidal flats due to longer exposure periods. Internationally and nationally important sites are defined under the EPBC Act and Ramsar criteria, with habitat considered critical where it regularly supports more than 1% (internationally important; >300 birds) or 0.1% (nationally important; >30 birds) of the flyway population. The degradation or loss of such sites would have disproportionate consequences for the species, and both direct removal and indirect impacts (e.g. disturbance, pollution, predation) must be avoided to support long-term survival.

Current threats to the species

Migratory shorebirds, including the ruddy turnstone, face major threats across their flyway, with habitat loss from coastal reclamation in the Yellow Sea and other staging areas the most significant. Additional pressures include altered hydrology from water diversion, pollution, oil extraction, and ongoing hunting. Climate change and associated sea level rise present long-term risks to breeding, staging and non-breeding habitats. In Australia, key threats include habitat loss and degradation from clearing, water quality decline, invasive species, and altered hydrology; disturbance from recreation and human activity, which can displace birds from critical roosting and foraging sites; and direct mortality through hunting, collisions, and chemical or oil spills (Department of Climate Change Energy the Environment and Water.

Recovery plans

There is no adopted or made recovery plan for this species, nor has one been determined as required.

sharp-tailed sandpiper

Conservation status

Vulnerable, Migratory.

Distribution

Vulnerable Migratory Shorebird Profiles

The sharp-tailed sandpiper breeds in northern Siberia from the Lena River delta east to the Kolyma River. It migrates through eastern Mongolia, China, Korea, Japan, Micronesia, the Philippines, and south-east Asia, with smaller numbers in the Malay Peninsula, Borneo, and Melanesia. It is recorded irregularly in Alaska, the Pacific coast of North America, and as a vagrant to Europe, South Asia, and various Pacific islands (Department of Climate Change, Energy, the Environment and Water, 2023a).

During the non-breeding season, around 91% of the East Asian–Australasian population occurs in Australia and New Zealand. In Australia, the species is widespread across all states, occupying both coastal and inland freshwater and saline wetlands. It is common along the south-east coast, with scattered inland records, and occurs widely across Tasmania, the Northern Territory, South Australia, and Western Australia, extending from the Pilbara and Kimberley to the Nullarbor and Lake Eyre (Department of Climate Change, Energy, the Environment and Water, 2023a).

Important populations

The SPRAT database does not identify 'important populations' of any shorebird species. However, the occurrence of known 'important habitat' can be used as a surrogate for an 'important population'. As stated above, no records of these species in significant numbers have been recorded in or near the Project Area. The Gladstone Harbour and its surrounds have been extensively surveyed by shorebird/wader groups over time. The area is not known to support a national or international population or any shorebird species. Since the Project does not support any important habitat, it is considered not to support any important populations. If roosting and foraging was to occur within the Project Area, this would only be from vagrant individuals, rather than significant population numbers. No records of this species in significant numbers have been recorded in or near the Project Area, and the existing human disturbances are likely to impact on these species' likelihood within the site.

Historical records within the desktop search extent

Numerous WildNet records occur within the desktop search extent, with the most recent occurring 6.7 km west of Section A, along Valentine Plains Rd from 1993. More recent ALA records occur along the coast near Section E and amongst freshwater inland waterbodies near Section A.

Habitat

In Australasia, the sharp-tailed sandpiper primarily occupies shallow fresh or brackish wetlands with muddy margins and emergent vegetation, including lagoons, swamps, lakes, waterholes, and saltmarsh. Inland, they occur at dams, bore drains, saltpans, and hypersaline lakes. Coastal habitats include estuaries, inlets, sheltered intertidal mudflats, mangrove-lined creeks, and, less frequently, rocky shores or reefs. They also use artificial sites such as saltworks, sewage ponds, and flooded paddocks, shifting seasonally between ephemeral inland wetlands and coastal mudflats (Department of Climate Change, Energy, the Environment and Water, 2025b).

They forage along wet mud or sand margins, in shallow water, or among inundated saltmarsh and sedges. Feeding also occurs in sewage ponds, hypersaline environments, coastal mudflats, and occasionally paddocks after rain. They exploit seasonal changes, feeding on mudflats at low tide and moving to freshwater wetlands at high tide, and may forage among algae mats or beachcast seagrass.

Roosting typically occurs on wet mud, sand, or shallow water at wetland edges, and in sparse vegetation such as grass or saltmarsh. They also roost on sandy beaches, stony shores, rocks in water, and occasionally within mangroves (Department of Climate Change, Energy, the Environment and Water, 2025b).

Habitat critical to the survival of the species

Habitat critical to the survival of the species is defined in the conservation advice (Department of Climate Change, Energy, the Environment and Water, 2023a) and refers to areas that are necessary:

- For activities such as foraging, breeding, roosting, or dispersal;
- For the long-term maintenance of the species (including the maintenance of species
- essential to the survival of the sharp-tailed sandpiper, such as macrobenthos);
- To maintain genetic diversity and long-term evolutionary development; or
- For the re-introduction of populations or recovery of the species.

Sharp-tailed sandpipers are more flexible in habitat use than most shorebirds during the non-breeding season, occurring across coastal and inland wetlands ranging from freshwater to hypersaline. They are tolerant of grassy vegetation and reach highest densities around shallow freshwater wetlands with grassy margins. Other habitats include sewage ponds, flooded fields, mudflats, mangroves, rocky shores, and beaches (BirdLife Australia, 2023). No habitat has been formally listed on the EPBC Register of Critical Habitat.

Under the EPBC Act, habitat is considered internationally important if it regularly supports at least 1% of a species' population or 20,000 waterbirds, and nationally important if it regularly supports 0.1% of the population, 2,000 shorebirds, or 15 shorebird species. The National Directory of Important Migratory Shorebird Habitat identifies all known feeding and roosting sites for sharp-tailed sandpipers in Australia (Weller et al. 2020). An estimated 85,000 individuals occur in the East Asian–Australasian Flyway, with about 91% spending the non-breeding season in Australia (Bamford et al. 2008; Hansen et al. 2016). Sites supporting ≥850 individuals are internationally important, while those supporting ≥85 individuals are nationally important.

All internationally or nationally important habitat is considered critical to the survival of the species. Loss or degradation of these habitats would significantly reduce population viability. Retention of foraging and roosting areas is essential, and indirect pressures such as human disturbance, light pollution, disease, invasive species, and predation should be minimised.

Current threats to the species

Migratory shorebirds in the East Asian–Australasian Flyway face significant threats, the most severe being habitat loss through large-scale reclamation of intertidal mudflats for aquaculture and development, particularly in the Yellow Sea where over 40% of intertidal areas have been lost. Water regulation and diversion reduce freshwater and sediment flows, while pollution, oil extraction, and declining water quality further degrade habitats. Disturbance from recreational and industrial activities restricts access to critical roosting and foraging areas. Climate change and sea-level rise pose long-term risks to breeding and non-breeding habitats. Hunting remains a serious threat in parts of Asia.

Vulnerable Migratory Shorebird Profiles

	Within Australia, habitat loss through clearing, inundation, infilling, or draining reduces the availability of essential foraging and roosting sites. Habitat degradation occurs through altered hydrology, water pollution, vegetation loss, invasive species such as cord grass, and exposure of acid sulfate soils. Shorebirds are particularly sensitive to these changes due to their specialised feeding strategies. Direct mortality risks include hunting, disturbance, bird strikes, and oil or chemical spills. **Recovery plans** There is no adopted or made recovery plan for this species, nor has one been determined as required.
terek sandpiper	**Conservation status** Vulnerable, Migratory. **Distribution** The terek sandpiper breeds across northern Russia, from the White Sea east to the Anadyr basin, with southern limits extending from Latvia to the Yenisei River. Breeding also occurs in Finland, Ukraine, central Yukutia, the Koryak Highlands, and Kamchatka. During the non-breeding season, the species occupies coastal regions of Africa, the Arabian Peninsula, the Indian subcontinent, Indochina, south-east Asia, New Guinea, Australia, and New Zealand. It migrates through Mongolia, China, Korea, Japan, Taiwan, and the Philippines, with vagrants recorded in Europe, Alaska, Fiji, and South America. In Australia, the species is primarily coastal, occurring more commonly in northern and eastern regions. It is widespread in the Northern Territory, particularly from Darwin to the Gulf of Carpentaria. In Queensland, it occurs from the Gulf across Torres Strait and along the eastern coast. Important sites in New South Wales include the Hunter and Richmond River estuaries, with scattered records further south. In Victoria, it occurs at Corner Inlet, Anderson Inlet, Westernport Bay, and western Port Phillip Bay. The species is also regularly recorded in Tasmania and along the South Australian coast. In Western Australia, records are concentrated in the Pilbara, with scattered occurrences south to the Swan Coastal Plain and occasionally on the south coast. **Important populations** The SPRAT database does not identify ‘important populations’ of any shorebird species. However, the occurrence of known ‘important habitat’ can be used as a surrogate for an ‘important population’. As stated above, no records of these species in significant numbers have been recorded in or near the Project Area. The Gladstone Harbour and its surrounds have been extensively surveyed by shorebird/wader groups over time. The area is not known to support a national or international population or any shorebird species. Since the Project does not support any important habitat, it is considered not to support any important populations. If roosting and foraging was to occur within the Project Area, this would only be from vagrant individuals, rather than significant population numbers. No records of this species in significant numbers have been recorded in or near the Project Area, and the existing human disturbances are likely to impact on these species’ likelihood within the site. **Historical records within the desktop search extent** WildNet records occur within the desktop search extent, with the most recent dating from 1980, approximately 6.5 km north of Section E, at Passage Islands. Other ALA records occur as recently as 2020 from the Gladstone area (ALA, 2025).

Vulnerable Migratory Shorebird Profiles

Habitat

The terek sandpiper primarily inhabits sheltered coastal mudflats, mangrove-lined estuaries, sandy beaches, estuaries, and sandflats, occasionally using coral reefs, river mouths, coastal swamps, and saltpans. It forages mainly in the upper littoral zone of mudflats, but on rock platforms uses the lower littoral zone. The species is carnivorous, feeding predominantly on crustaceans and insects, with seeds, molluscs, and spiders also taken in breeding areas. Foraging occurs at both high and low tides, typically by chasing prey across wet mud or probing in shallow water. Roosting occurs communally in mangroves or dead trees, often with other shorebirds. Breeding takes place in Arctic tundra marshland valleys, where nests are ground scrapes lined with vegetation and debris.

Habitat critical to the survival of the species

Habitat critical to the survival of the species is defined in the conservation advice (Department of Climate Change, Energy, the Environment and Water, 2024h) and refers to areas that are necessary:

- For activities such as foraging, breeding, roosting, or dispersal;
- For the long-term maintenance of the species (including the maintenance of species;
- essential to the survival of the terek sandpiper, such as macrobenthos);
- To maintain genetic diversity and long-term evolutionary development; or
- For the re-introduction of populations or recovery of the species.

Terek sandpipers rely on a mosaic of feeding and roosting habitats. They primarily forage on soft wet intertidal mudflats in estuaries, embayments, harbours, lagoons, sandbanks, spits, and near mangroves. Occasionally, they feed among samphire, in the upper littoral zone where a thin film of water covers the sand, or on exposed rock platforms in the lower littoral zone.

Roosting occurs mainly in mangroves, but birds may also use dead trees, driftwood, flat shores, muddy spits, islets, sandy or pebbly beaches, and occasionally inland brackish pools, riverbeds, and grassy or cultivated paddocks near the coast.

No Critical Habitat has been formally identified under section 207A of the EPBC Act.

Sites are considered internationally important if they regularly support ≥1% of the flyway population (≥500 individuals), and nationally important if they support ≥0.1% (≥50 individuals) or ≥2,000 migratory shorebirds. All such sites are considered habitat critical, and their loss or degradation can have disproportionately negative impacts on the species.

Actions that remove or degrade habitat, cause disturbance, or introduce new threats such as invasive species, disease, or pollution should be avoided to maintain population survival and recovery.

Current threats to the species

Terek sandpipers face multiple threats along the East Asian–Australasian Flyway, with the greatest being habitat loss, both direct and indirect. Staging areas used during migration are being lost or degraded through reclamation of mudflats for development. Many intertidal areas along the flyway have already been reclaimed, and the process is continuing rapidly. Water regulation and diversion in major rivers further reduce water and sediment flows, compounding habitat loss.

Vulnerable Migratory Shorebird Profiles

Other threats include intensive oil exploration and extraction, pollution from industrial discharge or nutrient enrichment, and inappropriate land management, all of which can degrade habitat and increase vulnerability to disease and parasites. Hunting remains a serious problem in parts of China, where Terek sandpipers are sometimes caught. Human recreational activities have also increased, causing disturbance; startled birds often flock tightly and cease foraging, which can reduce energy accumulation critical for migration. Competition for food with humans may also occur.

Global warming and associated sea-level rise are likely to affect breeding, staging, and non-breeding grounds. Modelling suggests that a 1 m rise in sea level could reduce the species' population flow by 25% due to intertidal habitat loss.

Recovery plans

There is no adopted or made recovery plan for this species, nor has one been determined as required.

In the Project Area

Surveys

28 habitat assessments were conducted, diurnal bird surveys were undertaken throughout all field surveys, and opportunistic surveys of wetlands were undertaken.

Survey adequacy aligns with relevant guidelines for these species. Refer to **Section 4.5** for further details.

Species occurrence

These threatened migratory shorebirds are considered to have a moderate likelihood of occurrence within the Project Area, with the presence of suitable habitat indicated by both State mapping and the findings of the field survey program.

Habitat within the Project Area

Habitat type	Habitat modelling rules	Area (ha)	
		Project Area	Disturbance Footprint
Roosting and foraging	Coastal lagoons, intertidal mudflats or sandflats exposed at low tide and with soft substrate provide foraging habitat. At high tide lakes, sewage ponds and flood waters provide suitable foraging habitat. Terrestrial wetlands are also sometimes suitable. Modelled habitat included all freshwater wetlands and farm dams, intertidal areas, near-coastal wetlands and dams, tidal flats dominated by mangroves, sedges and grasses, and areas adjacent to or including REs 12.1.2 and 12.1.3.	107.8	1.1

Table 8.30 Assessment of Potential Project Impacts and Mitigation and Management Commitments for Vulnerable Migratory Shorebirds

Potential Impact	Assessment	Mitigation Commitments
Direct		
Vegetation clearing causing habitat loss and fragmentation	Vegetation clearing is unlikely to directly impact these species, as much of the Project sits within already disturbed areas or alongside the existing transmission line.	• Identify MNES fauna habitat and individuals through pre-clearance surveys • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Disturbance activities must be contained to Disturbance Footprint subject to minor micro-siting within the Field Survey Extent • Refer to Table 5.1 of the MNES Management Plan for further details on mitigation measures.
Direct injury or mortality	The risk of direct injury or mortality is low but possible during construction activities. Minimal impact to shorebird habitat and flushing surveys prior to works will minimise these risks.	• Appropriately qualified fauna spotter catcher to undertake pre-clearance habitat assessment and be present during clearing and disturbance to habitat features • Flushing surveys • Clearing must be staged, with non-habitat trees felled first • Tampering with an animal breeding place to be carried out in accordance with an approved Species Management Program • Clear delineation of habitat features to be retained • Restrict vehicles to approved access tracks • Vehicle travelling speed restricted to <40 km/hr • Excavations must be secured (e.g. covered) • Refer to Table 5.3 of the MNES Management Plan for further details on mitigation measures.
Disturbance to foraging behaviours due to increased noise and activity during construction	Construction-related noise and activity may disturb shorebirds, causing them to flush from foraging areas, though these will be temporary and localised. Minimal shorebird habitat is expected to be disturbed.	• Plant and equipment to be fitted with appropriate noise attenuation and maintained • Deliveries and removal of material and equipment to and from site within approved hours for construction • Plant to be turned off when not in use • No unnecessary use of horns or other audible signals on mobile plant or equipment • Machinery and equipment will be maintained in good working condition • Refer to Table 5.10 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Indirect		
Soil exposure resulting in an increased risk of erosion and sedimentation of water bodies, reducing water quality and degrading aquatic habitats	Construction of the transmission line will involve ground disturbance that may expose soils, increasing the risk of erosion and sedimentation of nearby water bodies. This could reduce water quality and degrade aquatic habitats. With Powerlink's erosion and sediment control measures in place, the impact is expected to be minor, localised, and temporary.	• Soil sampling and testing to inform both erosion and sediment control (ESC) and rehabilitation • Develop Erosion and Sediment Control Plan (ESCP) in accordance with the IECA Best Practice Erosion and Sediment Control Guidelines 2008 • Extent and duration of soil exposure will be minimised • Disturbed areas will be promptly stabilised. • Site is monitored and controls adjusted to maintain required performance standard • Minimum personnel requirements will apply for ESCP development and verification • A Water Quality Monitoring Plan must be developed by an appropriately qualified person • Dewatering Management Plan will be developed • Acid Sulphate Soil Management Plan will be developed • Awareness training for identification and management of ASS will be undertaken • Water extraction activities will be strictly controlled and monitored to ensure no waterbodies are completed drained • Erosion and sediment control measures in accordance with IECA 2008 • Refer to Table 5.4 and Table 5.12 of the MNES Management Plan for further details on mitigation measures.
Increased risk of contamination associated with activities such as refuelling or storage of chemicals	Construction activities, including refuelling and chemical storage, present a risk of soil and water contamination. With appropriate handling, storage, and spill management procedures implemented, the impact is expected to be low and readily manageable.	• Hazardous materials must be stored and handled appropriately • An Emergency Response Plan will be developed • Spill kits will be available during construction • Hazardous materials locations will be bunded • All waste disposed of in accordance with legislative requirements • No refuelling within 50 m of a watercourse • Application of herbicides in accordance with legislative requirements • Refer to Table 5.4 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Temporary changes in hydrology from installation of infrastructure creating a barrier to surface flow and increasing stormwater run-off	Installation of infrastructure may temporarily alter surface hydrology, creating minor barriers to flow and increasing stormwater run-off. With standard drainage and erosion controls in place, impacts are expected to be minimal and short-term.	• A Water Quality Monitoring Plan must be developed by an appropriately qualified person • Dewatering Management Plan will be developed • Acid Sulphate Soil Management Plan will be developed • Awareness training for identification and management of ASS will be undertaken • Water extraction activities will be strictly controlled and monitored to ensure no waterbodies are completed drained • Erosion and sediment control measures in accordance with IECA 2008 • Refer to Table 5.12 of the MNES Management Plan for further details on mitigation measures.
Removal of water from existing constructed wetlands and farm dams leading to changes in hydrology / habitat extent and water quality. Increased activity at these locations resulting in avoidance and potentially altered foraging and breeding behaviour	Removal of water from constructed wetlands and farm dams may alter hydrology, habitat extent, and water quality. Increased activity around these sites could cause temporary disturbance, with potential avoidance and altered foraging or breeding behaviour. With disturbance and extraction activities minimised through mitigations, this is expected to have little impact.	

Potential Impact	Assessment	Mitigation Commitments
Periodic burst of elevated noise levels may startle and disorientate individuals within proximity	Periodic bursts of elevated noise may temporarily startle or disorient individuals nearby, though impacts are expected to be minor and short-lived.	• Plant and equipment to be fitted with appropriate noise attenuation and maintained • Deliveries and removal of material and equipment to and from site within approved hours for construction • Plant to be turned off when not in use • No unnecessary use of horns or other audible signals on mobile plant or equipment • Machinery and equipment will be maintained in good working condition • Refer to Table 5.10 of the MNES Management Plan for further details on mitigation measures.
Increased pest levels, notably those which may predate upon individuals	The Project is not expected to increase pest levels within the Project Area beyond existing levels.	• All waste to be secured • Biosecurity Instrument Permit to be obtained for moving materials out of or within different biosecurity zones • Educate workforce in the identification of pest fauna species • Avoid inclusion of any water retaining voids or pits • Refer to Table 5.6 of the MNES Management Plan for further details on mitigation measures.
Minor increases in the noise and light levels at the Calliope River substation during the operational phase due to the substation upgrade	Given the substation's existing Disturbance Footprint and the fact that operational activities will not significantly exceed current baseline conditions, the additional noise and light are unlikely to result in measurable impacts to shorebirds. Potential disturbance will be localised to the immediate vicinity of the substation and is not expected to affect foraging or roosting habitat within the broader area.	• Plant and equipment to be fitted with appropriate noise attenuation and maintained • Deliveries and removal of material and equipment to and from site within approved hours for construction • Plant to be turned off when not in use • No unnecessary use of horns or other audible signals on mobile plant or equipment • Machinery and equipment will be maintained in good working condition • Refer to Table 5.10 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Degradation of habitat adjacent to the Project Area	Degradation of intertidal or estuarine habitats through sedimentation, pollution, or human disturbance could reduce prey availability and limit foraging efficiency. This is expected to be minimal with appropriate mitigation measures.	• Restrict vehicles to approved access tracks • Hazardous materials must be stored and handled appropriately • An Emergency Response Plan will be developed • Spill kits will be available during construction • Hazardous materials locations will be bunded • All waste disposed of in accordance with legislative requirements • No refuelling within 50 m of a watercourse • Application of herbicides in accordance with legislative requirements • Refer to Table 5.3 and Table 5.4 of the MNES Management Plan for further details on mitigation measures.

Table 8.31 Significant Impact Assessment: Vulnerable Migratory Shorebirds

Impact Criteria	Assessment
Lead to a long-term decrease in the size of an important population of a species	**Unlikely** Direct impacts to potential habitat are limited to clearing of 1.1 ha of roosting and foraging habitat for threatened migratory shorebird species. This loss of habitat is considered unlikely to significantly reduce the species' ability to persist in the local area given habitat within the adjacent areas and offshore islands is likely to be preferred, as it is less disturbed. While suitable foraging habitat is found within and immediately adjacent to the Project Area, the site is not known to support significant numbers of these species and therefore they are expected to occur as infrequent individuals only. Implementation of the MNES Management Plan will assist to minimise potential indirect impacts of the Project, such as habitat degradation, weed invasion and temporary alterations to hydrology. The Project is therefore unlikely to lead to a long-term decrease in the size of the population.
Reduce the area of occupancy of an important population	**Unlikely** These species are widespread throughout Australia's east coast. A total of 1.1 ha of direct habitat clearing will occur as a result of the Project. Given their widespread distribution and broad habitat requirements, the removal of 1.1 ha of habitat is unlikely to reduce the area of occupancy of these species.

Impact Criteria	Assessment
Fragment an existing important population into two or more populations	**Unlikely** These species are highly mobile and undergo large seasonal movements. Potential habitat within the Project Area is highly fragmented as a result of historical clearing and the existing transmission line and substation. The habitat is considered marginal in quality due to the existing disturbances and human activity. Given the ability for these species to readily disperse across the landscape, vegetation clearance associated with the Project is unlikely to present barriers to local movement, to the extent that it fragments any population within the Project Area.
Adversely affect habitat critical to the survival of a species	**Unlikely** As described above, the potential habitat within the Project Area is not considered critical to the survival of the species as it is not considered to be important habitat for these species. It is unlikely that the species will depend on the habitat within the Project Area, due to its small patch size and the existing human disturbances that occur there, such as clearing for the existing transmission line, the presence of feral predators, litter, and noise and activity from the existing roads and substations. Direct impacts to suitable habitat are limited to clearing of 1.1 ha of roosting and foraging habitat. This loss of habitat is considered unlikely to significantly reduce the ability of these species to persist in the local area given habitat within the adjacent areas is likely to be preferred. Indirect impacts on potential habitat will be actively managed via the MNES Management Plan. Therefore, the Project is unlikely to adversely affect habitat critical to the survival of the species.
Disrupt the breeding cycle of an important population	**Unlikely** These species are migratory visitors to Australia which return to breeding grounds in other countries. On this basis, the Project is unlikely to disrupt the breeding cycle of the population.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely** The suitable habitat within the Project Area is already fragmented and disturbed by exotic grass, cattle grazing and human disturbances. A maximum of 1.1 ha of roosting and foraging habitat will be directly impacted as a result of the Project. The roosting and foraging habitat is not considered highly unique or important for refuge and habitat with similar characteristics, quality and condition occurs widely within the region. It is recognised that potential indirect impacts on habitat that will be retained, may occur as a result of the Project, including sediment contamination, erosion, acid sulfate soil disturbance, hydrology alteration, waste disposal, noise, light and vibration. These indirect impacts will be managed via the implementation of measures outlined in the MNES Management Plan. While minor increases in the noise and light levels at the Calliope River substation during the operational phase are expected due to the substation upgrade, these are not expected to be significant in relation to the existing impacts.

Impact Criteria	Assessment
	Given the infrequent use of the Project Area by these species as well as their high mobility, the Project is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species are likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**Unlikely** Invasion of intertidal mudflats by weeds such as cord grass (*Spartina* species) and predation have been identified as threats to migratory shorebirds (Department of the Environment and Energy, 2017a). Historical clearing has occurred in discrete locations across the Project Area primarily for cattle grazing purposes, and ongoing maintenance currently occurs within the existing transmission line. It is considered likely that these areas already act as conduits for pest movement in the landscape. Appropriate biosecurity controls and weed washdown procedures will be followed, to mitigate the introduction or proliferation of pest and weed species as outlined in Table 5.5 of the MNES Management Plan Based on this, it is unlikely the Project will result in invasive species that are harmful to these species becoming established.
Introduce disease that may cause the species to decline	**Unlikely** There are no known diseases affecting these species. The Project will employ best practice biosecurity protocols during construction and operation; therefore, introduction of a disease that may cause the species to decline is unlikely.
Interfere with the recovery of the species	**Unlikely** There are currently no recovery plans for any threatened shorebird species. However, the Wildlife *Conservation Plan for Migratory Shorebirds* (Department of the Environment, 2015d) outlines national activities to support the Flyway shorebird conservation initiatives and provides a strategic framework to ensure these activities and future research, and management actions are integrated and remain focused on the long-term survival of migratory shorebird populations and their habitats. Additionally, the East Asian-Australasian Flyway Site Network, which is part of the broader Flyway Partnership, promotes the identification and protection of key sites for migratory shorebirds. Australia has 17 sites in the network (Partnership for the East Asian-Australasian Flyway, 2008). The Queensland sites include: • Moreton Bay, Queensland • Bowling Green Bay, Queensland • Shoalwater Bay, Queensland • Great Sandy Strait Queensland • Currawinya National Park, Queensland. None of these sites are located within or adjacent to the Project Area. Therefore, the Project is unlikely to interfere with the recovery of these threatened migratory shorebird species.
Significant Residual Impact	**Unlikely to have a significant impact**

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FIGURE 8.10-1

Vulnerable Migratory Shorebirds Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

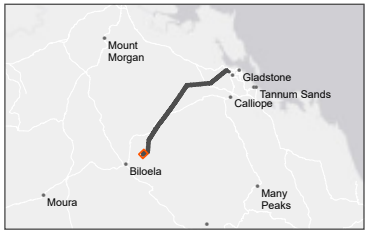
- Railway
- Watercourse
- Field Survey Extent
- Disturbance Footprint
- Project Area

Migratory Shorebirds Habitat

- Roosting and foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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Image Source: ESRI Basemap (2025) | **Data Source:** Queensland D of Resources (2025)



FIGURE 8.10-21

Vulnerable Migratory Shorebirds Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

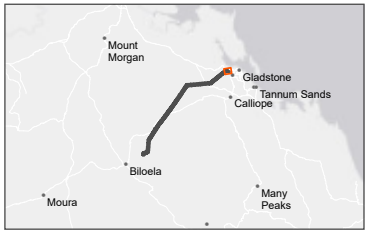
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Disturbance Footprint
- Project Area
- Greater Sand Plover Records (ALA)
- Red Knot Records (ALA)
- Sharp-tailed Sandpiper Records (ALA)

Migratory Shorebirds Habitat

- Roosting and foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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8.2.6 Endangered Fauna Species

8.2.6.1 Australian Painted Snipe (*Rostratula australis*)

Table 8.32 Australian Painted Snipe: Ecology and Relevance to the Project Area

Australian Painted Snipe	
Profile	**Conservation status** Endangered **Distribution** Australian painted snipe has been recorded amongst wetlands in all States of Australia. It is most common in eastern mainland Australia, where it has been recorded at scattered locations throughout much of Queensland, New South Wales, Victoria, and south-eastern South Australia. **Habitat** The species occurs in shallow freshwater (occasionally brackish) wetlands, both ephemeral and permanent, such as lakes, swamps, claypans and inundated or waterlogged grassland/saltmarsh with areas of bare mud and mixed heights of low vegetation. In the inland and northern extent of its distribution, gilgai wetland surfaces are favoured, notably for nest sites. Modified habitats such as low-lying woodlands converted to grazing pasture, rice farms, sewage farms, dams, bores and irrigation schemes are also used; however, the species does not necessarily breed in such habitats (Department of Climate Change, Energy, the Environment and Water, 2022f). Dominant vegetation in occupied wetlands can include grass, sedge, *Marsilea drummondii* (nardoo), rushes and reeds, low samphire (*Tecticornia spp.*) shrublands, and open shrublands of *Duma florulenta* (lignum) and *Acacia stenophylla*. Fallen or washed-up timber also provides concealing opportunities for the species. As outlined in the species Conservation Advice (Department of Sustainability Environment Water Population and Communities, 2013a), important areas for this species in the past have included the Murray-Darling Basin (particularly the Riverina of Victoria and New South Wales), Queensland Channel Country, Fitzroy Basin of Central Queensland, south-eastern South Australia and adjacent parts of Victoria. **Population** Australian painted snipe is considered to occur in a single, contiguous breeding population. The National Recovery Plan provided an estimate of the Australian population at approximately 340 mature individuals in 2020 (Department of Climate Change, Energy, the Environment and Water, 2022f). **Historical records within the desktop search extent** No WildNet records occur within the desktop search extent. The closest WildNet record occurs from Kinka Beach near Rockhampton, approximately 82 km north-east of the Project Area in 1990. Limited ALA records occur, with the closest located 8 km east of Section E in Gladstone in 2011 (Atlas of Living Australia, 2025).

Australian Painted Snipe

Habitat critical to the survival of the species

The *National Recovery Plan for the Australian Painted Snipe (Rostratula australis)* (Department of Climate Change, Energy, the Environment and Water, 2022f) provides guidance on what habitat should be considered habitat critical to the survival of the species. Any categorisation of habitat critical to survival must acknowledge that the species exists in a mosaic of wetland habitats, with carrying capacity fluctuating according to seasonal or episodic floods and effects of threats (Department of Climate Change, Energy, the Environment and Water, 2022f). The species habitat is also influenced by biophysical environments that vary across the species range.

As a guide, habitat critical to the survival of the Australian painted snipe can be considered to include (Department of Climate Change, Energy, the Environment and Water, 2022f):

- Any natural wetland habitat where the species is known or likely to occur (especially with suitable breeding habitat) within the indicative distribution map (see Figure 1 of *National Recovery Plan for the Australian Painted Snipe (Rostratula australis)* (Department of Climate Change, Energy, the Environment and Water, 2022f)).
- Any location outside the above area that may be periodically occupied by Australian painted snipe when conditions are favourable.

The habitat within the Project Area is within the known or likely to occur distribution for the species. However, it should be noted that these areas have experienced significant land use changes and exist within non-remnant vegetation, often dominated by invasive grass species subject to grazing by cattle, and regular maintenance under the existing transmission line. Despite this, based on the aforementioned definitions, all suitable habitat is considered to be critical to the survival of the species within the Project Area.

Current threats to the species

The primary identified threat to Australian painted snipe is the loss, fragmentation and degradation of wetlands, through drainage and the diversion of water for agriculture and reservoirs. The *National Recovery Plan for the Australian Painted Snipe (Rostratula australis)* (Department of Climate Change, Energy, the Environment and Water, 2022f) notes that loss of breeding habitat has largely been attributed to the reduced frequency of flooding in previously suitable habitat, exacerbated by a loss of fresh water to irrigation and other diversions, water levels being stabilised in remaining wetlands so that water becomes too deep, or continuous reed beds develop and loss of wetland vegetation in floodplain wetlands due to increased cropping, and possibly through altered fire regimes at some sites.

Other identified threats include:

- Grazing and the associated trampling of wetland vegetation, nutrient enrichment, and disturbance to substrate by livestock.
- Replacement of native wetland vegetation by invasive weeds.
- Predation by invasive animals (e.g. nest predation by foxes or cats).
- Prolonged periods of drought and reduction in rainfall and runoff associated with climate change.

Recovery plans

National *Recovery Plan for the Australian Painted Snipe (Rostratula australis)* (Department of Climate Change, Energy, the Environment and Water, 2022f).

Australian Painted Snipe

In the Project Area

Surveys

Field surveys have been undertaken within the Project Area from March 2023 to July 2025, which included 422 habitat assessments, diurnal bird surveys, opportunistic wetland surveys and incidental spotlighting at wetlands and dams.

Species occurrence

The Australian painted snipe is considered to have a moderate likelihood of occurrence within the Project Area, with the presence of suitable habitat indicated by both State mapping and the findings of the field survey program.

Habitat with the Project Area

Habitat type	Habitat Modelling Criteria	Area (ha)	
		Project Area	Disturbance Footprint
Seasonal breeding, foraging and dispersal	All freshwater wetlands and farm dams. Where field data is not available, habitat conservatively includes all farm dams and waterbodies mapped as lacustrine or palustrine wetlands based on waterbody data in the Queensland wetland area mapping. The species is not known to utilise intertidal areas and as such the tidal flats (including RE 12.1.2 and 12.1.3), intertidal wetlands and the Calliope River are excluded. No gilgai or low-lying floodplains (including areas that have been converted to grazing pasture) that are subject to regular inundation occur within the Project Area.	80.2	0.6

Table 8.33 Assessment of Potential Project Impacts and Mitigation and Management Commitments for Australian Painted Snipe

Potential Impact	Assessment	Mitigation Commitments
Direct		
Vegetation clearing causing habitat loss and fragmentation	Vegetation clearing is unlikely to directly impact this species, as much of the Project sits within already disturbed areas or alongside the existing transmission line. However, farm dams which are considered suitable habitat do occur within	• Identify MNES fauna habitat and individuals through pre-clearance surveys • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Disturbance activities must be contained to Disturbance Footprint subject to minor micro-siting within the Field Survey Extent • Refer to Table 5.1 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
	the Disturbance Footprint and may be directly impacted by disturbance works.	
Direct injury or mortality	The risk of direct injury or mortality is low due to the species occurrence being restricted to wetland habitat. However, direct mortality is possible during earthworks in and around wetlands if the species is not flushed by construction machinery.	• Appropriately qualified fauna spotter catcher to undertake pre-clearance habitat assessment and be present during clearing and disturbance to habitat features • Flushing surveys • Clearing must be staged, with non-habitat trees felled first • Tampering with an animal breeding place to be carried out in accordance with an approved Species Management Program • Clear delineation of habitat features to be retained • Restrict vehicles to approved access tracks • Vehicle travelling speed restricted to <40 km/hr • Excavations must be secured (e.g. covered) • Refer to Table 5.3 of the MNES Management Plan for further details on mitigation measures.
Disturbance to foraging behaviours due to increased noise and activity during construction	Construction related noise and activity may disturb any individuals of the species present, causing them to flush from foraging areas, though these will be temporary and localised.	• Plant and equipment to be fitted with appropriate noise attenuation and maintained • Deliveries and removal of material and equipment to and from site within approved hours for construction • Plant to be turned off when not in use • No unnecessary use of horns or other audible signals on mobile plant or equipment • Machinery and equipment will be maintained in good working condition • Refer to Table 5.10 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Indirect		
Soil exposure resulting in an increased risk of erosion and sedimentation of water bodies, reducing water quality and degrading aquatic habitats	Construction of the transmission line will involve ground disturbance that may expose soils, increasing the risk of erosion and sedimentation of nearby water bodies. This could reduce water quality and degrade aquatic habitats.	• Soil sampling and testing to inform both erosion and sediment control (ESC) and rehabilitation • Develop Erosion and Sediment Control Plan (ESCP) in accordance with the IECA Best Practice Erosion and Sediment Control Guidelines 2008 • Extent and duration of soil exposure will be minimised • Disturbed areas will be promptly stabilised. • Site is monitored and controls adjusted to maintain required performance standard • Minimum personnel requirements will apply for ESCP development and verification • A Water Quality Monitoring Plan must be developed by an appropriately qualified person • Dewatering Management Plan will be developed • Acid Sulphate Soil Management Plan will be developed • Awareness training for identification and management of ASS will be undertaken • Water extraction activities will be strictly controlled and monitored to ensure no waterbodies are completed drained • Erosion and sediment control measures in accordance with IECA 2008 • Refer to Table 5.4 and Table 5.12 of the MNES Management Plan for further details on mitigation measures.
Increased risk of contamination associated with activities such as refuelling or storage of chemicals	Construction activities, including refuelling and chemical storage, present a risk of soil and water contamination. With appropriate handling, storage, and spill management procedures implemented, the impact is expected to be low and readily manageable.	• Hazardous materials must be stored and handled appropriately • An Emergency Response Plan will be developed • Spill kits will be available during construction • Hazardous materials locations will be bunded • All waste disposed of in accordance with legislative requirements • No refuelling within 50 m of a watercourse • Application of herbicides in accordance with legislative requirements • Refer to Table 5.4 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Removal of water from existing farm dams leading to changes in hydrology / habitat extent and water quality. Increased activity at these locations resulting in avoidance and potentially altered foraging and breeding behaviour	Removal of water from constructed wetlands and farm dams may alter hydrology, habitat extent, and water quality. Increased activity around these sites could cause temporary disturbance, with potential avoidance and altered foraging or breeding behaviour. With disturbance and extraction activities minimised through mitigations, this is expected to have little impact.	• A Water Quality Monitoring Plan must be developed by an appropriately qualified person • Dewatering Management Plan will be developed • Acid Sulphate Soil Management Plan will be developed • Awareness training for identification and management of ASS will be undertaken • Water extraction activities will be strictly controlled and monitored to ensure no waterbodies are completed drained • Erosion and sediment control measures in accordance with IECA 2008 • Refer to Table 5.12 of the MNES Management Plan for further details on mitigation measures.
Periodic bursts of elevated noise levels may startle and disorientate individuals within proximity to the noise source	Periodic bursts of elevated noise may temporarily startle or disorient individuals nearby, though impacts are expected to be minor and short-term.	• Plant and equipment to be fitted with appropriate noise attenuation and maintained • Deliveries and removal of material and equipment to and from site within approved hours for construction • Plant to be turned off when not in use • No unnecessary use of horns or other audible signals on mobile plant or equipment • Machinery and equipment will be maintained in good working condition • Refer to Table 5.10 of the MNES Management Plan for further details on mitigation measures.
Increased pest levels, notably those which may predate upon individuals	The Project is not expected to increase pest levels within the Project Area beyond existing levels.	• All waste to be secured • Biosecurity Instrument Permit to be obtained for moving materials out of or within different biosecurity zones • Educate workforce in the identification of pest fauna species • Avoid inclusion of any water retaining voids or pits • Refer to Table 5.6 of the MNES Management Plan for further details on mitigation measures.

Table 8.34 Significant Impact Assessment: Australian Painted Snipe

Impact Criteria	Assessment
Lead to a long-term decrease in the size of a population	**Unlikely** The Australian painted snipe is inferred to have undergone a severe decline in the number of mature individuals since the 1950s and specifically over the last three generations (~26 years) due to the loss and degradation of its wetland habitat. This species was not recorded within the Project Area during field surveys. However, potential habitat is present within the Project Area and includes seasonal breeding, foraging and dispersal habitat. Only a small number of individuals at any one time are expected to utilise potential habitat. A maximum of 0.6 ha of seasonal breeding, foraging and dispersal habitat may be directly impacted via vegetation clearing in the waterbody edges. Indirect impacts include increased activity and noise, increased weed incursion, erosion and sedimentation at waterbodies and potential changes in hydrology due to water extraction activities. However, these would be temporary and only present in a small area within the site at any one time. Therefore, no Project related activities are considered likely to lead to a long-term decrease in the size of a population.
Reduce the area of occupancy of the species	**Unlikely** This species' area of occupancy was estimated by to be 2,000 km^2 and decreasing. The area of occupancy has declined as approximately 50% of wetlands in Australia have been removed since European settlement (S. T. Garnett et al., 2022). Habitat within the Project Area is potentially suitable for seasonal breeding, foraging and dispersal. However direct impacts will only occur to areas of temporary use, and in isolated areas at any given time. Water extraction activities will be strictly controlled and monitored in liaison with the landholder to ensure no waterbodies are completed drained. This species is known to readily move to areas of suitable habitat, and the Project Area does not occur at the limit of the species distribution. As such the Project is unlikely to reduce the area of occupancy of the species.
Fragment an existing population into two or more populations	**Unlikely** No existing population is known from the Project Area, and it is likely that utilisation would be intermittent and opportunistic for transitory individuals during optimal conditions (after rain events). The species is also highly mobile, and the Project will not result in the creation of barriers to movement within or between habitat for the species. As construction of the Project will occur in phases, direct and indirect impacts at one time will be localised to only a small area within the Project Area. This will allow potentially present individuals to relocate to other areas of suitable habitat within the Project Area or outside. Therefore, it is unlikely the Project will fragment an existing population into two or more populations.

Impact Criteria	Assessment
Adversely affect habitat critical to the survival of a species	**Unlikely** As the Project Area contains areas suitable habitat for seasonal foraging and breeding, these areas are considered habitat critical to the survival of the species. Direct impacts are anticipated to occur to some areas of riparian vegetation only. Utilisation is expected to be intermittent and opportunistic for transitory individuals during optimal conditions (after rain events). Water extraction activities will be strictly controlled and monitored in liaison with the landholder to ensure no waterbodies are completed drained. While the mapped habitat is considered to be important habitat, it should be noted that the majority of habitat is already highly fragmented, impacted by exotic species and often in non-remnant condition. Based on the above, the magnitude of the impact is not considered to have an adverse effect on habitat critical to the survival of the species.
Disrupt the breeding cycle of a population	**Unlikely** The Australian painted snipe may breed at any time throughout the year in response to favourable wetland conditions, rather than during a particular season. Although the Project Area contains potentially suitable breeding habitat, due to its disturbed nature and high weed presence, it is unlikely provide breeding habitat during the dry season (loss of vegetative islands and flooded fringing vegetation). Under ideal climatic conditions (following an above average wet season), water availability in the landscape will be high and Australian painted snipe breeding habitat may be present. As construction of the Project will occur in phases, direct and indirect impacts at one time will be localised to only a small area within the Project Area. The remainder of the Project Area will still provide suitable breeding habitat for the species, for any individuals looking to build a new nest. If an active Australian painted snipe nest is discovered within the zone to be impacted, the active breeding place will be managed under an approved Species Management Program issued by the Queensland Government. As such, the Project is unlikely to disrupt the breeding cycle of a population.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely** No existing population is known from the Project Area, and it is likely that utilisation would be intermittent and opportunistic for transitory individuals during optimal conditions (after rain events). The species is also highly mobile and may utilise other habitat areas in the local landscape. Direct impacts are anticipated to occur to some areas of suitable habitat (a maximum of 0.6 ha). Water extraction activities will be strictly controlled and monitored in liaison with the landholder to ensure no waterbodies are completed drained. Per waterbody, a single access point will be utilised for water extraction to minimise areas of disturbance and allow potentially occurring individuals to avoid the same area during construction. Measures targeted to erosion and sediment control, potential contamination and pests will also be implemented during construction as outlined in Table 5.4 and 5.5 of the MNES Management Plan, to ensure indirect impacts that may lead to habitat degradation or increased threat levels to the species are managed. As such the Project is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of the habitat to the extent that the species is likely to decline.

Impact Criteria	Assessment
Result in invasive species that are harmful to a Endangered species becoming established in the Endangered species' habitat	**Unlikely** The replacement of endemic wetland vegetation by invasive, noxious weeds has been identified as a threat to the Australian painted snipe. However, appropriate biosecurity controls and weed washdown procedures will be adhered to, to mitigate the introduction or proliferation of pest and weed species as outlined within Table 5.5 and 5.6 of the MNES Management Plan. Based on this, it is unlikely the Project will result in invasive species that are harmful to this species becoming established.
Introduce disease that may cause the species to decline	**Unlikely** Disease has not been identified as a threat to the Australia painted snipe. Weed and pest management controls for the Project will ensure best practice site hygiene measures.
Interfere with the recovery of the species	**Unlikely** The *National Recovery Plan for the Australian Painted Snipe* (Department of Climate Change, Energy, the Environment and Water, 2022f) lists the following objectives to achieve the aim of a positive population trend by 2032: • Manage and protect known Australian Painted Snipe habitat at the landscape scale. • Develop and apply techniques to measure changes in population trajectory in order to measure the success of recovery actions. • Reduce, or eliminate threats at breeding and non-breeding habitats. • Undertake research to improve knowledge of the habitat requirements, biology and behaviour of Australian Painted Snipe. • Engage community stakeholders to improve awareness of the conservation of Australian Painted Snipe. • Coordinate, review and report on recovery progress. • The Project Area only contains seasonal breeding, foraging and dispersal Australian painted snipe habitat. If present, the species is only likely to utilise the habitat during the wet season, and on a transitory and temporary basis. Based on the above, the Project is unlikely to interfere with the recovery of the species.
Significant Residual Impact	**Unlikely to have a significant impact**

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FIGURE 8.11-1

Australian Painted Snipe Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

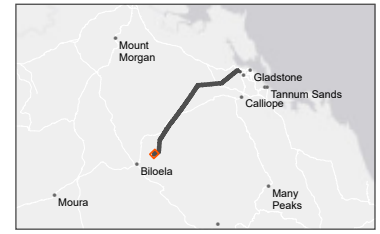
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Australian Painted Snipe Habitat

- Seasonal breeding, foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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Kilometres

Scale 1:20,000 at A4
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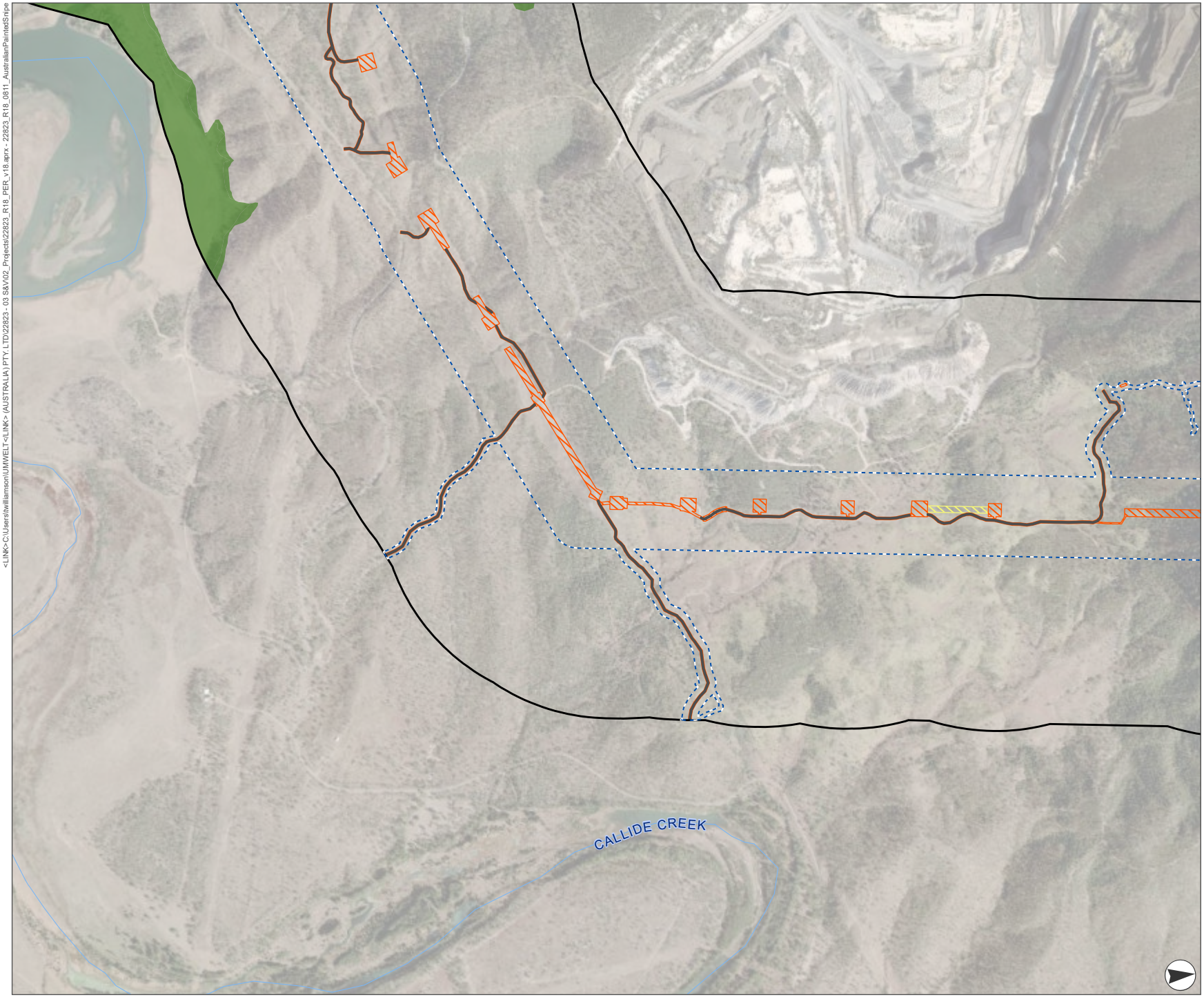


FIGURE 8.11-2

Australian Painted Snipe Records and Habitat within the Field Survey Extent and Disturbance Footprint

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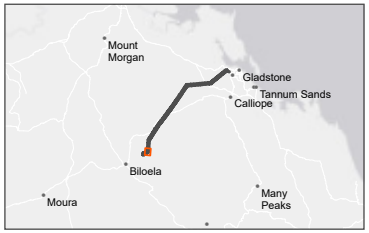
- Watercourse
- Field Survey Extent
- Project Area

Australian Painted Snipe Habitat

- Seasonal breeding, foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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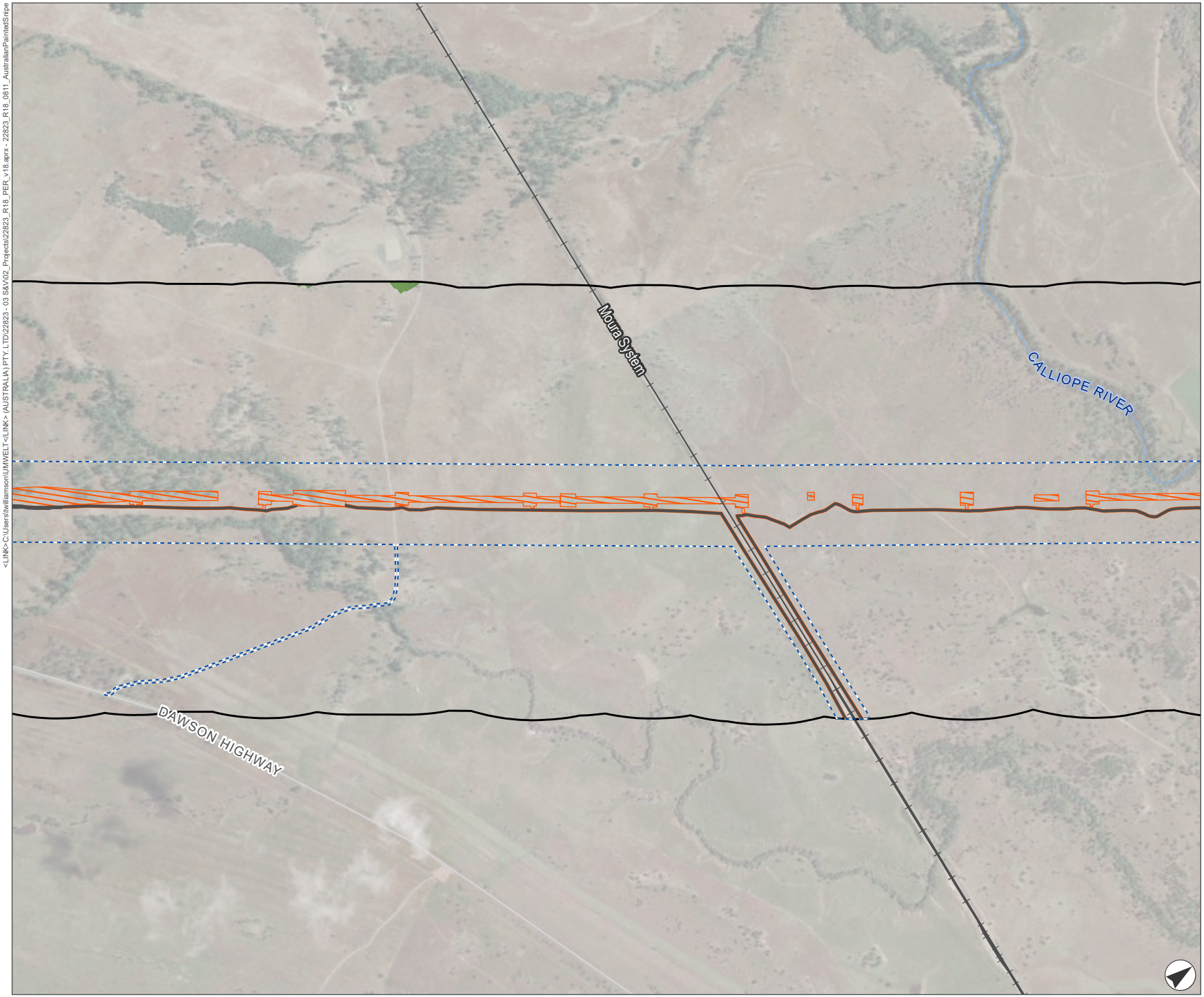


FIGURE 8.11-9

Australian Painted Snipe Records and Habitat within the Field Survey Extent and Disturbance Footprint

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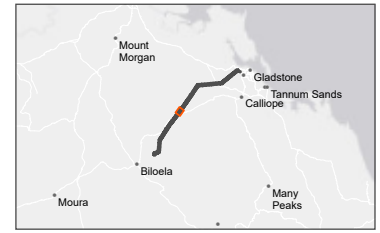
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Australian Painted Snipe Habitat

- Seasonal breeding, foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.11-14

Australian Painted Snipe Records and Habitat within the Field Survey Extent and Disturbance Footprint

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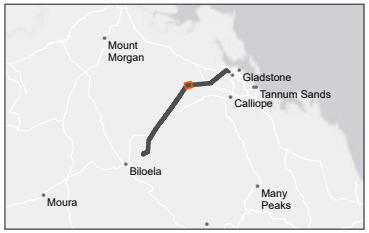
- Field Survey Extent
- Project Area

Australian Painted Snipe Habitat

- Seasonal breeding, foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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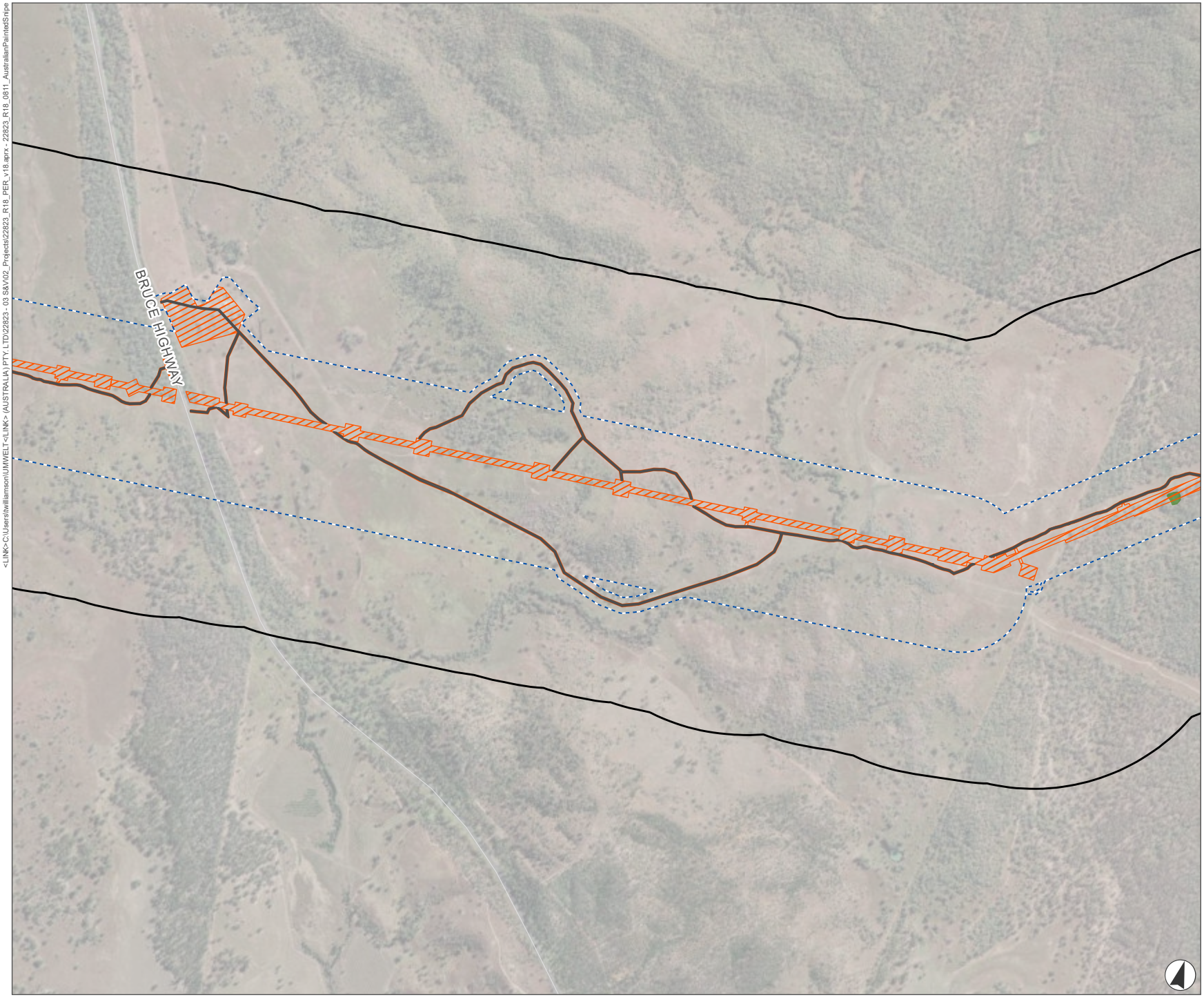
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FIGURE 8.11-17

Australian Painted Snipe Records and Habitat within the Field Survey Extent and Disturbance Footprint

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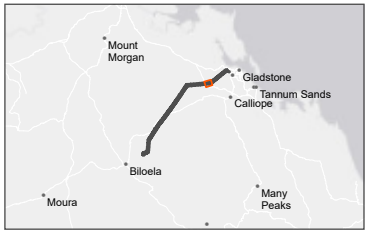
- Roads
- Field Survey Extent
- Project Area

Australian Painted Snipe Habitat

- Seasonal breeding, foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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Kilometres

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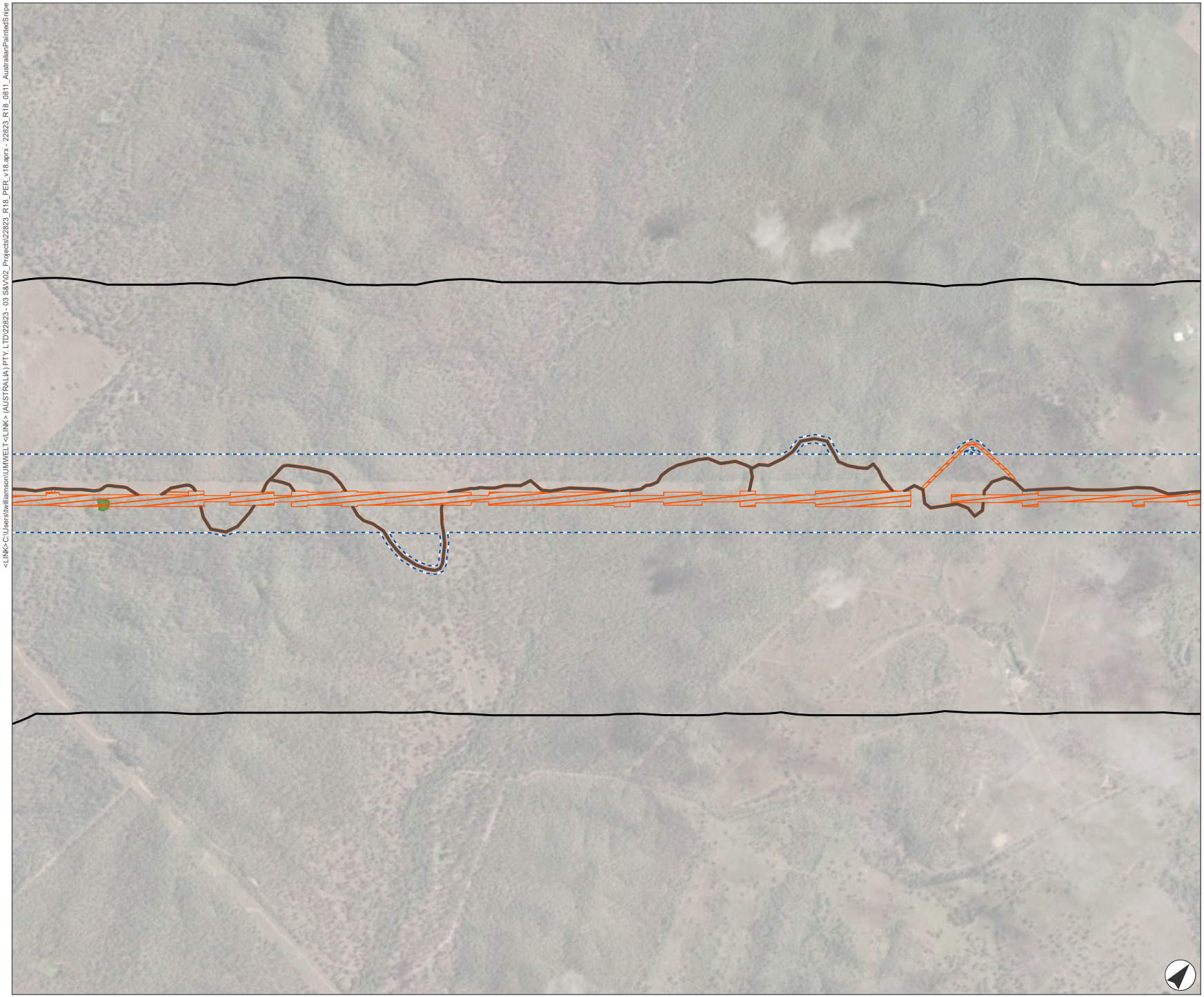


FIGURE 8.11-18

Australian Painted Snipe Records and Habitat within the Field Survey Extent and Disturbance Footprint

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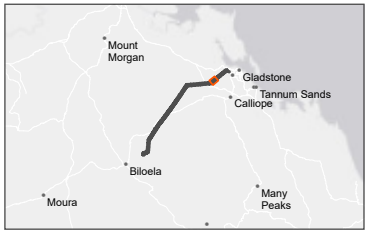
- Field Survey Extent
- Project Area

Australian Painted Snipe Habitat

- Seasonal breeding, foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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Kilometres

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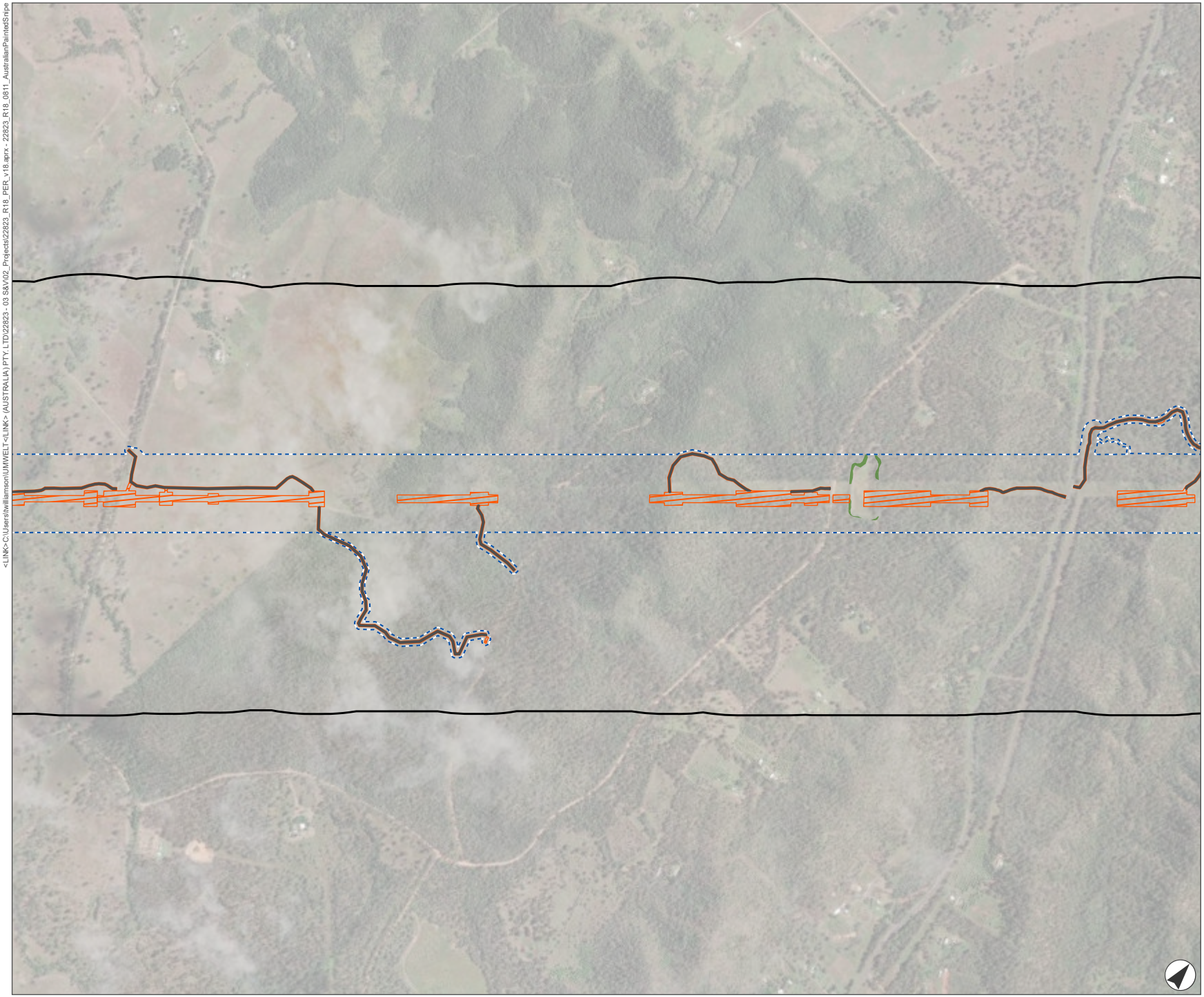


FIGURE 8.11-19

Australian Painted Snipe Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

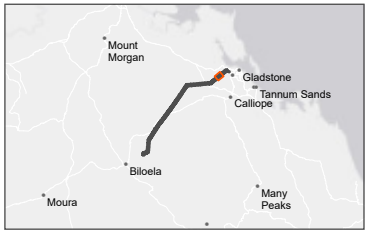
- Field Survey Extent
- Project Area

Australian Painted Snipe Habitat

- Seasonal breeding, foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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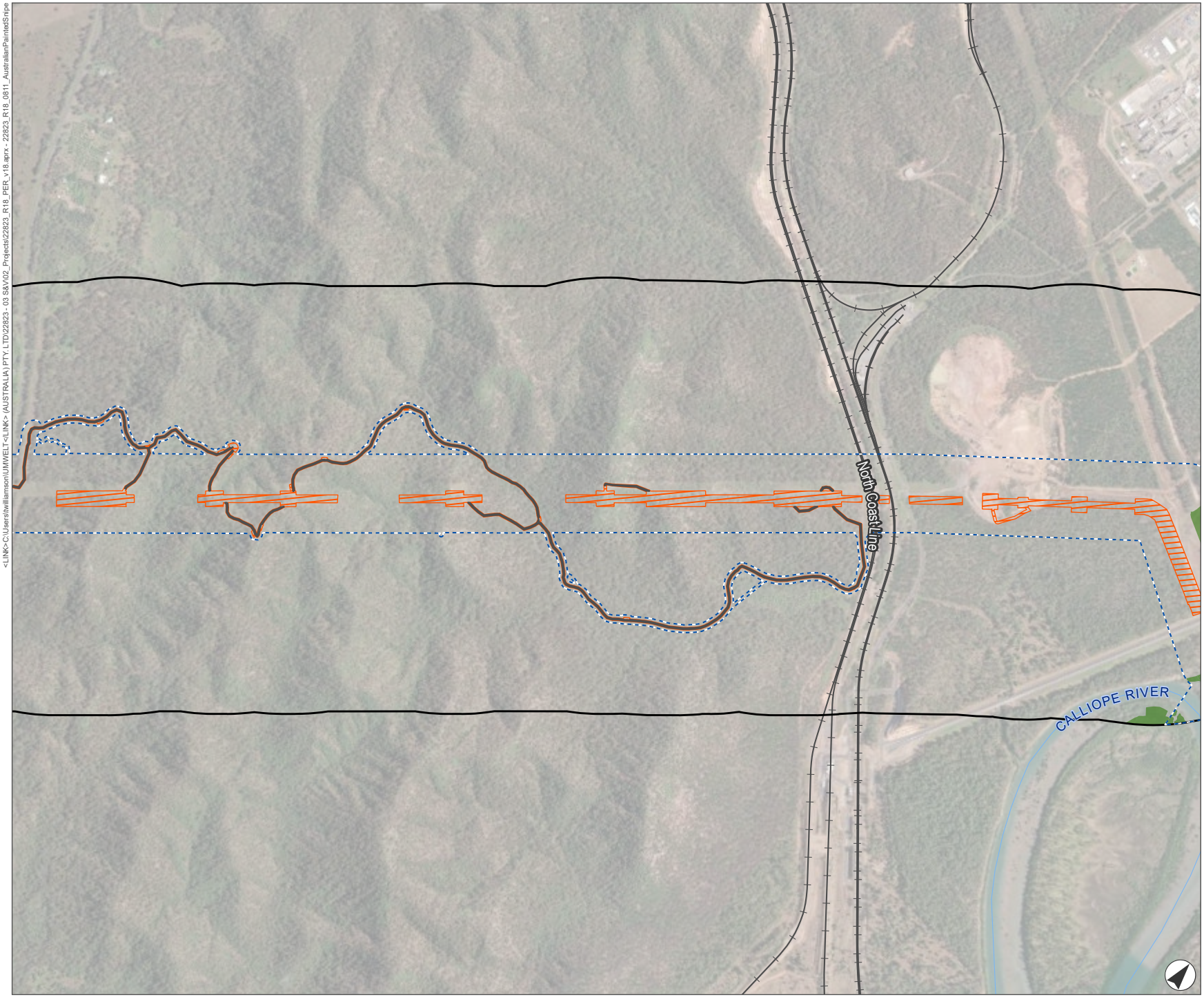


FIGURE 8.11-20

Australian Painted Snipe Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

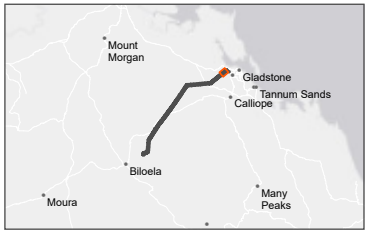
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Australian Painted Snipe Habitat

- Seasonal breeding, foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

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FIGURE 8.11-21

Australian Painted Snipe Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

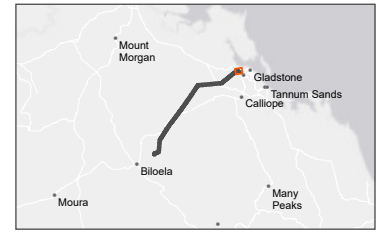
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Australian Painted Snipe Habitat

- Seasonal breeding, foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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8.2.6.2 Greater Glider (Southern and Central) (*Petauroides volans*)

Table 8.35 Greater Glider (Southern and Central): Ecology and Relevance to the Project Area

Greater Glider (southern and central)	
Profile	**Conservation status** Endangered **Distribution** Based on the findings of (McGregor et al., 2020), at least two species of greater glider are recognised to occur within Queensland: *Petauroides volans* (southern and central) and *Petauroides minor* (northern). As suggested by the common name, *Petauroides minor* is restricted to a relatively small area of northern Queensland from Townsville to the Windsor Tablelands and has a highly disjunct distribution. Relative to the northern species, the southern and central species (*Petauroides volans*) has a broad and mostly continuous distribution from Proserpine in Queensland, south through New South Wales and the ACT, to Wombat State Forest in central Victoria (Department of Climate Change, Energy, the Environment and Water, 2022b). **Population** While not generally applicable to species listed Endangered under the EPBC Act, the Conservation Advice now describes all populations of greater glider (southern and central) as 'important'. Further, coastal populations may be important for maintaining genetic diversity as they are geographically distinct from inland populations. As such, any individuals which may occur within the Project Area are conservatively considered part of an important population. **Historical records within the desktop search extent** WildNet records were identified within the desktop search extent, with two recent records dating from 2015 at the Callide Timber Reserve, approximately 8.6 km north-west of the Project Area. Numerous other WildNet records are known from Kroombit Tops National Park (with the most recent in 2020) situated 18km south of the Project Area and Targinnie from 2007 (Atlas of Living Australia, 2025). **Habitat** Greater gliders (southern and central) typically occur in highest abundance in tall, montane, moist eucalypt forests with relatively old trees and abundant hollows. During the day, they spend most of their time denning in hollowed trees, with a single individual inhabiting up to twenty different dens within its home range. Hollows are therefore an important and limiting habitat resource. As described in the species' Conservation Advice (Department of Climate Change, Energy, the Environment and Water, 2022b), the species probability of occurrence is positively correlated with the availability of tree hollows. Selection of some tree species over others for denning by greater gliders will depend on the age and senescence stage of the tree and the species inherent propensity to form hollows. For example, species such as *Eucalyptus latisinensis* (white mahogany) and *Blakella intermedia* (pink bloodwood) tend to develop hollows at a younger age / smaller DBH than *Blakella citriodora* and ironbark species (noting that *Blakella citriodora* and *Eucalyptus crebra* were abundant throughout the Project Area). Greater gliders are primarily folivorous, with a diet mostly comprising the leaves and flowers of *Myrtaceae* (e.g. eucalypt) trees. The species favours forests with a diversity of eucalypt species due to seasonal variation in its preferred foraging tree species. Within the Brigalow Belt

Greater Glider (southern and central)

Bioregion, a number of tree species have been identified as dominant or co-dominant species in greater glider (southern and central) associated REs, including (in descending order of extent): *Eucalyptus crebra, Blakella citriodora, Eucalyptus tereticornis, Corymbia clarksoniana, Eucalyptus moluccana, Blakella intermedia, Eucalyptus acmenoides, Lophostemon suaveolens* and *Blakella trachyphloia* (Eyre, Smith, et al., 2022).

The *Guide to greater glider habitat in Queensland* (Eyre, Smith, et al., 2022) defines habitat categories for the species as habitat, potential habitat and not habitat.

Habitat includes:

- REs with confirmed greater glider records.
- Habitat attributes (but not necessarily all attributes), such as live and dead hollow-bearing trees for denning, feed trees, large trees, habitat connectivity across the landscape.

Potential habitat includes:

- REs that do not have confirmed greater glider records but are identified by experts as potential greater glider habitat.
- Contains habitat attributes (but not necessarily all attributes), such as live and dead hollow-bearing trees for denning, feed trees, large trees, habitat connectivity across the landscape.

Not habitat includes:

- REs with no confirmed records of greater gliders and identified by experts as nonhabitat.
- Does not contain habitat attributes such as live and dead hollow-bearing trees for denning, feed trees, large trees, habitat connectivity across the landscape.

This document also defines the importance of tree size for greater gliders, 'with trees >30 cm diameter at breast height (DBH) preferentially selected for foraging and >50 cm DBH for denning.' Certain tree species are favoured by greater gliders for foraging and contribute the bulk of the diet in any one area. Young foliage is selected if available and this can alter the pattern of forage tree selection at different times of the year (Eyre, Smith, et al., 2022). For example, (Comport et al., 1996) found that foraging on *Eucalyptus tereticornis* and *Eucalyptus crebra* was variable, with gliders favouring the species in some months and avoiding them in others. Studies in the Brigalow Belt Bioregion found that favoured feed tree species included *Eucalyptus fibrosa*, *Eucalyptus moluccana* and *Blakella* citriodora. However, this list may reflect bias in survey, localised effort and species availability and is not considered a complete list.

Habitat critical to the survival of the species

Habitat critical to the survival of greater glider (southern and central) is defined in the species' Conservation Advice (Department of Climate Change, Energy, the Environment and Water, 2022b) as:

- Large contiguous areas of eucalypt forest, which contain mature hollow-bearing trees and a diverse range of the species' preferred food species in a particular region

Greater Glider (southern and central)	
	• Smaller or fragmented habitat patches connected to larger patches of habitat, that can facilitate dispersal of the species and/or that enable recolonisation • Cool microclimate forest/woodland areas (e.g. protected gullies, sheltered high elevation areas, coastal lowland areas, southern slopes) • Areas identified as refuges under future climate changes scenarios • Short-term or long-term post-fire refuges (i.e. unburnt habitat within or adjacent to recently burnt landscapes) that allow the species to persist, recover and recolonise burnt areas. Greater glider (southern and central) habitat occurs within the Project Area. Modelled habitat primarily comprises connected patches which in certain locations also occur at suitable elevations in cool microclimates. Approximately 23% of the total modelled habitat anticipated to be impacted by the Project is identified as likely or current denning habitat and contains preferred feed trees and hollow bearing trees or trees with the potential to contain hollows (i.e. large trees according to the relevant BioCondition benchmark thresholds) and is therefore considered critical habitat. The remaining habitat is composed of foraging and dispersal habitat or potential or future denning habitat which connect to patches of larger habitat and facilitate dispersal and colonisation and are therefore also considered critical habitat. Given this, all modelled habitat within the Project Area is considered habitat critical to the survival of the species. **Current threats to the species** The main identified and potential threats to greater glider (southern and central), as identified in the species' Conservation Advice (Department of Climate Change, Energy, the Environment and Water, 2022b), are: • Habitat loss • Fragmentation and modification (via inappropriate fire regimes, land clearing and timber harvesting) • Barbed wire fencing • Climate change • Hyper-predation by owls • Predation by introduced species (including feral cats and foxes). **Recovery plans** *Draft National Recovery Plan for Greater Gliders Petauroides minor (northern) Petauroides volans (southern and central)* (DCCEEW, 2025a).
In the Project Area	**Surveys** Field surveys have been undertaken within the Project Area from March 2023 to July 2025, which included 422 habitat assessments (including searches for suitable hollows and collection of DBH data) and 51 person hours of spotlighting on foot and by vehicle within representative greater glider (southern and central) habitat.

Greater Glider (southern and central)

Species occurrence

Greater glider (southern and central) was not identified during the field surveys. However, given the presence of recent WildNet records located approximately 8.6 km north-west of the Project Area and the presence of suitable habitat, the species is considered a high likelihood of occurrence within the Project Area.

Species habitat

Suitable breeding, foraging and dispersal habitat is present within the Project Area where eucalypt woodlands support large trees with suitable hollows. Sections of this vegetation are also linked by vegetated corridors to nearby recorded occurrences of this species in Section B, Section D and Section E of the Disturbance Footprint. Eucalypt woodlands and forests dominate the Project Area and comprise a number of REs identified as 'habitat' or 'potential habitat' consistent with Department of the Environment and Science, (2022). The relevant REs are: 11.3.4, 11.3.25, 11.3.26, 11.10.4, 11.10.13, 11.11.15, 11.11.3, 11.11.3c, 11.11.4, 11.11.4c, 11.12.1, 11.12.3, 11.12.6, 11.10.13,12.3.3, 12.11.6, and 12.11.16.

Hollow-bearing trees and stags did not occur consistently across the communities listed above. However, based on previous advice from DCCEEW on a different project and in response to potential concerns with observer bias in identifying hollow-bearing trees (Eyre, Smith, et al., 2022), denning habitat has been identified based on the presence of trees with a DBH greater than that of the BioCondition benchmark for large trees on that RE. Patches where the DBH of trees was unknown were conservatively included in the mapping. This conservative approach likely over represents the suitable habitat within the Disturbance Footprint.

The nearby state forests such as the Don River State Forest, the Calliope Conservation Park, the Maxwelton State Forest and the Mount Stowe State Forest, are all expected to provide large areas of suitable habitat for the species and are functionally connected to the Project Area. While barriers to movement exist in the form of the existing transmission lines, roads and fences, the dispersal of the greater glider (southern and central) between these areas and the Project Area is likely to be maintained. Existing disturbances in the Project Area such as the existing transmission line, roads and tracks are likely to affect greater glider (southern and central) occupancy in the Project Area.

Habitat mapping rules

Suitable habitat within Project Area	Habitat Modelling Criteria	Area (ha)	
		Project Area	Disturbance Footprint
Likely or current denning	This habitat type comprises select patches or areas of remnant RE 11.3.4, 11.3.25, 11.3.26, 11.10.13,11.10.4, 11.11.3, 11.11.3c, 11.11.4, 11.11.4c, 11.11.15, 11.12.1, 11.12.3, 11.12.6, 12.3.3, 12.11.6 and 12.11.16. This habitat type is defined as eucalypt forest and woodlands, adjacent to or within foraging and dispersal habitat, comprising REs considered habitat or potential habitat as per the *Guide to greater glider habitat in Queensland* (Eyre, Smith, et al.,	3,430.5	31.5

Greater Glider (southern and central)			
	2022) containing appropriate tree species with a DBH greater than the RE threshold for large trees in the relevant BioCondition benchmark. Suitable communities in remnant condition only were found during the field survey program to consistently support large trees.		
Potential or future denning	Select patches or areas of regrowth RE 11.3.4, 11.3.25, 11.3.26, 11.10.4, 11.10.13, 11.11.3, 11.11.3c, 11.11.4, 11.11.4c, 11.11.15, 11.12.1, 11.12.3, 11.12.6 12.3.3, 12.11.6 and 12.11.16. Eucalypt forest and woodlands, adjacent to or within foraging and dispersal habitat, comprising REs considered habitat or potential habitat as per the *Guide to greater glider habitat in Queensland* (Eyre, Smith, et al., 2022) containing appropriate tree species with a diameter at breast height greater than 30 cm, but less than the RE threshold for large trees in the relevant BioCondition benchmark.	2,271.9	105.7
Foraging and dispersal	Forests and woodlands at least 10 m tall to enable gliding, that are dominated or co-dominated by locally important foraging tree species, including (but not limited to) *Blakella citriodora, Eucalyptus moluccana, E. tereticornis, E. crebra, C. intermedia* and *E. portuensis*, and functionally connected to current or future denning habitat. Excludes those areas that are isolated (>100 m from current or future denning).	89.0	4.3

Table 8.36 Assessment of Potential Project Impacts and Mitigation and Management Commitments for Greater Glider (southern and central)

Potential Impact	Assessment	Mitigation Commitments
Direct		
Habitat loss	Vegetation clearing required for construction will result in direct impacts to 141.5 ha of suitable habitat for greater glider including 31.5 ha of likely or current denning, 105.7 ha of potential or future denning and 4.3 ha of foraging and dispersal habitat.	• Identify MNES fauna habitat and individuals through pre-clearance surveys with hollows for greater glider identified and salvaged as per the MNES Management Plan. • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Disturbance activities must be contained to Disturbance Footprint subject to minor micro-siting within Field Survey Extent. • During the pre-clearance survey, the fauna spotter-catcher will locate, record and mark the habitat features (including those to be retained in situ) • Install tree protection to habitat trees immediately adjacent to areas of earthworks

Potential Impact	Assessment	Mitigation Commitments
		• Refer to Table 5.1 and Table 5.8 of the MNES Management Plan for further details on mitigation measures.
Injury or mortality	The Project has the potential to result in direct injury or mortality to individuals during the construction phase, through entrapment in denning trees that have been felled to accommodate the Disturbance Footprint or entanglement in project infrastructure including fencing. Entanglement in transmission wires and towers is considered highly unlikely given the height of span being mostly above canopy height.	• Appropriately qualified fauna spotter catcher to undertake pre-clearance habitat assessment and be present during clearing and disturbance to habitat features • Clearing must be staged, with non-habitat trees felled first • Tampering with an animal breeding place to be carried out in accordance with an approved Species Management Program • Clear delineation of habitat features to be retained • Habitat trees must be soft-felled • Restrict vehicles to approved access tracks • Vehicle travelling speed restricted to <40 km/hr • Excavations must be secured (e.g. covered) • Any new fencing used for the perimeter or within the Project Area must be constructed entirely of plain (non-barbed) wire where landholder preferences allow and where no security, safety, or insurance requirements apply. • The second preference for new fencing will incorporate a top strand of plain (non-barbed) wire with barbed wire only to be used where required to meet Australian safety standards, electrical security requirements, insurance conditions, or specific landholder or security restrictions. • Where new fencing incorporating barbed wire is established within the Project Area, fence visibility must be increased by affixing durable visibility tags or tape at 30 cm intervals along the top strand of the barbed wire fencing • Pre-clearance surveys for glider hollows • Suitable trees (stem injected where required) will be retained in situ as suitable gliding poles in riparian areas • Injured individuals transported to local wildlife carer or vet • Refer to Table 5.3 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Indirect		
Habitat degradation and fragmentation	The species is considered particularly sensitive to habitat fragmentation as a result of their low dispersal ability, relatively small home ranges and reliance on large hollow-bearing trees. The greater glider (southern and central) is absent from cleared areas and has little dispersal ability to move through cleared areas between fragments (Department of Climate Change Energy the Environment and Water, 2022). Habitat degradation and fragmentation may be facilitated through: • Introduction or proliferation of pest and weed species • Alterations to fire regimes including uncontrolled fires • Dust generated during construction activities disturbing behaviours or health/palatability of foraging resources.	• Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • Dust suppression measures including vehicles restricted to approved tracks, cover all loose loads and set speed limits (<40 km/hr) • Application of dust suppressants as required • Dust generating activities will be limited on days with strong winds blowing towards sensitive receptors or dust sensitive locations • Regular monitoring and visual surveillance to trigger management actions will be undertaken • Bushfire Management Plan will be developed • Burning of vegetation strictly prohibited unless a permit is obtained • Designated parking areas for vehicles and machinery • During operation, vegetation within the Disturbance Footprint will be managed in accordance with Powerlink's vegetation specification • Suitable trees (stem injected where required) will be retained in situ as suitable gliding poles in riparian areas • Refer to Table 5.4, Table 5.5 and Table 5.9 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Disorientation and disruption of breeding, foraging and dispersal behaviours	Noise, activity and vibration generated during construction and operation may disorientate or startle individuals or interrupt diurnal resting. Despite this, operational noise and lighting impacts at the Calliope River substation are currently present, and the expansion of the substation is not expected to significantly increase these indirect impacts during the operational phase.	• Plant and equipment to be fitted with appropriate noise attenuation and maintained • Deliveries and removal of material and equipment to and from site within approved hours for construction • Plant to be turned off when not in use • No unnecessary use of horns or other audible signals on mobile plant or equipment • Machinery and equipment will be maintained in good working condition • Refer to Table 5.10 of the MNES Management Plan for further details on mitigation measures.

Table 8.37 Significant Impact Assessment: Greater Glider (southern and central)

Impact Criteria	Assessment
Lead to a long-term decrease in the size of a population	**Unlikely** Greater glider (southern and central) was not recorded during the field survey program. A number of REs identified to comprise greater glider 'habitat' or 'potential habitat' as per the Guide to Greater Glider Habitat in Queensland occur within the Disturbance Footprint. However, findings from the field surveys determined that suitable hollow-bearing trees generally occurred in low abundance throughout these REs. Despite this, based on recent advice from DCCEEW, denning habitat has been mapped based on the DBH of trees within the community and their potential to bear hollows, rather than the physical presence of hollows themselves. On this basis, large areas of vegetation communities with trees with a DBH greater than that of the BioCondition benchmark for the associated RE have been included in denning habitat mapping which were found not to bear suitable hollows. Additionally, in areas where the DBH of trees was unknown, they have been conservatively included in the mapping. As such it is likely that the modelled extent of denning habitat which is being utilised by the species is overstated. A maximum of 141.5 ha of suitable habitat will be directly cleared to accommodate the Project, including 31.5 ha of likely or current denning habitat, 4.3 ha of foraging and dispersal habitat and 105.7 ha of potential or future denning habitat. Suitable habitat for the greater glider (southern and central) in the Project Area is not considered unique or high quality due to the rocky substrate and low water availability (resulting in stunted tree growth and low hollow abundance), historical clearing and ongoing disturbance from weeds and pests. In addition, the species was not detected during field surveys despite extensive spotlighting effort and the species high detectability. Habitat availability is expected to be high in the wider local area. There are several

Impact Criteria	Assessment
	protected areas adjacent to the Project Area which are likely to provide a greater abundance of important habitat resources including hollow bearing trees or stags. Potential indirect impacts on the species as a result of the Project are expected to be limited but will be actively managed via the MNES Management Plan. Based on the above, a long-term decrease in the size of a population is unlikely to result from the Project.
Reduce the area of occupancy of the species	**Unlikely** The greater glider (southern and central) has a large distribution extending across the majority of the east coast of Australia. The species area of occupancy is estimated at 15,316 km^2, however this may be overstated given the low resolution in the mapping methodology used by the Commonwealth (2 km x 2 km grid). Direct impacts via vegetation clearing will occur to 141.5 ha of suitable habitat will be directly cleared to accommodate the Project, including 31.5 ha of likely or current denning habitat, 4.3 ha of foraging and dispersal habitat and 105.7 ha of potential or future denning habitat. However, the Project is linear in nature and clearing will be minimised wherever possible. Some vegetation adjacent to the transmission line may remain in place if it does not violate the exclusion zones. No patch isolation or complete loss of any path of habitat will occur as a result of the Project, and movement within and out of the Project Area will be maintained. Due to the existing disturbances in the Project Area, such as existing roads, lights, the existing transmission line and human presence, greater gliders (southern and central) within the Project Area are likely to only be transitory individuals, rather than maintaining a long-term occupancy. Furthermore, the Project Area does not occur near the limit of the species distribution. Based on this, Project works are considered unlikely to materially reduce the availability or quality of habitat for the species to the point where the occupancy of a population would be reduced.
Fragment an existing population into two or more populations	**Potential** This species is considered to be sensitive to fragmentation due to low dispersal ability and relatively small home ranges (Eyre, Smith, et al., 2022), and the greater glider does not disperse across non-remnant areas (due to the high predation risk). While greater gliders (southern and central) can volplane distances up to 100 m, they typically glide no further than 30 m, although this is dependent on the canopy height and the distance between trunks of adjacent trees. Modelled habitat within the Disturbance Footprint is already subject to fragmentation as a result of historical clearing, the existing transmission line and ongoing agricultural practices. The existing transmission line has created a north-south barrier to movement for this species, as it has a linear cleared width of approximately 60 m (or 100m in Section C which contains limited greater glider habitat). This cleared distance is unlikely to be traversed by any current population within the Project Area, however, movement across cleared areas has been noted despite the increased predation risk (DCCEEW, 2025a). At its widest distance, the Project will increase these clearing widths up to 100 m (or wider in Section C). Some direct impacts will also occur within riparian vegetation which is likely to provide the preferred movement pathways for the species. However, movement to adjacent areas, particularly the nearby state forests and national parks, will be maintained. Direct impacts via vegetation clearing will occur to 141.5 ha of suitable

Impact Criteria	Assessment
	habitat, including 31.5 ha of likely or current denning habitat, 4.3 ha of foraging and dispersal habitat and 105.7 ha of potential or future denning habitat. The Project is linear in nature and clearing will be minimised wherever possible. Although highly unlikely, the infrastructure may present a barrier to movement in areas where connecting wires may be low enough to obstruct gliding. As such, the local population of greater gliders (southern and central) may be disrupted as dispersal across the easement may be restricted. Therefore, it is possible that the Project may fragment an existing population into two or more populations.
Adversely affect habitat critical to the survival of a species	**Likely** As described above, all suitable greater glider (southern and central) habitat within the Project Area has been conservatively considered to meet the definition of habitat critical to the survival of the species. Approximately 141.5 ha of suitable habitat will be directly impacted via vegetation clearing for construction of the Project, including 31.5 ha of likely or current denning habitat, 4.3 ha of foraging and dispersal habitat and 105.7 ha of potential or future denning habitat. While the final extent of clearing may be less than this, the loss of the majority of this habitat is largely unavoidable in order to facilitate the Project. While large areas of suitable habitat will remain following the construction of the Project, the removal of this habitat and key habitat features is considered an 'adverse effect' on habitat critical as per the Conservation Advice.
Disrupt the breeding cycle of a population	**Potential** Breeding is restricted to a very brief period in February to May, and females give birth to single young from March to June. Vegetation clearing and construction is unavoidable during this period, however disturbance will be phased and localised to small portions of the Disturbance Footprint at a time. Tree hollows are required for this species to breed, and potential breeding habitat will be directly impacted. The use of fauna spotter catchers, particularly during the breeding period, will ensure that any displaced individuals possibly bearing young are captured and relocated. In addition, a high-risk SMP will be implemented. However, the reduction in suitable hollow-bearing trees available for the species in the local area may result in the disruption of the breeding cycle of a population.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely** As described earlier, suitable habitat for the greater glider (southern and central) within the Project area is not considered unique or high quality due to the rocky substrate and low water availability (resulting in stunted tree growth and low hollow abundance), historical clearing and ongoing disturbance from weeds and pests. The Project is linear in nature and clearing will only be completed as strictly required. Within areas of greater glider habitat, suitable glider hollows (tree DBH >30cm and hollow size greater than 8cm) will be prioritised for avoidance within the Disturbance Footprint or otherwise salvaged in accordance with the MNES Management Plan. Potential indirect impacts on the species as a result of the Project are expected to be limited but will be actively managed in alignment with the MNES Management Plan (specifically for biosecurity, dust, noise, light and vibration impacts). A Bushfire Management Plan will also be developed as part of the Emergency Preparation and Response Plan as outlined within Table 5.9 of the MNES Management Plan, which will ensure that indirect amplification of bushfire risk and consequent habitat

Impact Criteria	Assessment
	modification will be less likely to occur. Specific measures for the greater glider (southern and central) will be implemented including pre-clearance survey requirements. Based on the above, the Project is unlikely to modify, destroy, remove or isolate or decrease the availability of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to an Endangered species becoming established in the Endangered species' habitat	**Unlikely** European fox and feral cats are invasive species that are known to predate upon the Greater glider (southern and central). Predation primarily occurs when gliders come to the ground to move between habitat areas beyond the volplane distance which is likely to be rare. Both species were recorded in the Project Area during the field survey program. It is unlikely the Project will result in the establishment of further feral species or exacerbate current populations within greater glider (southern and central) habitat given the existing transmission line currently provides movement for feral species. However, appropriate biosecurity controls and weed washdown procedures will be adhered to, to mitigate the introduction or proliferation of pest and weed species as outlined within Table 5.5 of the MNES Management Plan. Based on this, it is unlikely the Project will result in invasive species that are harmful to the species becoming established.
Introduce disease that may cause the species to decline	**Unlikely** The species is not known to be vulnerable to disease directly. Phytophthora root fungus (*Phytophthora cinnamomic*) has the potential to indirectly impact the species via the infection of eucalyptus trees. The Project will implement best practice biosecurity protocols; therefore, the introduction of a disease that may cause the species to decline is unlikely.
Interfere with the recovery of the species	**Potential** The species' draft recovery plan (DCCEEW, 2025a) outlines the following recovery actions for this species: • A national monitoring program • Habitat restoration. Habitat loss, disturbance and modification are likely to occur due to the Project. The Project will directly contribute to the loss of 141.5 ha of suitable habitat, including areas containing hollow-bearing trees. The loss of this habitat may exacerbate edge effects and ultimately modify areas of habitat that aren't to be directly removed by the Project. The Project may therefore interfere with the recovery of the species by reducing the availability of habitat in the regional context, albeit to a limited extent.
Significant Residual Impact	**Likely to have a significant impact**

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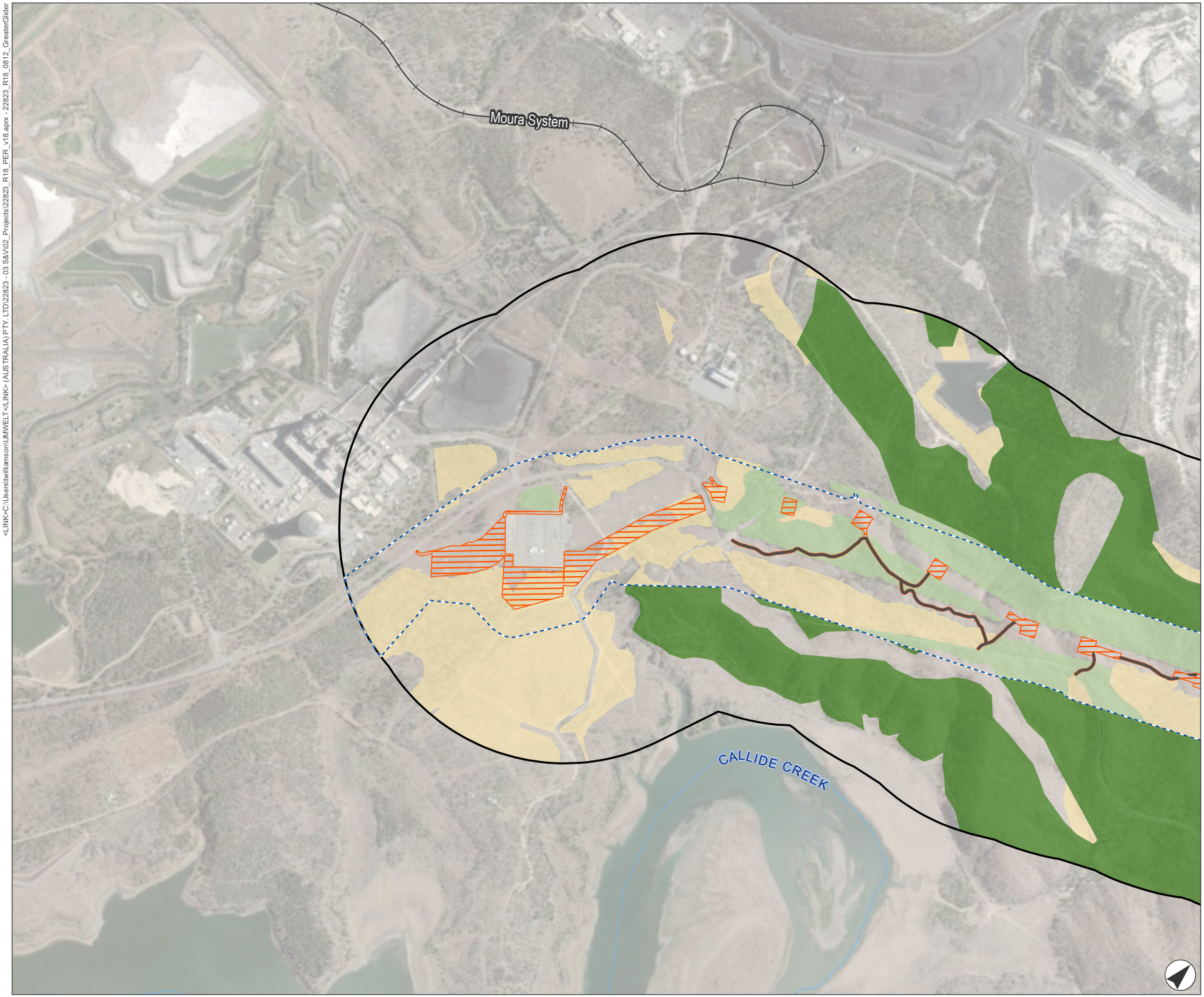


FIGURE 8.12-1

Greater Glider (Southern and Central) Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

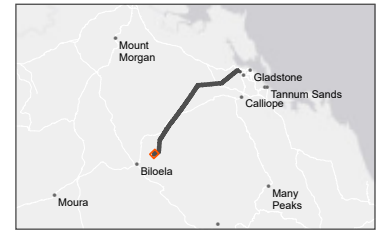
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Greater Glider Habitat

- Foraging and dispersal
- Likely or current denning
- Potential or future denning

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
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FIGURE 8.12-2

Greater Glider (Southern and Central) Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

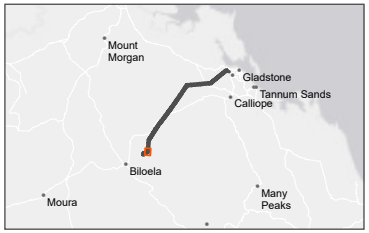
- Watercourse
- Field Survey Extent
- Project Area

Greater Glider Habitat

- Foraging and dispersal
- Likely or current denning
- Potential or future denning

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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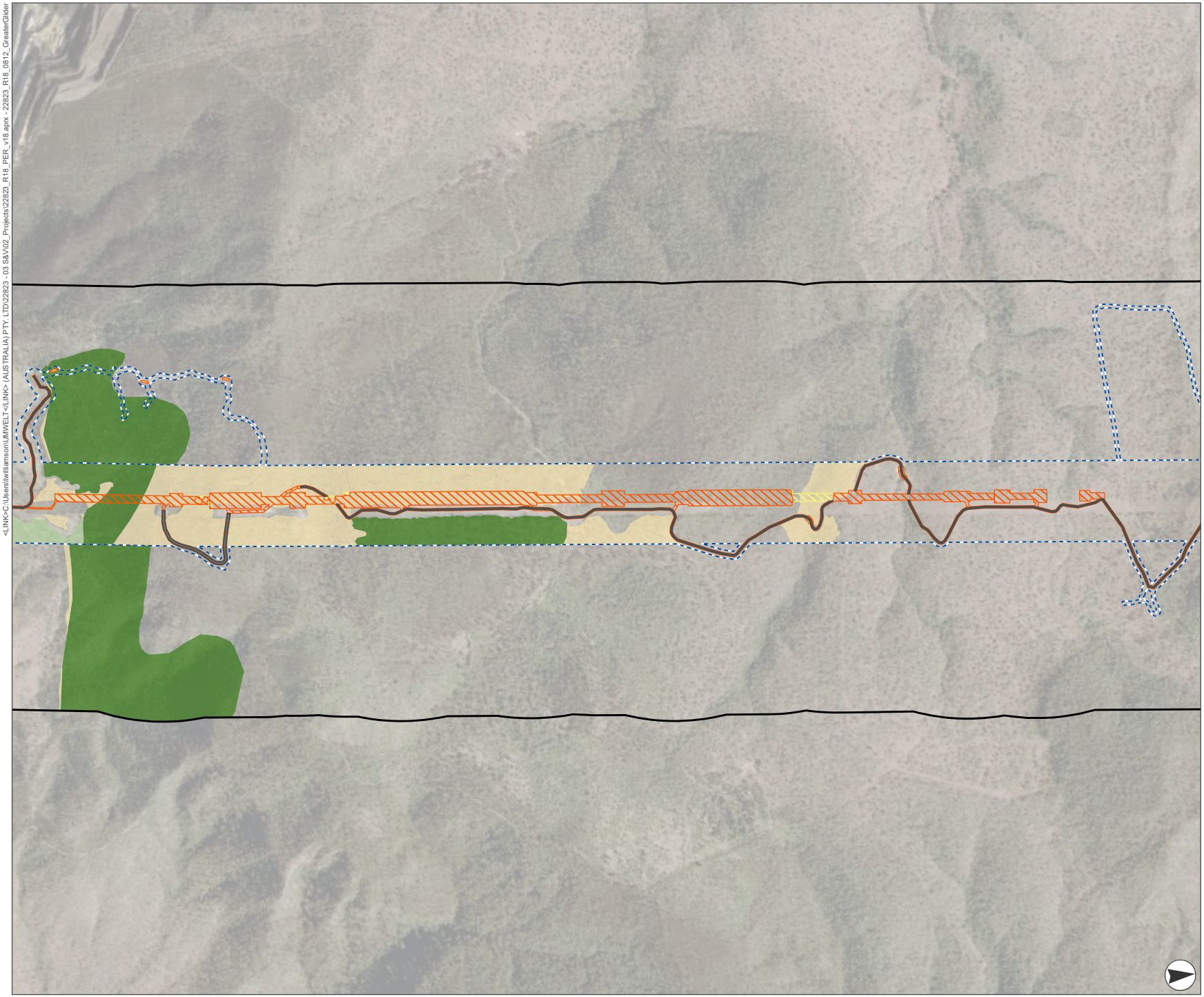


FIGURE 8.12-3

Greater Glider (Southern and Central) Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

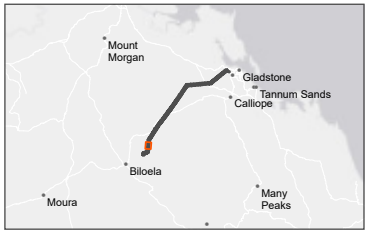
- Field Survey Extent
- Project Area

Greater Glider Habitat

- Foraging and dispersal
- Likely or current denning
- Potential or future denning

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.12-4

Greater Glider (Southern and Central) Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

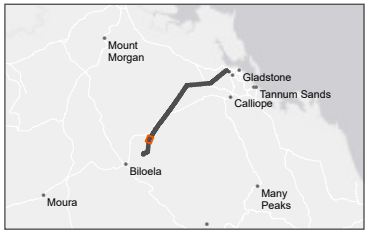
- Field Survey Extent
- Project Area

Greater Glider Habitat

- Likely or current denning
- Potential or future denning

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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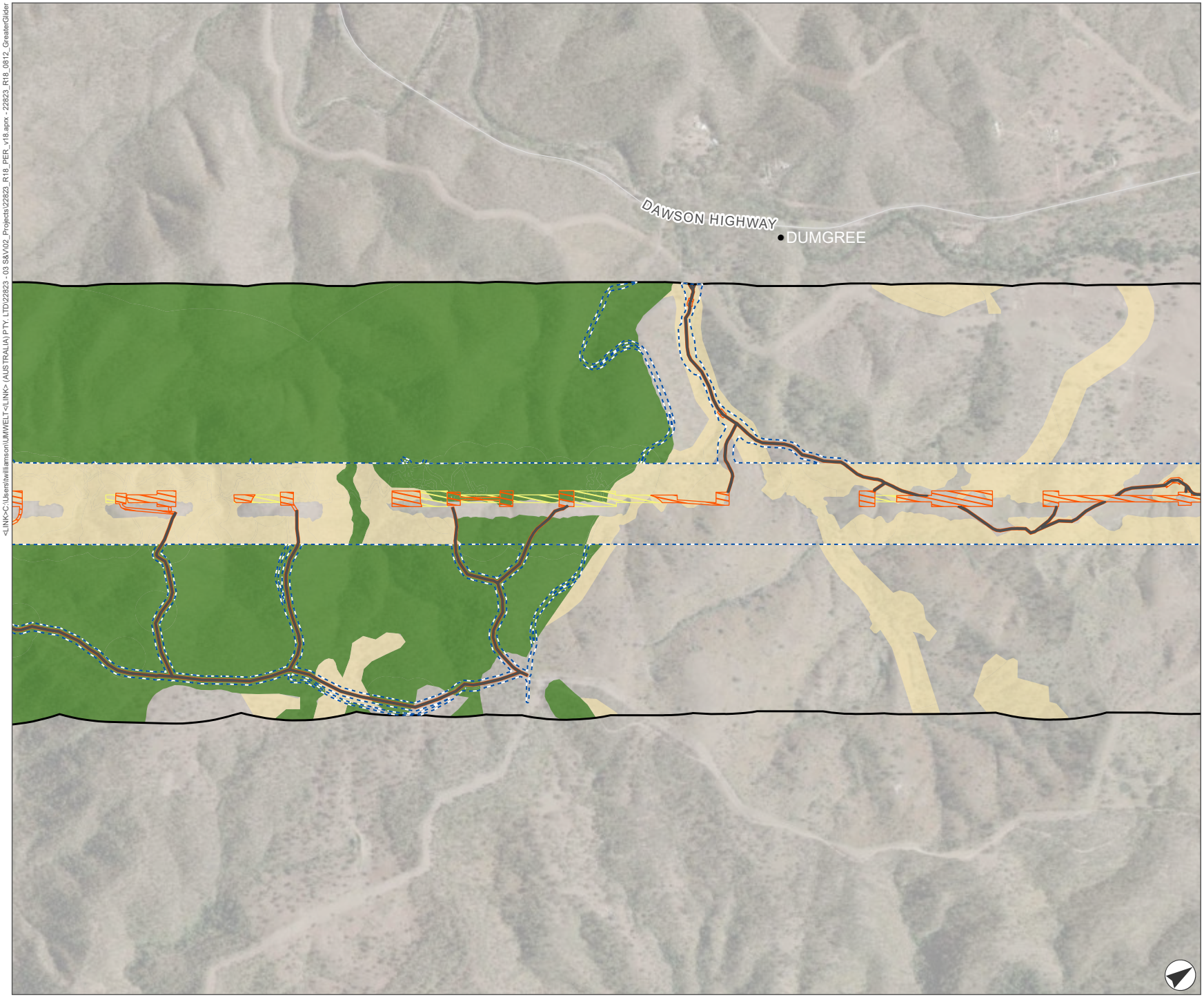


FIGURE 8.12-5

Greater Glider (Southern and Central) Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

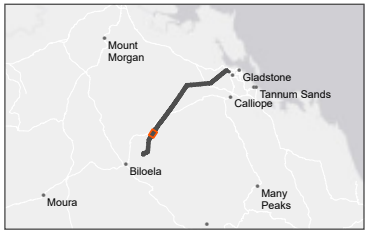
- Roads
- Field Survey Extent
- Project Area

Greater Glider Habitat

- Likely or current denning
- Potential or future denning

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.12-6

Greater Glider (Southern and Central) Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

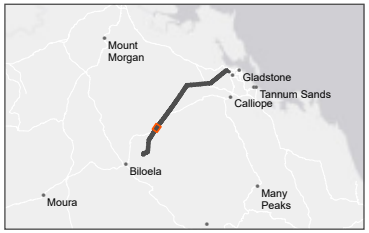
- Roads
- Watercourse
- Field Survey Extent
- Project Area

Greater Glider Habitat

- Likely or current denning
- Potential or future denning

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.12-7

Greater Glider (Southern and Central) Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

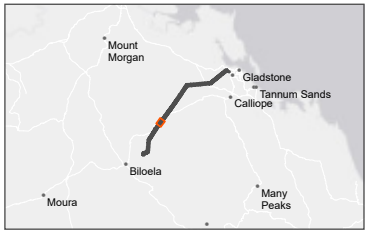
- Roads
- Watercourse
- Field Survey Extent
- Project Area

Greater Glider Habitat

- Foraging and dispersal
- Likely or current denning
- Potential or future denning

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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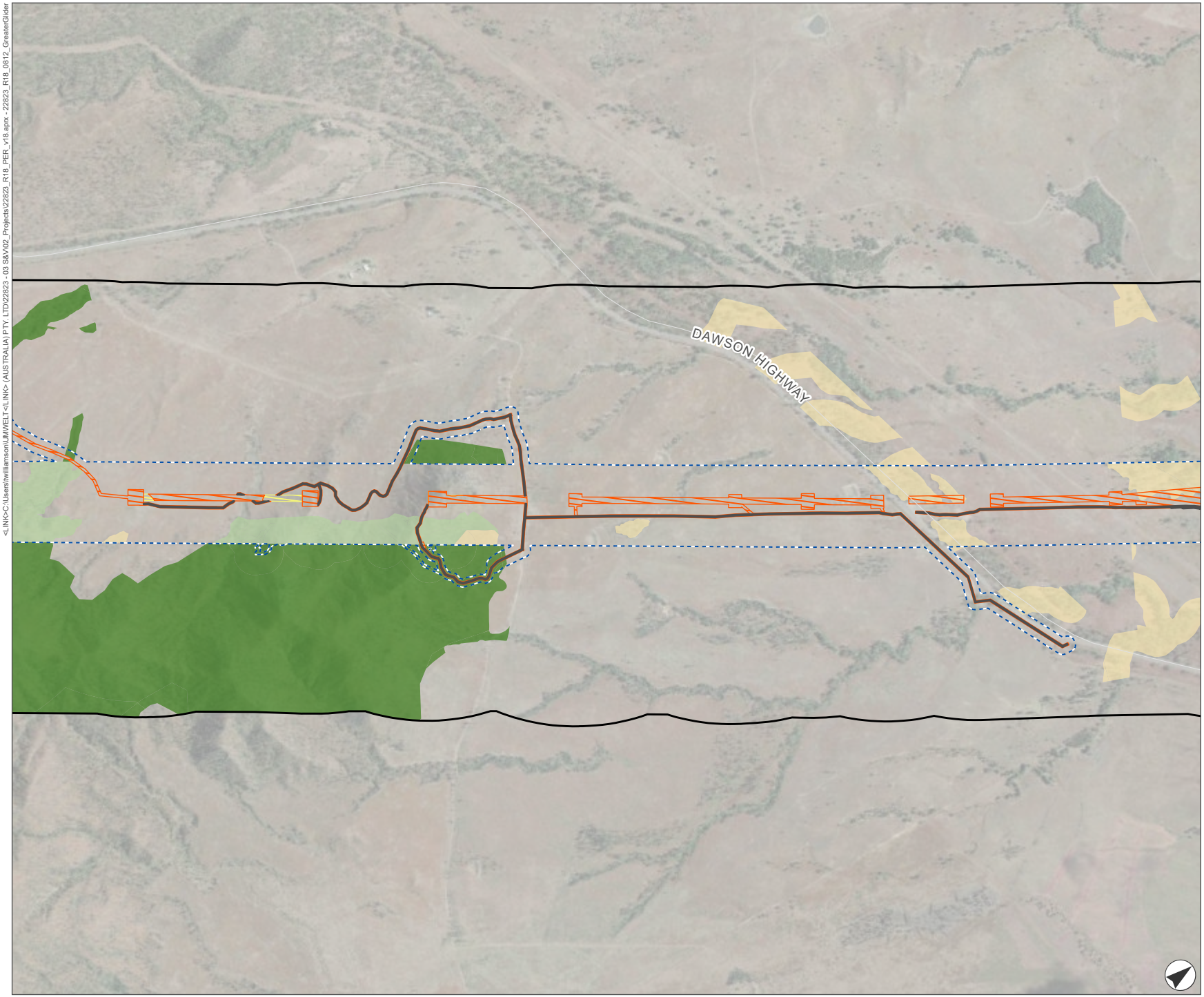


FIGURE 8.12-8

Greater Glider (Southern and Central) Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

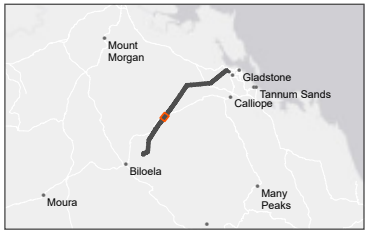
- Roads
- Field Survey Extent
- Project Area

Greater Glider Habitat

- Foraging and dispersal
- Likely or current denning
- Potential or future denning

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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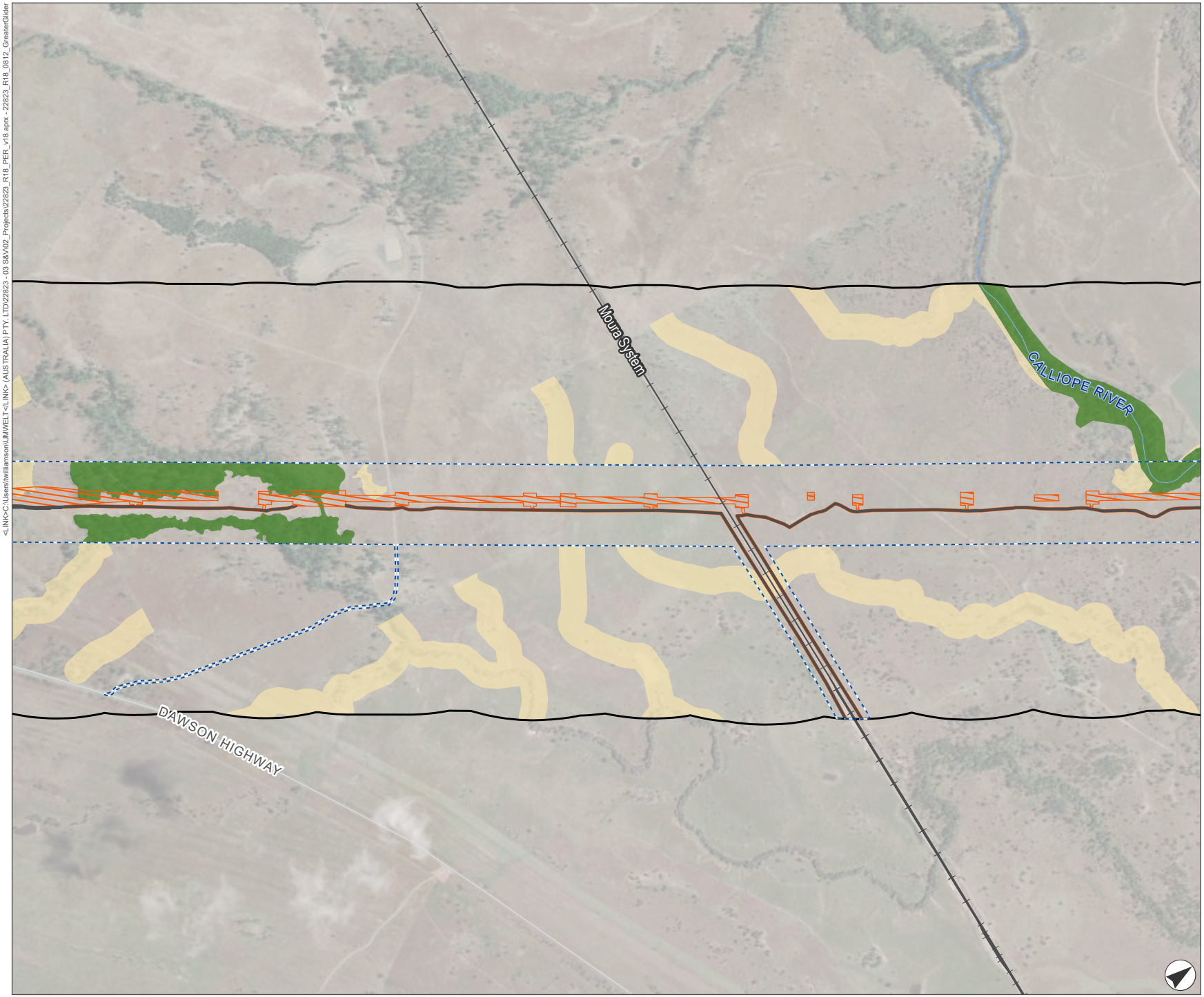


FIGURE 8.12-9

Greater Glider (Southern and Central) Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

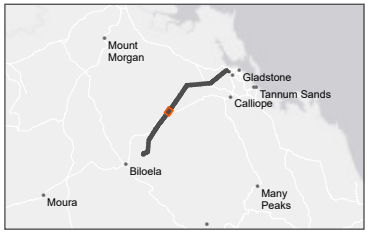
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Greater Glider Habitat

- Likely or current denning
- Potential or future denning

Disturbance Footprint

- Full Clearing
- Existing Clearance



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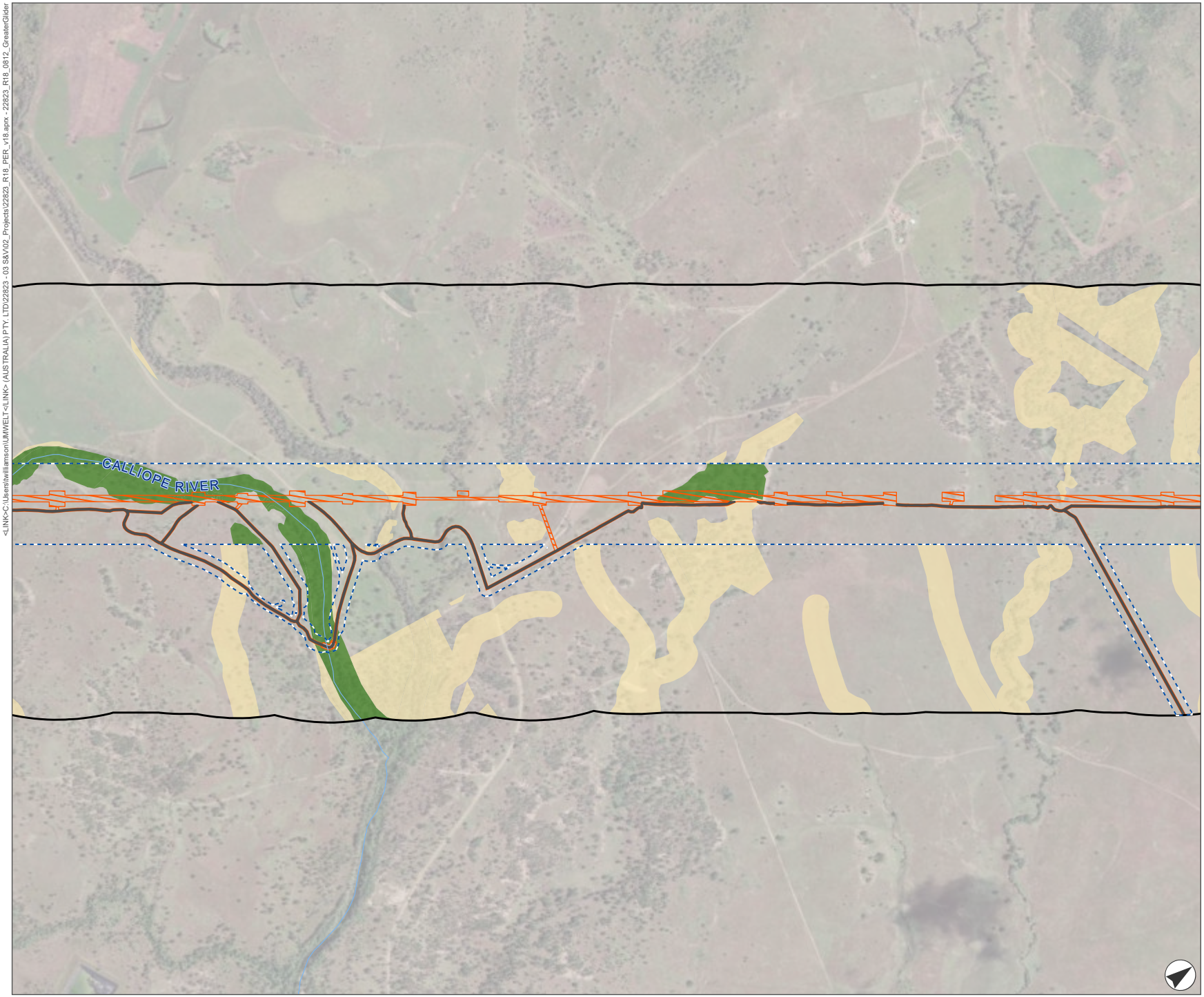


FIGURE 8.12-10

Greater Glider (Southern and Central) Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

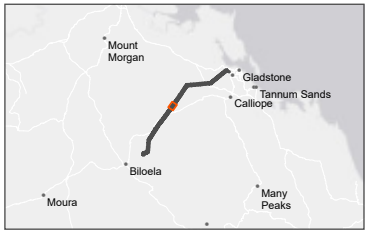
- Watercourse
- Field Survey Extent
- Project Area

Greater Glider Habitat

- Likely or current denning
- Potential or future denning

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

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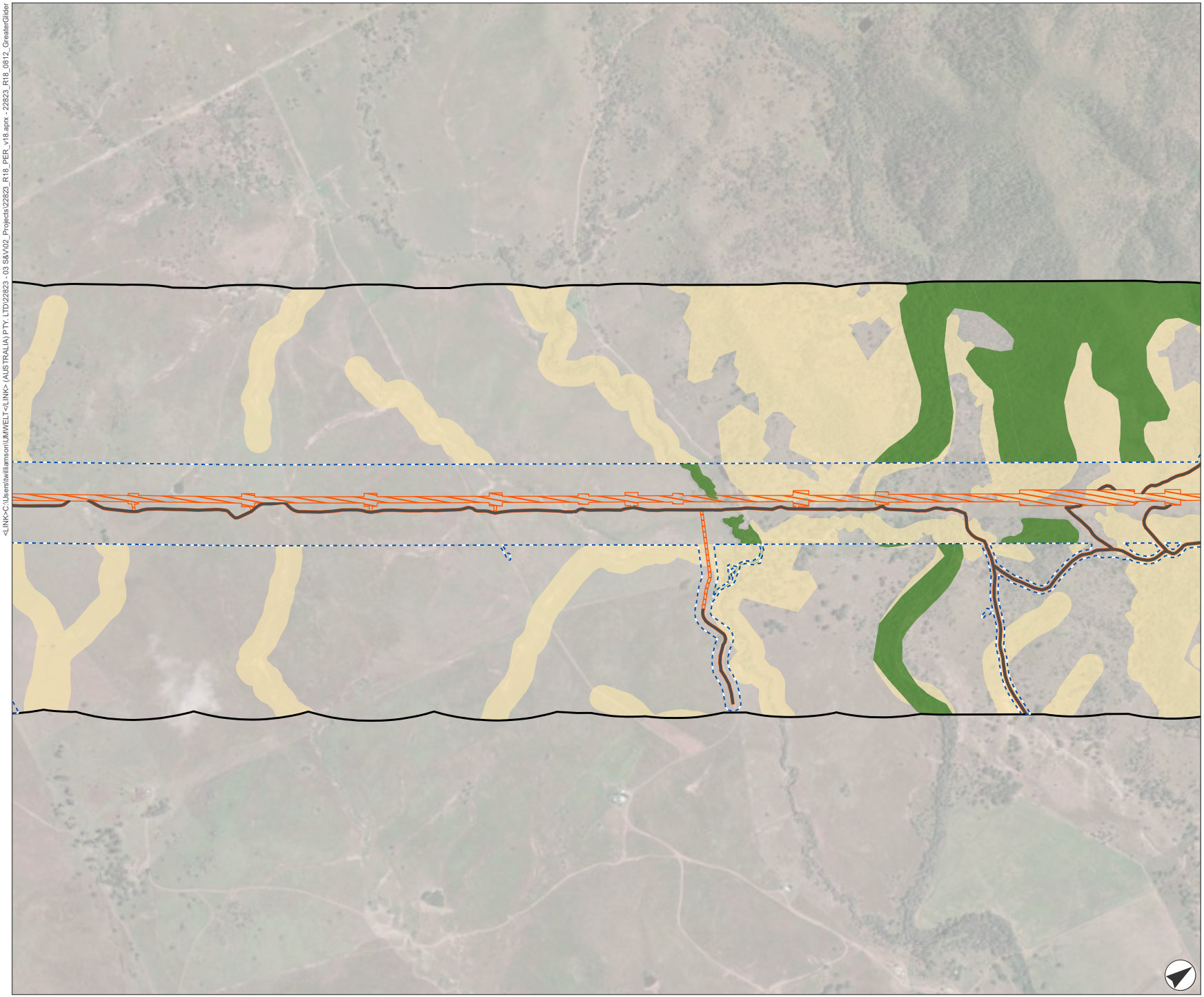


FIGURE 8.12-11

Greater Glider (Southern and Central) Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

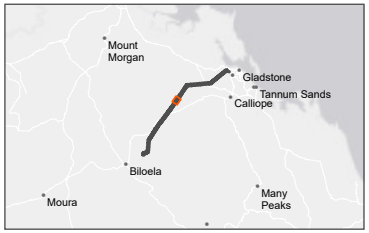
- Field Survey Extent
- Project Area

Greater Glider Habitat

- Likely or current denning
- Potential or future denning

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.12-12

Greater Glider (Southern and Central) Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

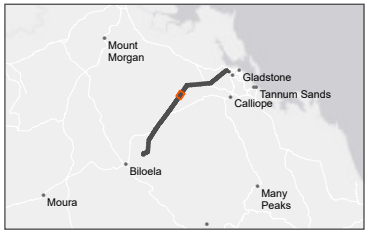
- Field Survey Extent
- Project Area

Greater Glider Habitat

- Likely or current denning
- Potential or future denning

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

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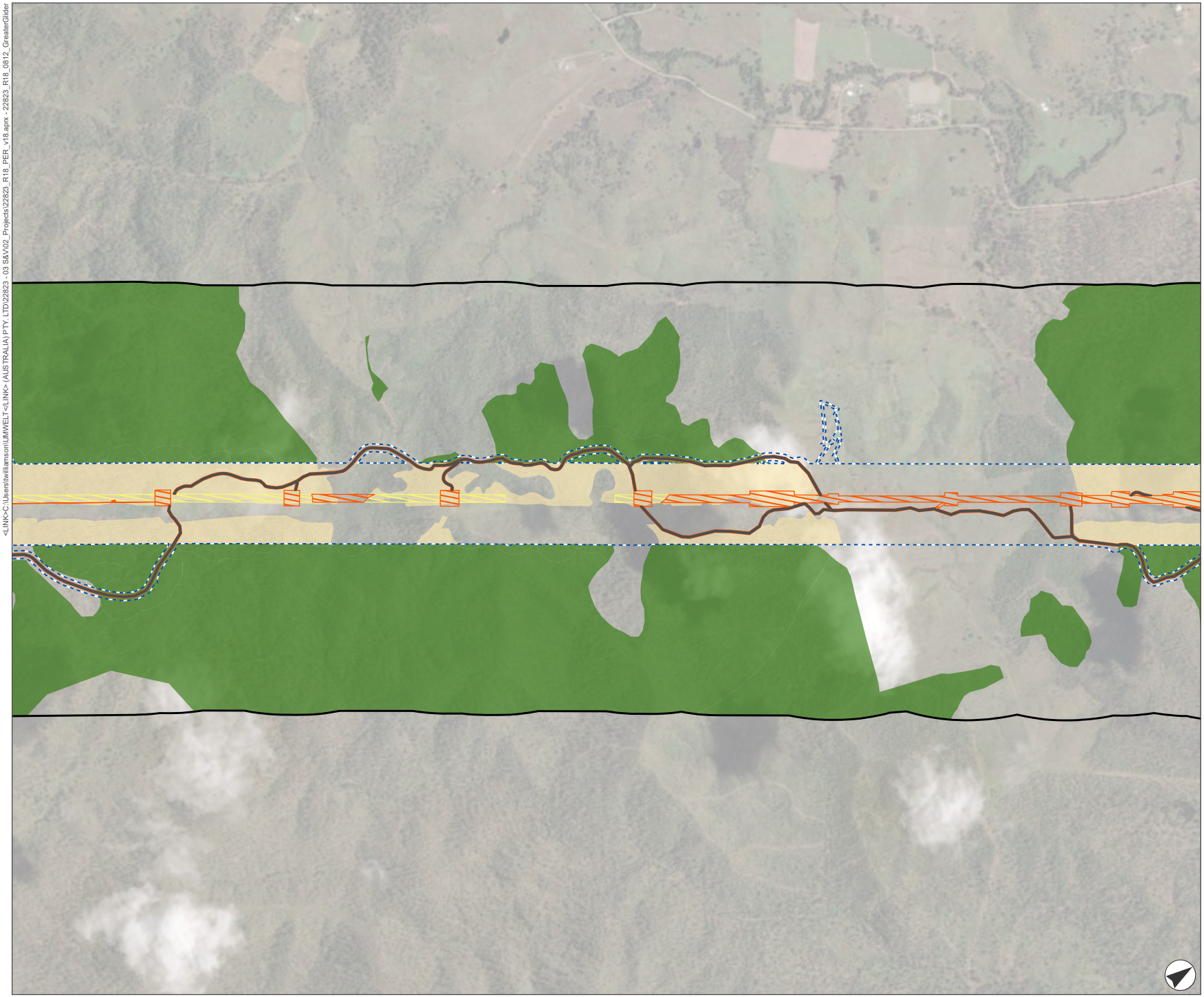


FIGURE 8.12-13

Greater Glider (Southern and Central) Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

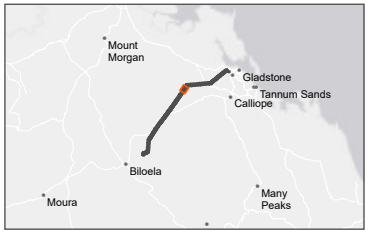
- Field Survey Extent
- Project Area

Greater Glider Habitat

- Likely or current denning
- Potential or future denning

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



0 0.5 1

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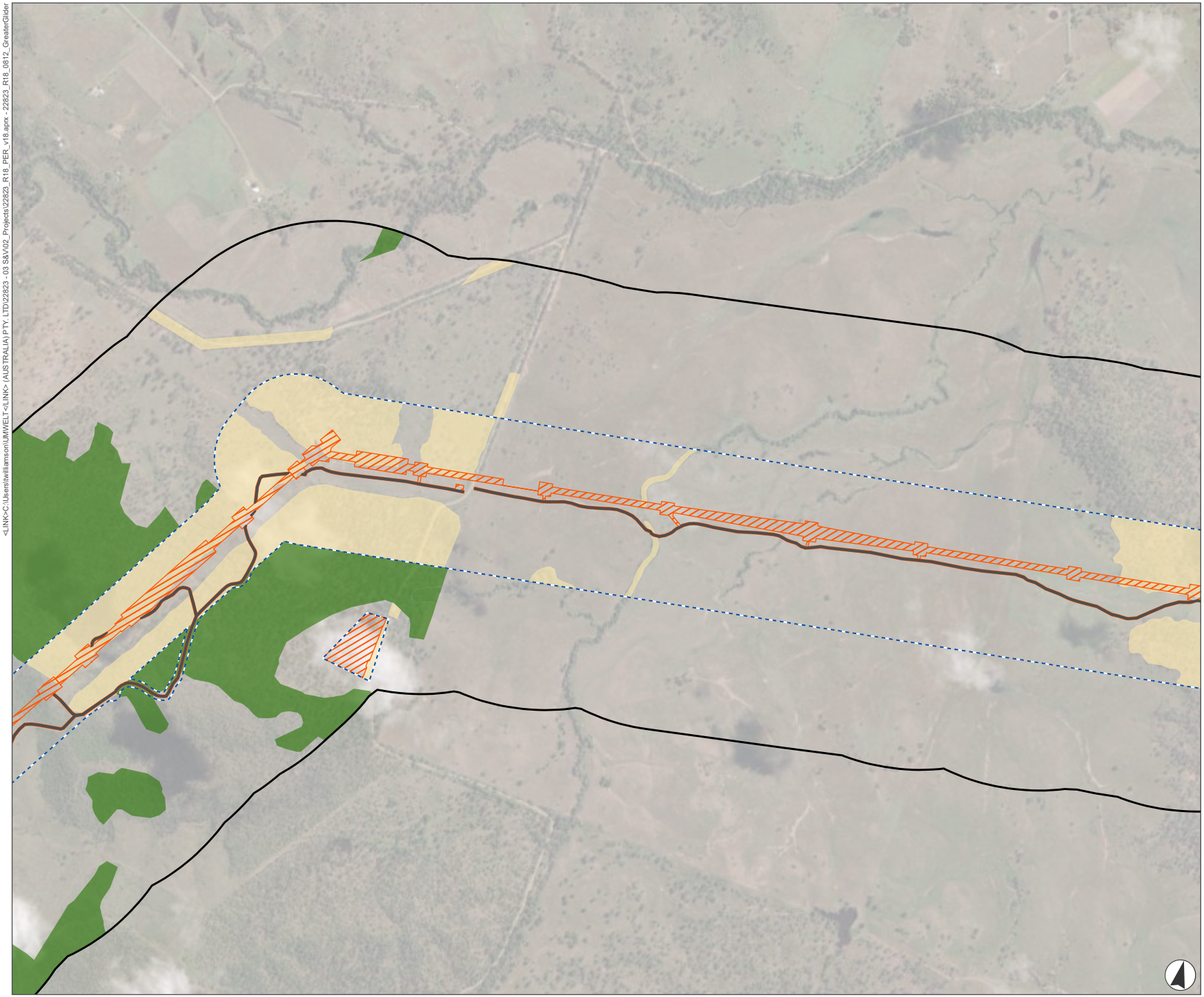


FIGURE 8.12-14

Greater Glider (Southern and Central) Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

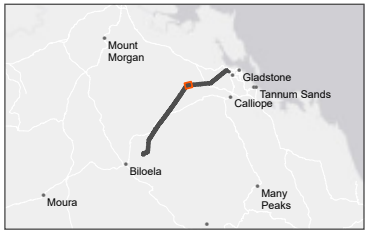
- Field Survey Extent
- Project Area

Greater Glider Habitat

- Likely or current denning
- Potential or future denning

Disturbance Footprint

- Full Clearing
- Existing Clearance



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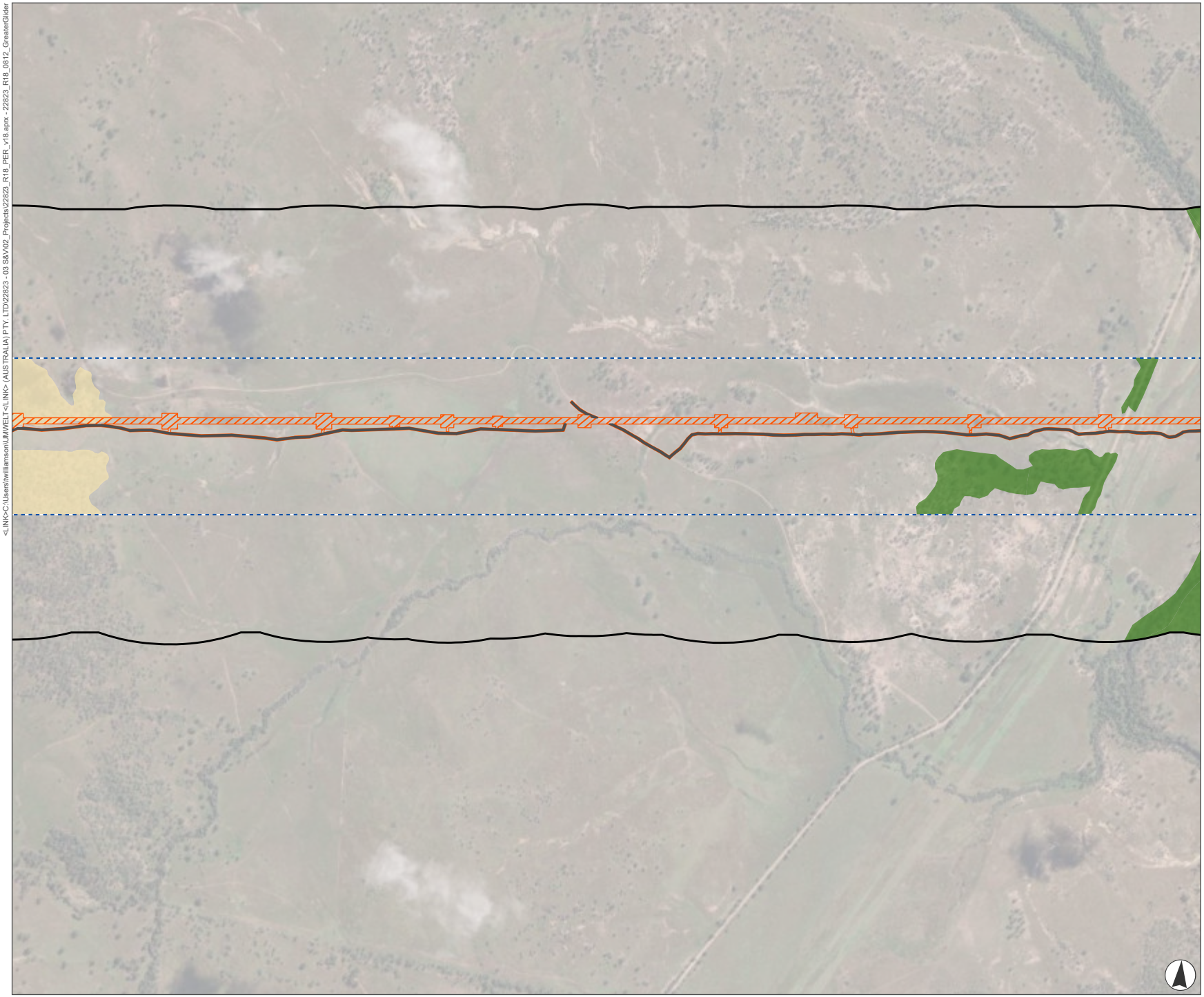


FIGURE 8.12-15

Greater Glider (Southern and Central) Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

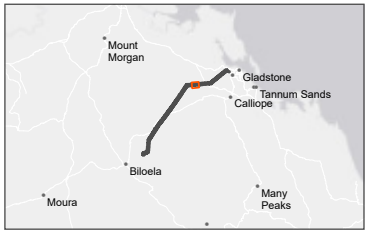
- Field Survey Extent
- Project Area

Greater Glider Habitat

- Likely or current denning
- Potential or future denning

Disturbance Footprint

- Full Clearing
- Existing Clearance



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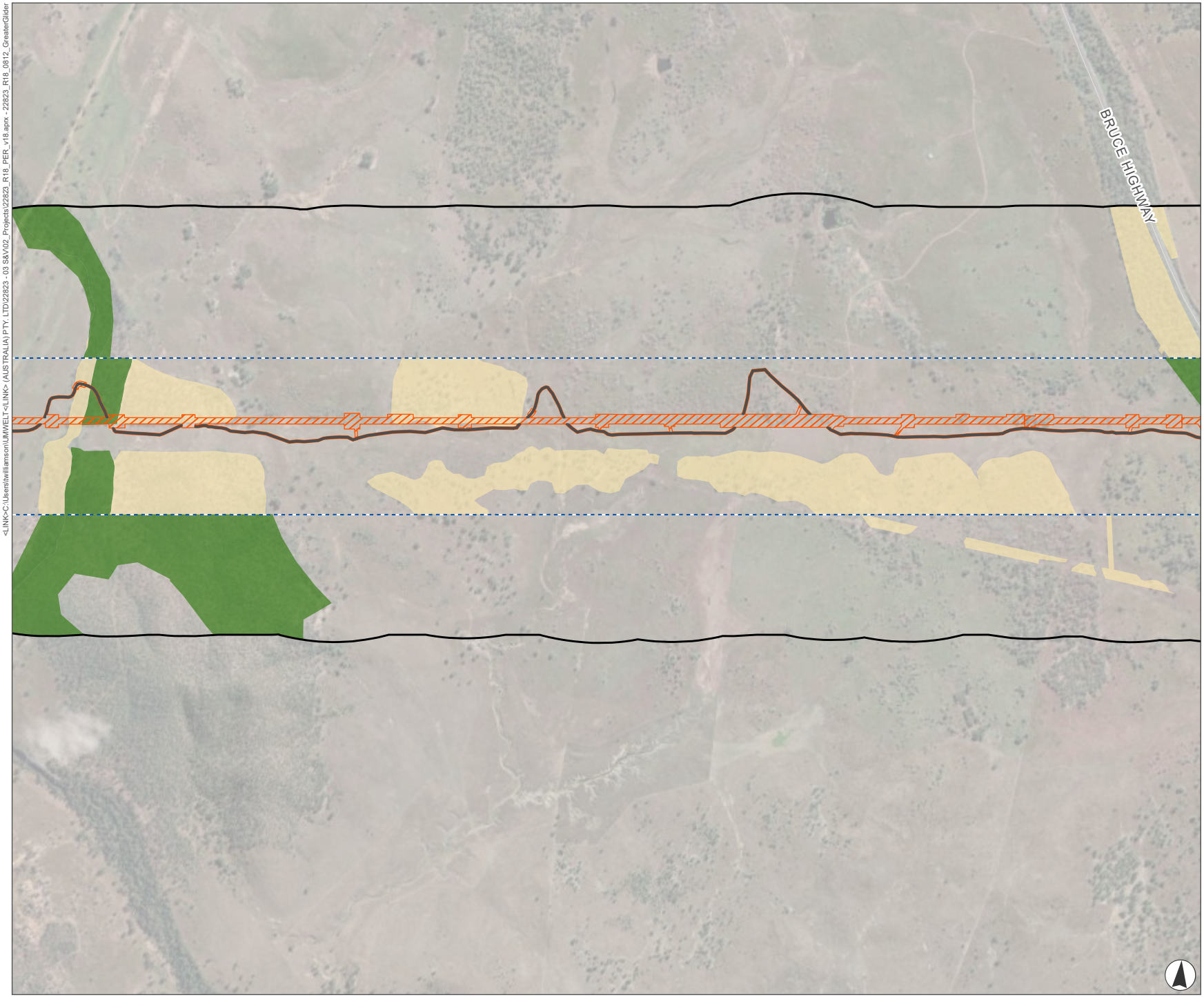


FIGURE 8.12-16

Greater Glider (Southern and Central) Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

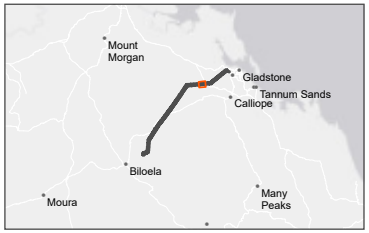
- Roads
- Field Survey Extent
- Project Area

Greater Glider Habitat

- Likely or current denning
- Potential or future denning

Disturbance Footprint

- Full Clearing
- Existing Clearance



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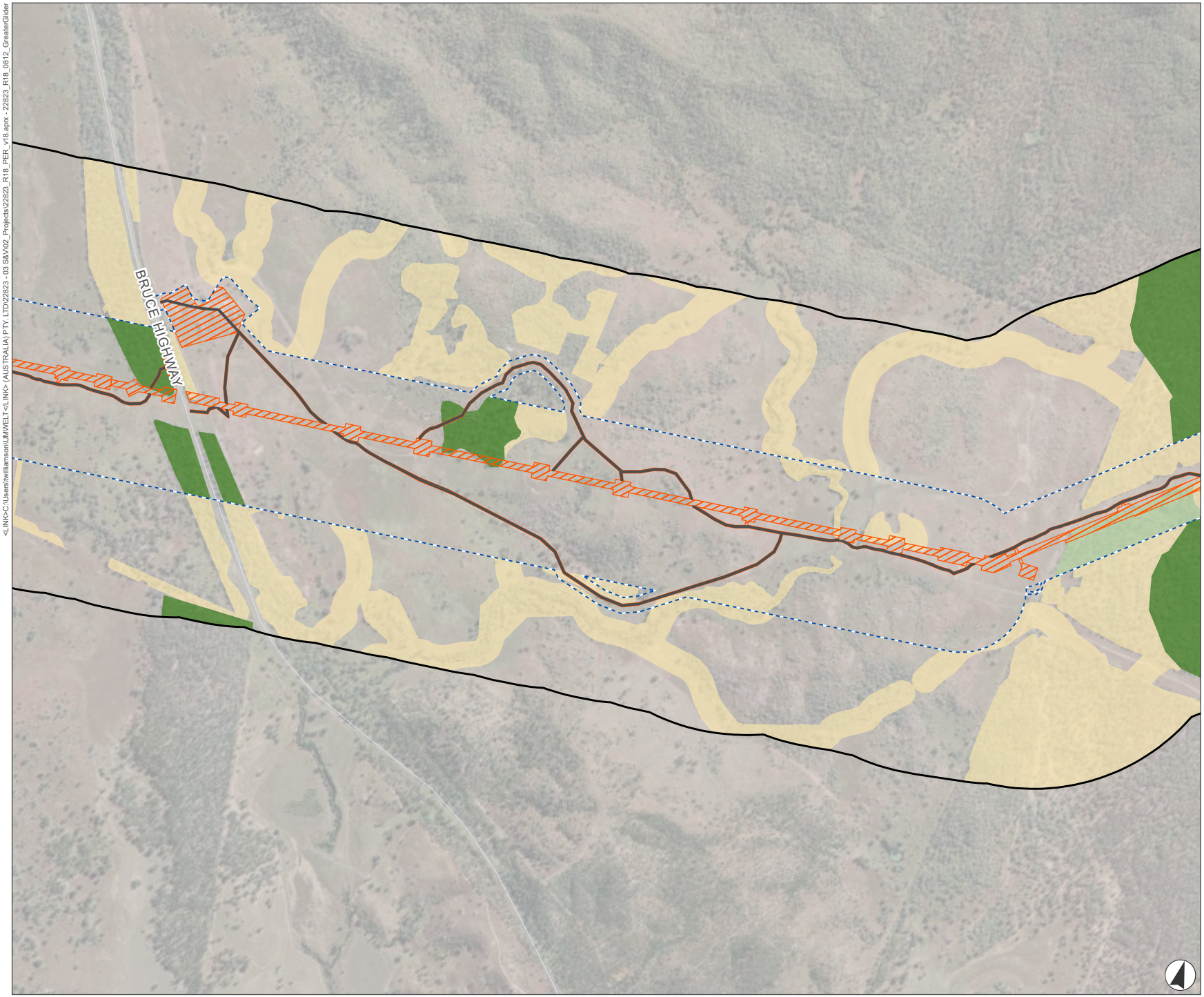


FIGURE 8.12-17

Greater Glider (Southern and Central) Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

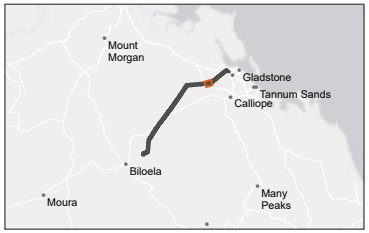
- Roads
- Field Survey Extent
- Project Area

Greater Glider Habitat

- Foraging and dispersal
- Likely or current denning
- Potential or future denning

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.12-18

Greater Glider (Southern and Central) Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

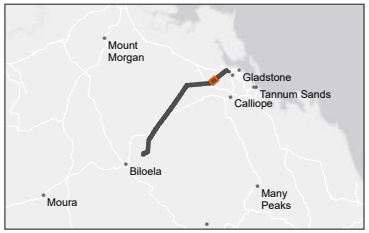
- Field Survey Extent
- Project Area

Greater Glider Habitat

- Foraging and dispersal
- Likely or current denning
- Potential or future denning

Disturbance Footprint

- Full Clearing
- Existing Clearance



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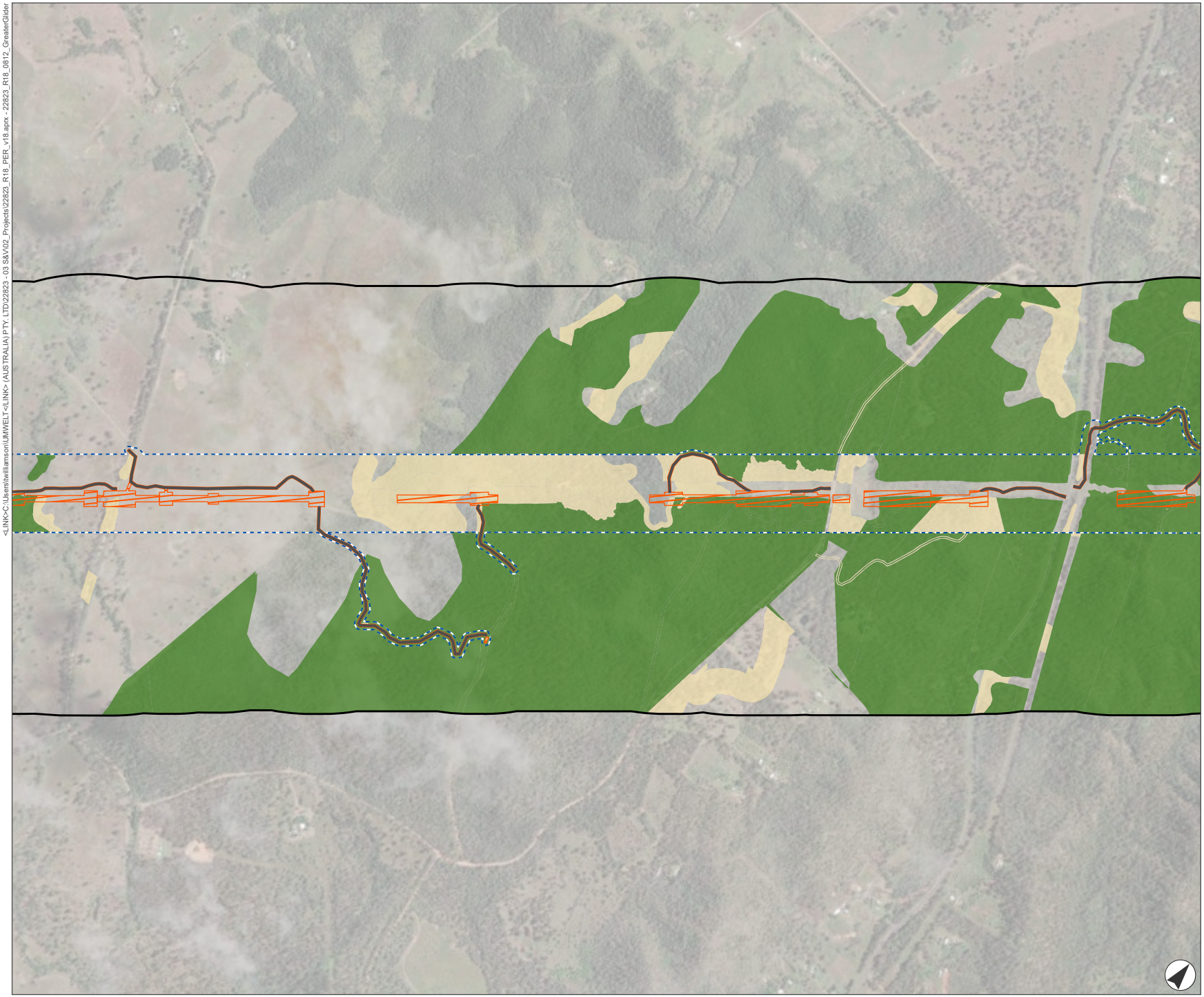


FIGURE 8.12-19

Greater Glider (Southern and Central) Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

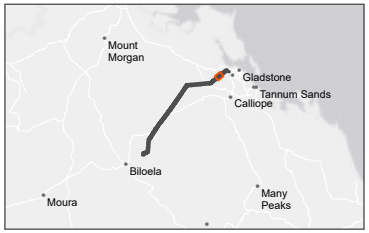
- Field Survey Extent
- Project Area

Greater Glider Habitat

- Likely or current denning
- Potential or future denning

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.12-20

Greater Glider (Southern and Central) Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

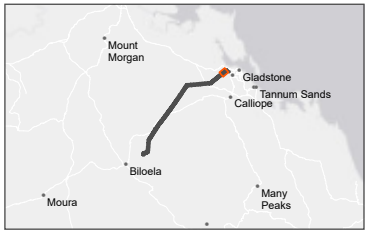
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Greater Glider Habitat

- Likely or current denning
- Potential or future denning

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.12-21

Greater Glider (Southern and Central) Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

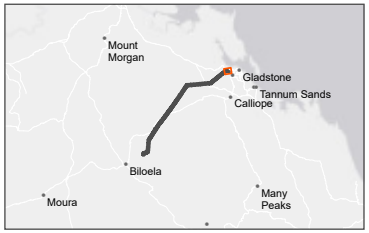
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Greater Glider Habitat

- Likely or current denning
- Potential or future denning

Disturbance Footprint

- Full Clearing
- Existing Clearance



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8.2.6.3 Koala (*Phascolarctos cinereus*)

Table 8.38 Koala: Ecology and Relevance to the Project Area

Koala	
Profile	**Conservation status** Endangered **Distribution** The range of the combined populations of Queensland, New South Wales and the Australian Capital Territory extends from approximately the latitude of Cairns to the New South Wales-Victoria border. Although the species is often more abundant in coastal areas, inland populations do occur. The species' distribution is not continuous within its range with a number of populations isolated by cleared land or unsuitable habitat (Department of Agriculture, Water and the Environment, 2022)(Department of Agriculture Water and the Environment, 2022b*)*. **Population** While not generally applicable to species listed Endangered under the EPBC Act, the *Conservation Advice for Phascolarctos cinereus (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory* (Department of Agriculture Water and the Environment, 2022a) describes important populations of koala as those that are valuable for cultural, social and economic reasons, as well as for species conservation. This document lists the following characteristics of important populations under a conservation lens: • have the potential to act as a source population to adjacent areas of suitable or potentially suitable habitat • exist in areas of climatically suitable refugia during periods of environmental stress • are genetically diverse • are disease free and/or exhibit low rates of infection with important pathogens • contain genes which may confer adaptation to current and future environmental stressors • are geographical or environmental outliers within the species range. The species is known to occur in low densities across many parts of Queensland. Whilst the Project Area contains large areas of suitable habitat, it is considered likely that only a very small number of individuals would occupy the Project Area at any one time. This is supported by the fact that only a single individual was sighted during the 3 year Project field survey program. Genetically important populations (Queensland and New South Wales populations north of the Clarence River Valley, New South Wales) occur within the Project Area and therefore any individuals identified through the field surveys are conservatively considered members of an important population. **Historical records within the desktop search extent** WildNet records were identified within the desktop search extent, with the most recent dating from 2016, 4.7 km north of Section D in Aldoga. ALA records are scattered throughout the wider region, with one historical record from 1997 occurring within 1km of Section D of the Project Area (Atlas of Living Australia, 2025). Four records from 1987 are adjacent to Section B; one record adjacent to the Dawson Highway, two

records adjacent to Coal Road and a single record adjacent to the Project Area near Batchfire coal mine. A 1992 record with a spatial uncertainty of 9 km places an occurrence within the Project Area near the junction of Section A/B (Atlas of Living Australia, 2025).

Habitat

The Koala is a specialist folivore that browses predominantly on the leaves of *Eucalyptus, Corymbia* and *Lophostemon* species and resides in forests and woodlands. Across New South Wales and Queensland alone, it is associated with over 600 species of food and shelter tree, though in a given region or site only a few species might be used (Department of Agriculture, Water and the Environment, 2022).

Within the Brigalow Belt bioregion, over 24 Eucalyptus species have been identified as 'locally important', as well as an additional 15 species (*Acacia* spp., *Corymbia* spp., *Eucalyptus* spp., and *Melaleuca* spp.) as 'ancillary habitat trees' (K. Youngentob et al., 2021). Youngentob et al. (2021) state that non-food tree species are an essential resource to koalas. Koalas use these shelter trees to thermoregulate, especially during hot days and to avoid predators. Koalas appear to prefer larger and more shady trees and use a wide range of tree species for shelter, including rainforest trees, *Callitris glaucophylla, Callitris columellaris*, *Acacia harpophylla* and *Melaleuca bracteata*.

Habitat suitability is based on the availability of the total set of biophysical habitat attributes required by the species to meet its foraging, survival (including predator avoidance), growth, movement and reproduction requirements. As described in the species' Conservation Advice (Department of Agriculture, Water and the Environment, 2022), for an individual koala these resources include access to sufficient quality food and shelter trees to meet their daily energetic requirements and reproductive needs, and a place to avoid predators. In consideration of this, koala habitat typically includes forests or woodlands, roadside and railway vegetation and paddock trees, safe intervening ground for travelling between trees and patches and access to vegetated corridors or paddock trees to facilitate movement.

Koalas are nocturnal and spend very small periods of time moving across the ground between food and shelter trees. Movement increases in the breeding season (typically September to February). Over a longer timescale, individuals' use of habitat is influenced by seasonal changes in food quality, changes in habitat caused by drought, disturbance history, the long-term results of a changing climate and competition with other species (e.g. bell miner *Manorina melanophrys**) (Department of Agriculture, Water and the Environment, 2022). As Koalas shift between locations for habitat resources over space and time, areas can constitute koala habitat even if a koala is not present at a given time (Department of Agriculture, Water and the Environment, 2022).

Habitat critical to the survival of the species

The *Conservation Advice for Phascolarctos cinereus (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory* (Department of Agriculture, Water and the Environment, 2022) defines habitat critical to the survival of the species as "the areas that the species relies on to avoid or halt decline and promote the recovery of the species". The following factors may be considered when identifying habitat that is critical to the survival of a species:

- Whether the habitat is used during periods of stress (examples: flood, drought or fire).
- Whether the habitat is used to meet essential life cycle requirements (examples: foraging, breeding, nesting, roosting, social behaviour patterns or seed dispersal processes).
- The extent to which the habitat is used by important populations.

- Whether the habitat is necessary to maintain genetic diversity and long-term evolutionary development.
- Whether the habitat is necessary for use as corridors to allow the species to move freely between sites used to meet essential life cycle requirements.
- Whether the habitat is necessary to ensure the long-term future of the species or ecological community through reintroduction or re-colonisation.
- Any other way in which habitat may be critical to the survival of a listed threatened species or a listed threatened ecological community.

The Project Area supports a matrix of suitable habitat in remnant, regrowth and non-remnant condition. Suitable habitat has been categorised based on the life-cycle functions supported, including climate refugia, breeding and foraging, shelter and dispersal (described further below).

Suitable habitat within the Project Area, including areas associated with timber reserves, State Forests and Conservation Parks, frequently comprise large, contiguous patches that extend beyond the Project Area boundary and exhibit a high degree of connectivity to the surrounding landscape. An important population is anticipated to occur within the wider region and occupy the Project Area at least periodically, albeit at low densities. It is considered reasonable to assume that the Project Area woodlands and open forests may be recolonised and support large numbers of the species in the future or already provide important movement corridors in the local area. As such, all potential breeding and foraging, climate refugia and shelter habitat is considered habitat critical to the survival of the species.

Over half of the Project Area is categorised as Koala habitat suitable for dispersal purposes only, including the existing powerline easement. These areas comprise historically cleared exotic grasslands with infrequent paddock trees, acacia or semi-evergreen vine thicket low regrowth or lantana thickets. As the species is relatively mobile and disperses by walking on the ground, most terrestrial environments can be considered suitable for dispersal, meaning such habitat is generally abundant in the landscape. In comparison to the other habitat utilisation categories, these areas offer minimal ecological value to the species due to the lack of essential resources and the increased exposure to threats. Nonetheless, these areas contribute to the overall habitat matrix and in many locations must be utilised to move as directly as possible from one area of woodland habitat to another. Successful movement within dispersal habitat (and thus survival) is best facilitated by areas that contain some form of woody vegetation which may act as a 'stepping-stone', allowing individuals to move off the ground and temporarily avoid predators and daytime temperatures. Given the range of recommended considerations relevant to the assessment of habitat critical to the survival of the species, dispersal habitat has been conservatively included as habitat critical to the survival of the species for the Project.

Current threats to the species

The main identified and potential threats to greater koala, as identified in the *Conservation Advice for Phascolarctos cinereus (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory* (Department of Agriculture Water and the Environment, 2022a) are:

- climate change driven processes and drivers, resulting in:
  - loss of climatically suitable habitat
  - increased intensity/frequency of drought, heatwaves and bushfires

Koala

- declining nutritional value of foliage.

- human related activities, resulting in:
  - clearing and degradation of koala habitat
  - mortality from vehicle strike
  - mortality from dog attack.
- disease and health, including:
  - Koala retrovirus (KoRV)
  - Chlamydia (*Chlamydia percorum*).

Recovery Plans

National Recovery Plan for the Koala *Phascolarctos cinereus* (combined populations of Queensland, New South Wales and the Australian Capital Territory) (Department of Agriculture, Water and the Environment 2022c).

In the Project Area

Surveys

Field surveys have been undertaken within the Project Area from March 2023 to July 2025, which included 422 habitat assessments and 51 person hours of spotlighting on foot and by vehicle and call playback within representative koala habitat.

Species occurrence

One record of koala was incidentally observed in July 2025 within a small *Eucalyptus melanoleuca* amongst RE 11.10.13 in Section B of the Project Area, almost directly beneath the existing powerline. This individual was observed to be healthy with no signs of disease. Additional individuals are predicted to occur within the Project Area due to the presence of potential breeding and foraging habitat present in the eucalypt woodlands within climate refugia habitat present within the vegetation fringing watercourses. This vegetation is also linked to nearby recorded occurrences of this species in Section A and Section D.

Habitat within the Project Area

Habitat type	Habitat modelling criteria	Area (Ha)	
		Project Area	Disturbance Footprint
Breeding, foraging and shelter	Breeding and foraging habitat is any forest or woodland that contains Brigalow Belt or South East Queensland (depending on the relevant bioregion/RE) 'locally important' koala trees (K. Youngentob et al., 2021) that is not climate refugia. This habitat type is represented by all REs in remnant and regrowth condition, excluding those on land zone 3 and REs 11.11.18, 11.10.8, 12.1.2	5,858.8	131.0

Koala				
		and 12.1.3. These REs are either captured in other habitat types or considered unsuitable. This habitat type is represented by all REs in remnant and regrowth condition, excluding those on land zone 3 and REs 11.11.18, 11.10.8, 12.1.2 and 12.1.3. These REs are either captured in other habitat types or considered unsuitable.		
	Climate refugia	Climate refugia comprises forests and woodlands on drainage lines or riparian zones that are resilient to drying conditions and are likely to provide a cooler refuge during periods of bushfire and heatwaves. This habitat is represented by all REs on land zone 3 in remnant and regrowth condition.	561.4	22.8
	Dispersal	Vegetation that is not already considered habitat (see above categories) that provides a safe intervening ground for the species to move across the landscape (i.e. free from impediments), particularly to and from areas of climate refugia and breeding and foraging habitat. This includes non-remnant shrublands (generally acacia-dominated) and grasslands, which occasionally support scattered small stands of regrowth trees and/or individual paddock trees. It excludes mangroves, vine thicket, farm dams and other waterbodies as well as areas that contain infrastructure or are physically inaccessible (e.g. exclusion fencing is present). As described in the earlier Habitat Critical to the Survival of the Species section, greater habitat value is provided by the areas of dispersal habitat that support woody vegetation (as opposed to areas devoid of such). Given the size of the Project Area, it was not practical to map non-remnant woody vegetation using field data. Instead, Koala dispersal habitat within the Project Area was further categorised using the Queensland *Statewide Landcover and Trees Study (SLATS) 2023–woody vegetation extent* mapping and current (2025) Project LiDAR. The SLATS 2023 dataset is the most current version of the mapping available and was published on 5 August 2025. The scale of the woody extent dataset is intended to capture features visible at a nominal map scale of 1:10,000:	7,580.1 (2,051.1 woody – SLATS 2023)	267.9 (27.1 woody– Project LiDAR)

Koala	
	stands of woody vegetation greater than 0.5 ha with a canopy density greater than 10% crown cover will be classified as woody. A minimum width of 20 m applies to linear features. Project LiDAR focuses on the Disturbance Footprint and was also utilised to examine woody vegetation in dispersal habitat to provide accuracy to 1 m. A 4 m height threshold was applied to individual trees or stands of vegetation which provide for the safe movement between other areas of suitable habitat and are likely to offer temporary refuge from daytime heat and predators. Juvenile trees less than 4 m are typically unable to physically support an individual koala. Similarly, shrubs less than 4 m were also deemed to be unsuitable as being considered as woody vegetation suitable for koala dispersal. This threshold aligns with the Qld Offset policy definition of a non-juvenile koala habitat tree (Department of the Environment, Tourism, Science and Innovation & Department of Environment and Science, 2025). Based on the current Project LiDAR, approximately 10.4% of the mapped koala dispersal habitat within the Disturbance Footprint comprises suitable woody vegetation (26.9 ha).

Table 8.39 Assessment of Potential Project Impacts and Mitigation and Management Commitments for Koala

Potential Impact	Assessment	Mitigation Commitments
Direct		
Vegetation clearing causing habitat loss and fragmentation	Vegetation clearing required for construction will result in direct impacts to 421.7 ha of suitable habitat for koala including 131 ha of breeding foraging and shelter, 22.8 ha of climate refugia and 267.9 ha of dispersal habitat (of which 27.1 ha comprises suitable woody vegetation). Although habitat fragmentation is a known threat to the species, it	• Identify MNES fauna habitat and individuals through pre-clearance surveys • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Disturbance activities must be contained to Disturbance Footprint subject to minor micro-siting within the Field Survey Extent • Habitat features to be relocated to adjacent areas • During the pre-clearance survey, the fauna spotter-catcher will locate, record and mark the habitat features (including those to be retained in situ) • Install tree protection to habitat trees immediately adjacent to areas of earthworks • Refer to Table 5.1 and Table 5.8 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
	is not anticipated that impacts from the Project would result in isolation of koala populations due to habitat fragmentation. The species is highly mobile and known to readily disperse large distances including across cleared areas. Connectivity within and to adjacent protected areas will be largely maintained and the extent of clearing would not result in a functional barrier to dispersal.	
Injury or direct mortality	Injury or mortality from vehicle strike is a threat to this species and is a possibility given the activity and movement of machinery associated with construction. However, the species is readily detectable and there is a suite of mitigation measures which are known to be effective at limiting this impact.	• Appropriately qualified fauna spotter catcher to undertake pre-clearance habitat assessment and be present during clearing and disturbance to habitat features • Clearing must be staged, with non-habitat trees felled first • Tampering with an animal breeding place to be carried out in accordance with an approved Species Management Program • Clear delineation of habitat features to be retained • Habitat trees must be soft-felled • Restrict vehicles to approved access tracks • Vehicle travelling speed restricted to <40 km/hr • Excavations must be secured (e.g. covered) • Clearing must be carried out in line with the *Nature Conservation (Koala) Conservation Plan 2017* • All confirmed koala sightings will be reported to QWildlife • Where a koala is suspected of Chlamydia infection, it will be taken to veterinarian/wildlife care facility • Signage in high-risk areas (e.g. riparian corridors) • Refer to Table 5.3 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Indirect		
Alterations to fire regimes including uncontrolled fires	Changes to fire frequency within the Project Area may impact on habitat and lead to degradation. Construction activities are unlikely to significantly alter existing grazing pressure or the implementation of land management practices currently employed by a landholder. Although the increased plant and vehicle presence will result in an increased number of potential ignition sources, employment of standard construction protocols will ensure the risk of bushfire is actively managed. Exotic grasses can create a dense, continuous fuel layer in the understorey which can increase the likelihood of fire ignition and promote more frequent and intense fires, changing the structure of koala habitat.	• Bushfire Management Plan will be developed • Burning of vegetation strictly prohibited unless a permit is obtained • Designated parking areas for vehicles and machinery • During operation, vegetation within the Disturbance Footprint will be managed in accordance with Powerlink's vegetation specification • Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • Refer to Table 5.5 and Table 5.9 of the MNES Management Plan for further details on mitigation measures.
Noise activity generated during construction and operation interrupting foraging, breeding or dispersal behaviours	Construction activities will mostly occur during daylight hours (6.00 am to 6.00 pm), which is outside of koala daily peak activity periods. As clearing will be staged, noise will be limited to discrete locations at the clearing front. Construction	• Plant and equipment to be fitted with appropriate noise attenuation and maintained • Deliveries and removal of material and equipment to and from site within approved hours for construction • Plant to be turned off when not in use • No unnecessary use of horns or other audible signals on mobile plant or equipment • Machinery and equipment will be maintained in good working condition

Potential Impact	Assessment	Mitigation Commitments
	noise will primarily occur around infrastructure (not intact habitat). Noise in relation to operation is negligible.	• Refer to Table 5.10 of the MNES Management Plan for further details on mitigation measures.
Dust generated during construction activities disturbing behaviours or health/palatability of foraging resources	Dust emissions may result following construction activities and affect adjacent habitat. Dust can settle on adjacent vegetation, coating leaves and reducing photosynthesis, respiration, and growth.	• Dust suppression measures including vehicles restricted to approved tracks, cover all loose loads and set speed limits (<40 km/hr) • Application of dust suppressants as required • Dust generating activities will be limited on days with strong winds blowing towards sensitive receptors or dust sensitive locations • Regular monitoring and visual surveillance to trigger management actions will be undertaken • Refer to Table 5.4 of the MNES Management Plan for further details on mitigation measures.
Loss of movement opportunities, barriers created within suitable habitat	The construction and operation of the Project is unlikely to introduce barriers to movement; with additional fencing or physical barriers not required. A temporary barrier to movement may be created due to the noise of construction; however, this will only be associated with the active portion of the Project. Proliferation of exotic shrubs may slow the movement of this species when moving across the ground. The koala is capable of crossing open spaces greater than 100m and as a consequence is capable of traversing the additional gap created with the co-location of	• Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • Refer to Table 5.5 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
	the Project with the existing transmission line. Therefore, the open space is not a functional barrier to movement.	
Increased susceptibility to predation by dogs, feral cats and/or red fox.	Predators were observed during field surveys and are present across the wider region. An increase in width of open space provides a greater opportunity for predators if a koala is traversing across the ground.	• All waste to be secured • Biosecurity Instrument Permit to be obtained for moving materials out of or within different biosecurity zones • Educate workforce in the identification of pest fauna species • Avoid inclusion of any water retaining voids or pits • Refer to Table 5.6 of the MNES Management Plan for further details on mitigation measures.

Table 8.40 Significant Impact Assessment: Koala

Impact Criteria	Assessment
Lead to a long-term decrease in the size of a population	**Unlikely** Whilst the Project Area contains suitable habitat, the species is present in very low densities with a single individual sighted during the field surveys. A maximum of 421.7 ha of mapped koala habitat will be directly impacted by the Project, including 131.0 ha of breeding foraging and shelter, 22.8 ha of climate refugia and 267.9 ha of dispersal habitat (i.e. historically cleared areas supporting non-remnant vegetation). Habitat within the Disturbance Footprint is degraded due to edge effects and fragmentation resulting from historical clearing for agriculture, roads and transmission infrastructure. This degradation has been compounded by the incursion of weed species, pest fauna, and cattle, which have significantly impacted the ground layer and reduced habitat quality. However, the broader Project Area contains extensive patches of suitable koala habitat, including areas of remnant and regrowth eucalypt woodland and open forest dominated by locally important tree species located to the north and south, particularly within adjacent state forests. These areas are likely to provide the necessary resources to support essential life cycle requirements (including but not limited to breeding and foraging) and maintain genetic diversity for koala populations in the region. Suitable habitat is also associated with non-remnant vegetation, which serves a dispersal function particularly where woody vegetation is present. Dispersal habitat within the Project Area is particularly disturbed and, in many locations, has common exotic, *Lantana camara** and/or only rare, regrowth locally important koala trees. Habitat to be impacted is not considered unique or critical in the landscape, in the context of the habitat that will be retained.

Impact Criteria	Assessment
	Importantly, areas of climate refugia occur and generally form intact corridors within and beyond the Project Area, enhancing the overall ecological resilience of the local area and supporting long-term movement and survival of koalas under changing environmental conditions. The Project has sought to maintain this existing habitat connectivity to the greatest extent possible by co-locating with the existing transmission infrastructure and maximising the use of historically cleared areas. Given the linear nature of the Project and the considered design (which leverages the terrain to maximise span lengths and minimise full vegetation clearing), intact habitat patches and functional corridors will be maintained following construction of the Project, ensuring koala movement and population viability are not compromised. Further, the Project will not create a barrier to movement that permanently alters the function of any habitat within the Project Area. This is supported by the fact that the single Koala sighting recorded during the field program was underneath the existing powerline. Indirect impacts on the species as a result of the Project are expected to be limited. Noise associated with construction will be limited to discrete locations at the clearing front and associated with assembly. Construction noise will primarily occur around infrastructure (not intact habitat). Noise impacts will be managed in accordance with Table 5.10 of the MNES Management Plan. Predators to the koala were observed during field surveys and will be actively managed through measures outlined within Table 5.6 of the MNES Management Plan. Responsible waste disposal and workforce education of pest fauna species present within the Project Area will occur as outlined within Table 5.3 and 5.4 of the MNES Management Plan. Due to an increase in activity onsite during the construction period especially, the risk of vehicle strikes will be increased. The MNES Management Plan will be implemented and includes koala specific mitigation measures such as speed limits and signage at high-risk areas. Given the infrequent use of the Project Area by this species as well as the implementation of measures outlined in the MNES Management Plan, a long-term decrease in the size of a population is unlikely to result from the Project.
Reduce the area of occupancy of the species	**Unlikely** As stated in the species' Conservation Advice, the area of occupancy for the koala is estimated at 19,428 km^2 and is contracting. It is noted that the area of occupancy may be potentially overstated given the low resolution in the mapping methodology used by the Commonwealth (2 km x 2 km grid). The koala is also widespread across Queensland, and the Project Area is not located near the limit of the species distribution. Although the Project will result in the removal of up to 421.7 ha of suitable habitat, 267.9 ha of this total area comprises habitat suitable for dispersal which will be largely unchanged post transmission line construction. Direct impacts to climate refugia, foraging and breeding and shelter habitat will occur, however no significant patch isolation will result ensuring that habitat functionality is maintained. The Project is linear in nature, and the species will still be able to utilise the remaining vegetation for its lifecycle requirements. As a consequence, habitat loss within the Project Area is not expected to diminish the local population's ability to persist. Furthermore, habitat of similar and better quality is widely available in the local area and connectivity to these areas will be maintained. Based on this, Project works are considered unlikely to materially reduce the availability or quality of habitat for the species to the extent that the area of occupancy of a population would be reduced.

Impact Criteria	Assessment
Fragment an existing population into two or more populations	**Unlikely** Habitat within the Disturbance Footprint has been degraded due to historical agricultural clearing and the presence of existing transmission infrastructure. This degradation has been exacerbated by the incursion of weed species, pest fauna, and cattle, which have significantly impacted the ground layer and reduced habitat quality. However, the broader Project Area contains extensive and ecologically valuable features, including climate refugia, functional dispersal corridors, and large patches of suitable koala habitat. Mapping indicates broad expanses of habitat in the surrounding landscape, such as the Calliope Range, Mount Stowe State Forest, and Calliope Conservation Park, which are likely to support essential life cycle requirements and maintain genetic diversity for koala populations in the region. The koala is a highly mobile species known to disperse across large distances, including through cleared or modified landscapes. Once constructed, the Project will not create a physical barrier to movement, as ground surfaces will remain intact and transmission towers will be placed in discrete locations. The Project will be co-located with an existing transmission line, resulting in a combined vegetation break of less than 100 m (excluding Section C which will be greater than 100 m). Given the linear nature of the infrastructure and the species' demonstrated ability to traverse open and non-remnant areas, vegetation clearance associated with the Project is unlikely to present significant barriers to local movement or fragment any koala population within the Project Area.
Adversely affect habitat critical to the survival of a species	**Likely** As described in the earlier section above, all suitable koala habitat within the Project Area is conservatively considered to comprise habitat critical to the survival of the species. A total of 153.8 ha of critical woodland and open forest habitat (climate refugia, breeding, foraging and shelter) will be directly impacted as a result of the Project. While large areas of similar woodland and open forest habitat will remain within the Project Area following the construction of the Project, the *Referral guidance for the endangered koala* (Department of Climate Change, Energy, the Environment and Water, 2022a) notes that 'even small areas of habitat loss (as little as 1 ha) can have a significant impact'. It is acknowledged that with this habitat loss, a local reduction in the presence of key resources including locally important koala trees and shelter trees will occur, which may at least in the short-term impact any individuals in the immediate area. Although for this assessment habitat critical to the survival of the species includes dispersal habitat, impacts to such habitat as a result of the Project are not considered adverse. Of the 267.9 ha of dispersal habitat within the Disturbance Footprint, 27.1 ha comprises woody vegetation as per the current Project LiDAR dataset. As discussed, woody vegetation in these areas generally comprises acacia shrublands and grassland areas with regrowth paddock trees. These may provide 'stepping-stone' movement opportunities including temporary refuge from predators and daytime temperatures. Only 27.1 ha of woody dispersal vegetation is anticipated to require permanent clearing, comprising 10.1% of the total dispersal habitat within the Disturbance Footprint. This overall loss of woody vegetation is considered highly unlikely to reduce the functionality of the dispersal habitat, with the vast majority of 'stepping stone' opportunities maintained proving linkages to suitable habitat adjacent to the Project. The

Impact Criteria	Assessment
	functionality of the dispersal habitat is not considered to be adversely impacted by the presence of the Project, as no permanent barriers will be created ensuring koalas will continue to be able to move freely beneath the transmission lines.
Disrupt the breeding cycle of a population	**Potential** During field surveys in 2025, a koala was observed adjacent to the Disturbance Footprint, inferring that the local population is utilising the Project Area, which may include for reproductive purposes. There are several processes throughout construction which could influence breeding behaviours–change of dispersal patterns for koalas searching for mates; construction noise masking breeding cues; and unsuccessful breeding due to poor body condition or stress induced disease (e.g. *Chlamydia*). Movement increases in the breeding season, particularly for mature males who may disperse large distances in search of a mate. Where the construction phase overlaps with the breeding season, this may result in increased encounters with vehicles and plant, increasing the risk of mortality or injury. This risk is also elevated during post-weaning dispersal which occurs at a young age. Construction noise and activity may result in avoidance of some areas, resulting in a temporary barrier to movement and limiting a male koala's ability to seek a female mate. It should be noted however, that construction will mostly be limited to daylight hours when koalas are most inactive and clearing would be staged during the construction phase. Once operational, the Project is unlikely to result in barriers to dispersal. In relation to disease, habitat clearance is associated with increased levels of physiological stress in wild koala populations (Department of Agriculture Water and the Environment, 2022c). In turn, prevalence of disease (chlamydiosis) has been found to increase following extreme stress from habitat loss (Department of Agriculture Water and the Environment, 2022c). *Chlamydia* can cause infertility amongst other ailments, which can be a contributor to population decline and breeding success. In less extreme circumstances, the onset of *Chlamydia* symptoms may result in poor body condition leading to unsuccessful breeding (Department of Agriculture Water and the Environment, 2022c). If the prevalence of chlamydiosis was to increase as a result of stress related to vegetation clearing, this may result in failed breeding for some individuals for one or more seasons. As habitat within the Project Area supports the species breeding requirements and given the potential impacts related to masking of mating cues, temporary barriers to movement and onset of disease/symptoms, it is possible that the Project would disrupt the breeding cycle of a population.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely** This species has very broad habitat requirements and can inhabit vegetation in varying condition, including non-remnant areas. Potential habitat that may be used preferentially for climate refuge and movement across the landscape (eucalypt woodland on alluvial soils) has been largely avoided through design, however a maximum of 421.7 ha would be impacted. Although a maximum 421.7 ha of potential habitat will be removed via vegetation clearing for construction, large, connected areas of potential habitat will remain. Retained habitat is highly likely to be of sufficient size and quality to support any individuals present.

Impact Criteria	Assessment
	Potential indirect impacts on the species as a result of the Project are expected to be limited but will be actively managed via the MNES Management Plan. Specific measures for the koala will be implemented including pre-clearance survey requirements. Based on the above, the Project is unlikely to modify, destroy, remove or isolate or decrease the availability of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to an Endangered species becoming established in the Endangered species' habitat	**Unlikely** The invasive species which poses the greatest threat to koala is the dog, both domestic and wild. Wild canines have been observed in the Project Area and likely the surrounding region. Koalas are most at risk of canine encounter when making movements along the ground between trees or habitat patches, particularly in cleared areas where refuge is limited. Existing cleared areas include tracks, roads, fence lines and grazing areas all of which may also provide conduits for dog movement. The widening of existing access tracks and co-locating of infrastructure within the Project Area exacerbates current risks to dispersing koalas. Koalas moving across these areas would be susceptible to dog attack, with increased distances between refuge trees. Koalas are likely most susceptible during the breeding season and natal dispersal when dispersal movements are typically longest. Appropriate biosecurity and weed washdown procedures will employed to mitigate the introduction of weed species, as outlined in Table 5.5 of the MNES Management Plan.
Introduce disease that may cause the species to decline	**Unlikely** *Chlamydia* and Koala Retrovirus (KoRV) are known threats to the species. *Chlamydia* and KoRV are found in most koalas and many live with the infections and never show outward signs of illness or suffer measurable reproductive consequences (K. N. Youngentob et al., 2021). These common pathogens can progress to clinical disease when influenced by factors that cause chronic stress, including habitat loss. Chronic stress to koalas is also thought to increase their susceptibility to contracting disease as their immune systems can be negatively impacted. Where chronic stress is widespread in a population, for example in marginal habitat or urban areas, it is possible that loss of fertility due to disease and reduced recruitment due to habitat fragmentation could cause populations to decline (Department of Agriculture Water and the Environment, 2022d). Extensive tracts of suitable koala habitat would remain adjacent to the Disturbance Footprint, with opportunities for koalas to seek refuge from disturbance during construction. Should an unwell koala be identified during clearing works, it will be handled appropriately by a qualified spotter catcher and taken to a predesignated veterinarian/wildlife care facility for treatment prior to release. Appropriate biosecurity and weed washdown procedures will be adhered to, to mitigate the introduction or proliferation of pest and weed species as outlined within Table 5.5 and 5.6 of the MNES Management Plan. Further, Project works are unlikely to lead to new pathways to disease dispersal into the Study Area for any individuals which may carry the disease. Based on the above, it is considered unlikely that Project activities are of the magnitude that would result in a population level decline from introduction or exacerbation of disease.

Impact Criteria	Assessment
Interfere with the recovery of the species	**Potential** A National Recovery Plan for the Koala was published in 2022. Four main objectives are detailed: • Stabilise and then increase the area of occupancy and size of populations that are declining. • Maintain or increase the area of occupancy and size of populations that are stable. • Metapopulation processes are maintained or improved. • Partners, communities and individuals have a greater role and capability in koala monitoring, conservation and management. There is limited available data about the current koala population viability and trends within the Gladstone - Biloela region. However, the species is known to inhabit a wide array of Eucalypt dominated vegetation communities across the Project Area and wider region. The population within the Study Area may contribute to metapopulation processes by maintaining genetic diversity, acting as a source population and existing in an area of climatically suitable refugia. Potential Project impacts which may interfere with these objectives include habitat loss, increased risk of vehicle strike or wild dog attack, degrading habitat through changes in hydrology and facilitating the introduction or spread of weeds, disease or pathogens. As described above, the majority of these impacts can be managed through mitigation measures outlined in the MNES Management Plan. However, the quantum of loss of habitat critical to the survival of the species may reduce the carrying capacity of the Project Area. Although metapopulation processes are likely to be maintained given that significant habitat will remain and connectivity within the local population and notional metapopulation should not be significantly disrupted, the size of the population may be reduced at some scale. To aid in regional koala monitoring, if a positive confirmation of koala is observed on the Project, the sighting will be submitted to QWildlife to contribute to the understanding of koala in the region. Photo evidence of the sighting will be included with the submission, where possible.
Significant Residual Impact	**Likely to have a significant impact**

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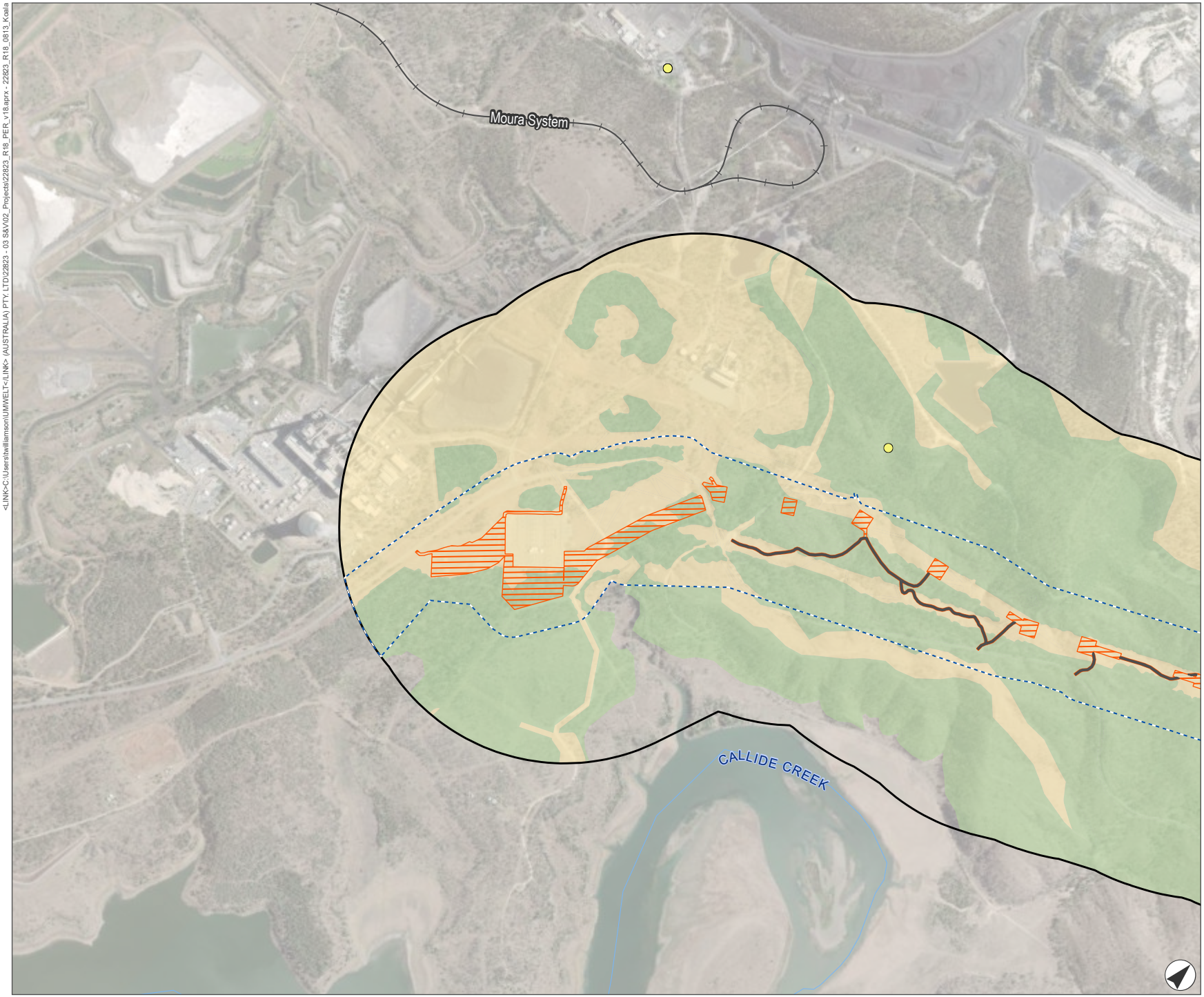


FIGURE 8.13-1

Koala Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

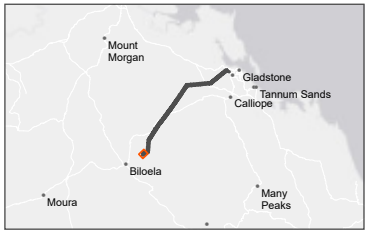
- Railway
- Watercourse
- Field Survey Extent
- Project Area
- Koala Records (ALA)

Koala Habitat

- Breeding, foraging and shelter
- Dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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FIGURE 8.13-2

Koala Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

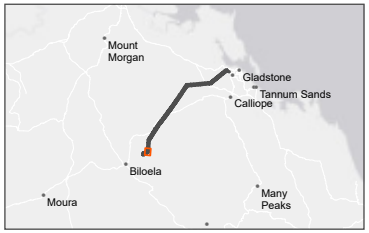
- Watercourse
- Field Survey Extent
- Project Area
- Koala Records (ALA)

Koala Habitat

- Breeding, foraging and shelter
- Climate refugia
- Dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
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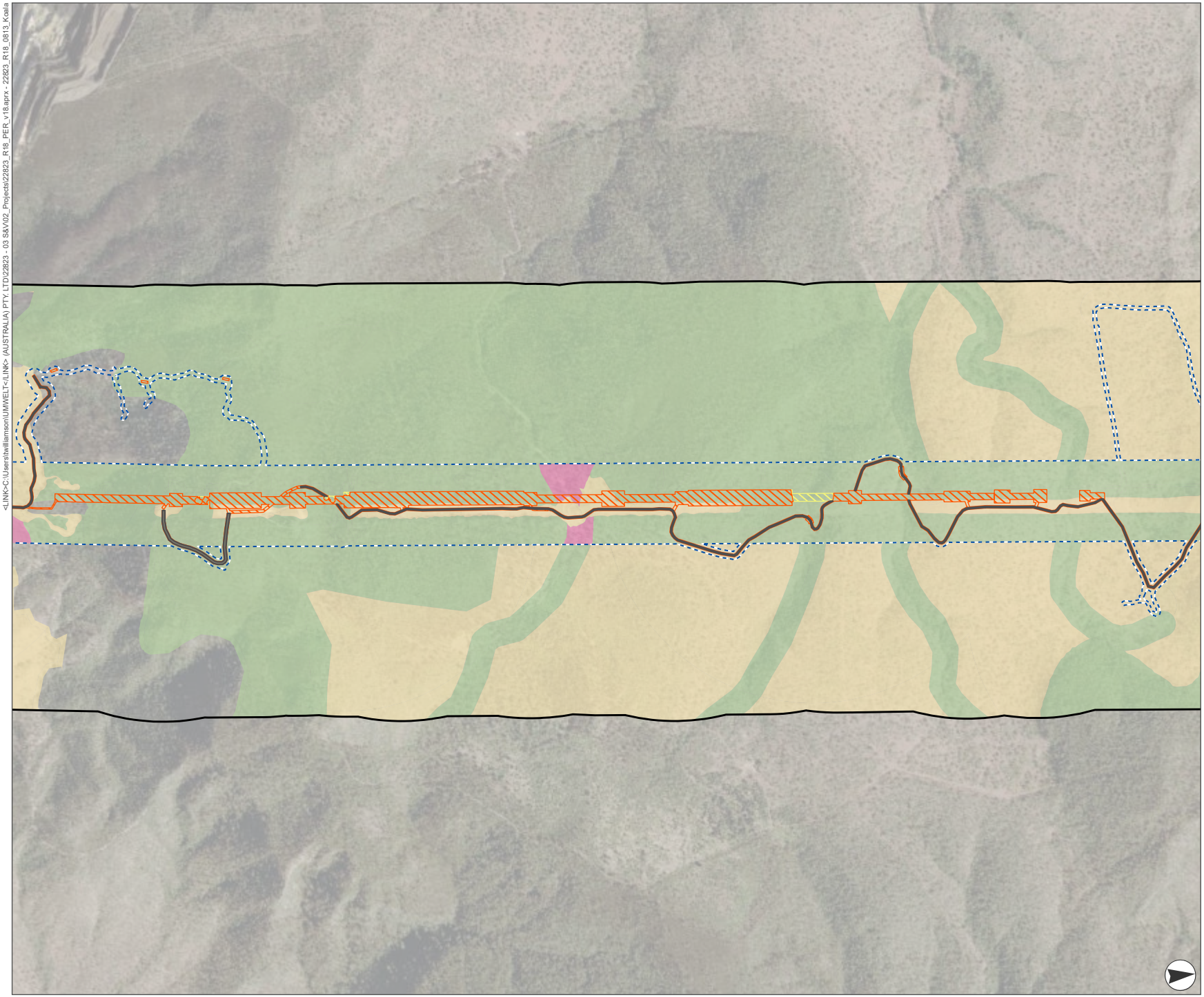


FIGURE 8.13-3

Koala Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

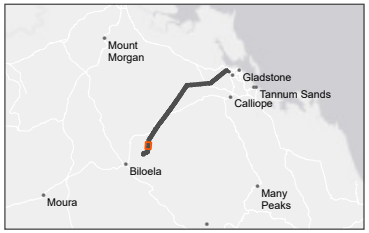
- Field Survey Extent
- Project Area

Koala Habitat

- Breeding, foraging and shelter
- Climate refugia
- Dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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FIGURE 8.13-4

Koala Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

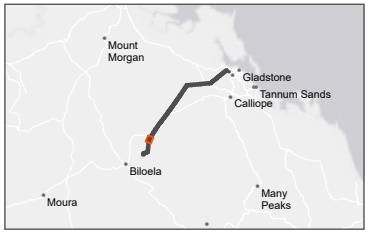
- Field Survey Extent
- Project Area
- Koala Records (Umwelt)

Koala Habitat

- Breeding, foraging and shelter
- Dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
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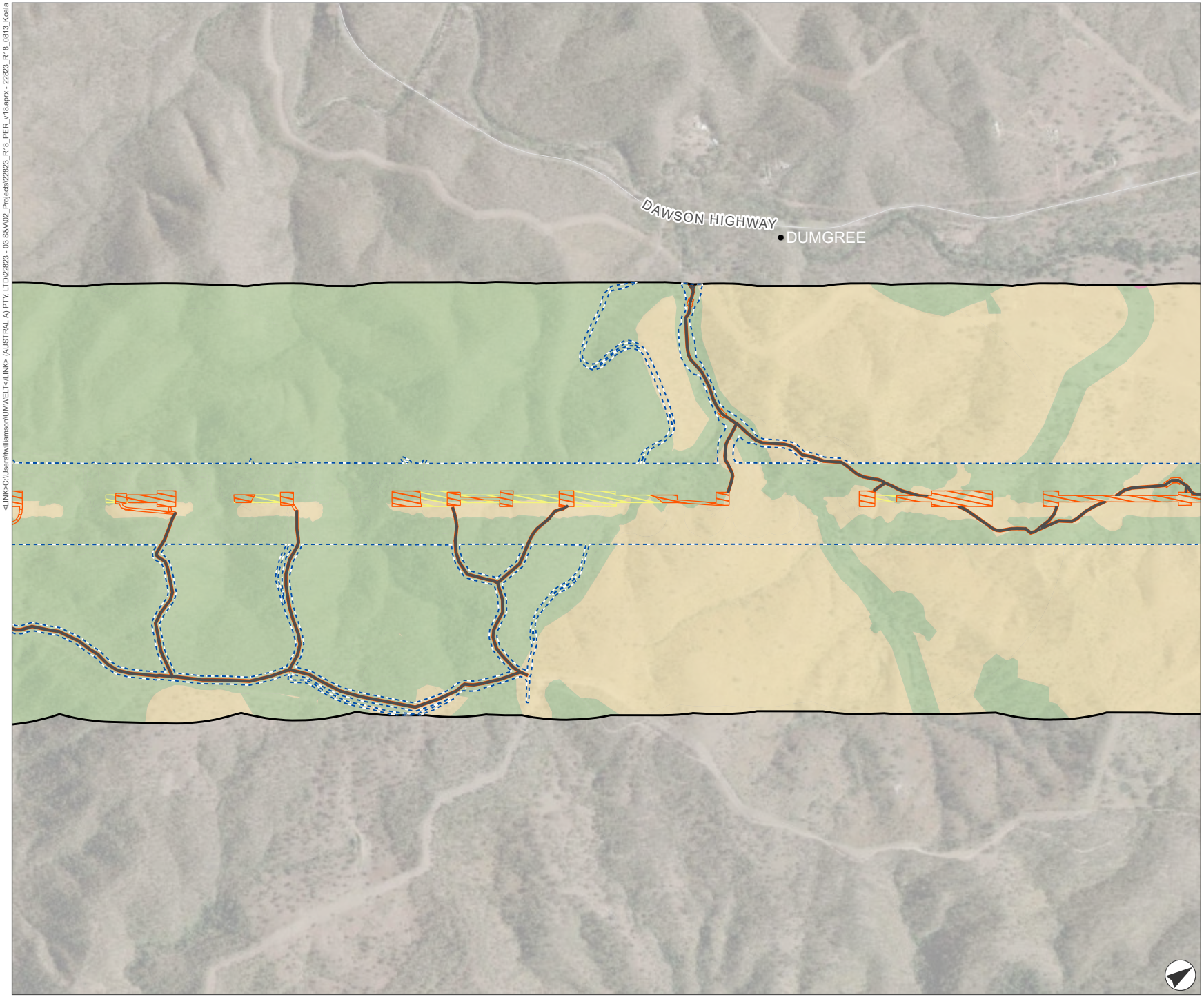


FIGURE 8.13-5

Koala Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

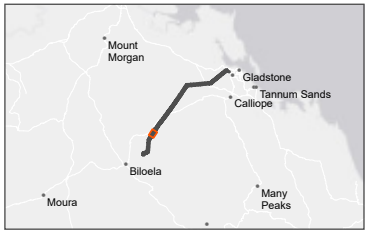
- Roads
- Field Survey Extent
- Project Area

Koala Habitat

- Breeding, foraging and shelter
- Climate refugia
- Dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

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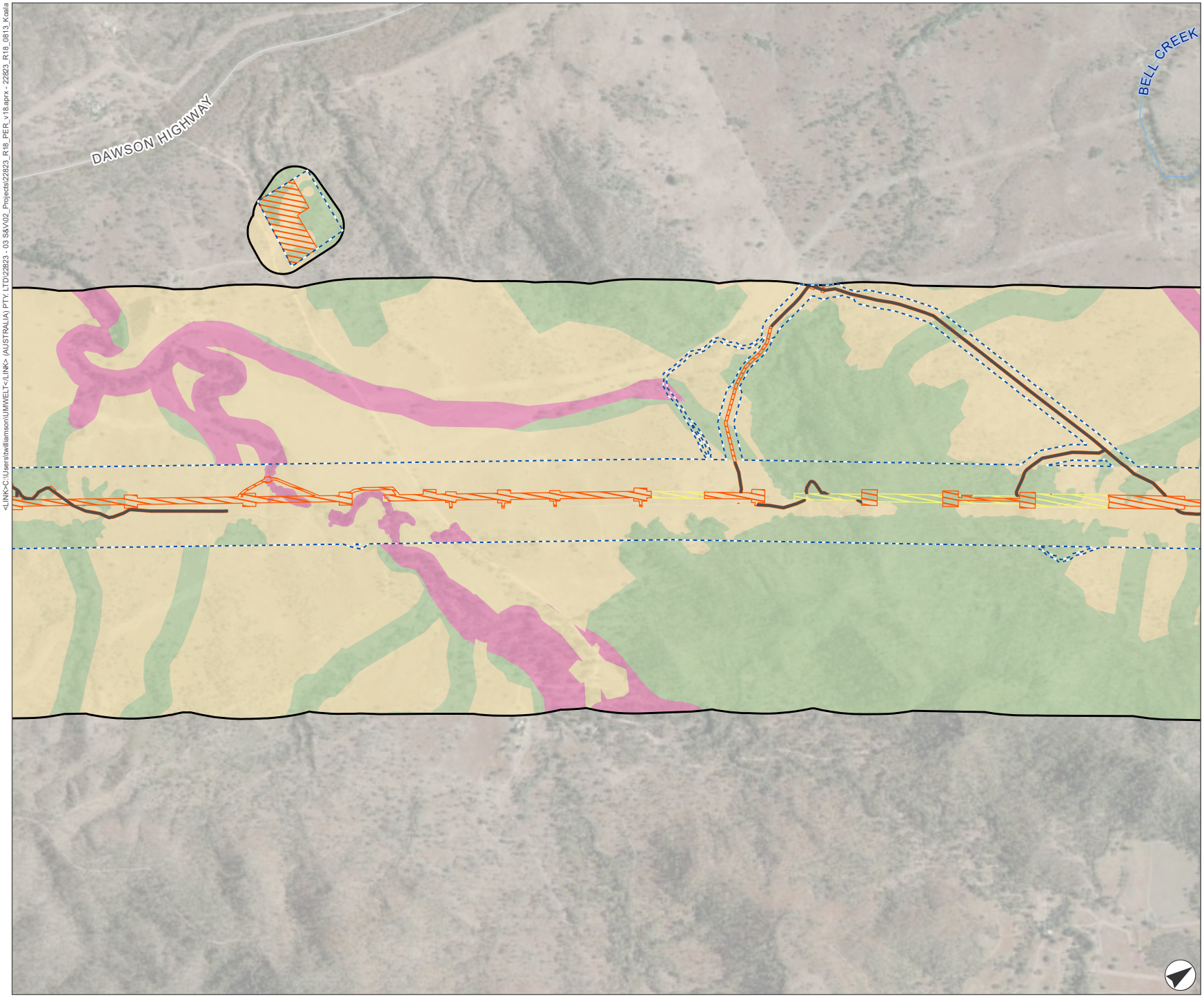


FIGURE 8.13-6

Koala Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

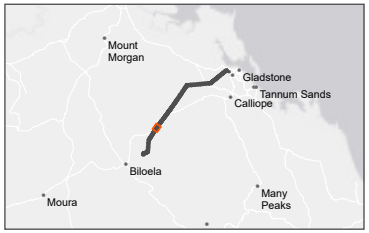
- Roads
- Watercourse
- Field Survey Extent
- Project Area

Koala Habitat

- Breeding, foraging and shelter
- Climate refugia
- Dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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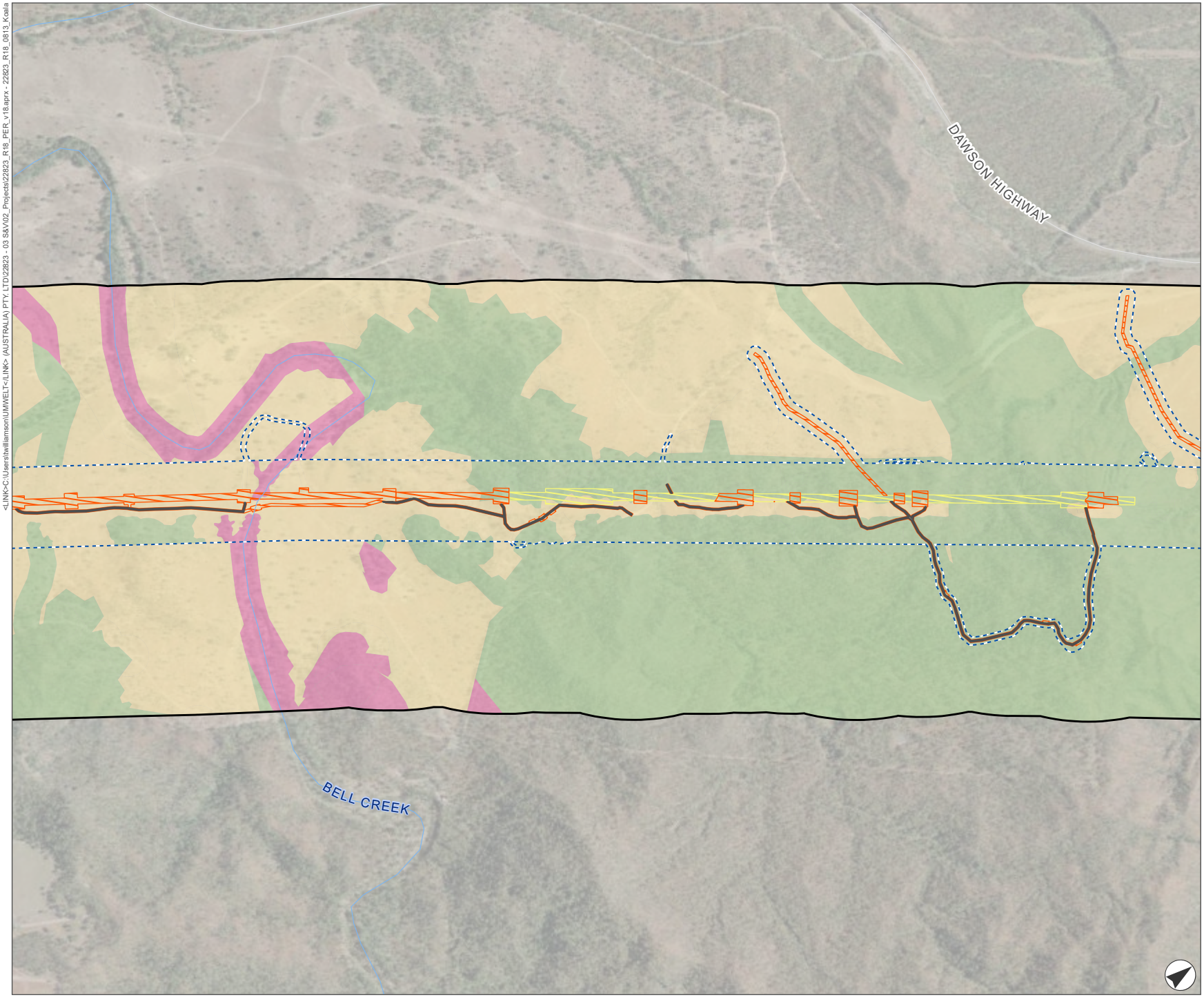


FIGURE 8.13-7

Koala Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

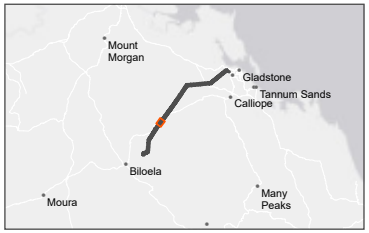
- Roads
- Watercourse
- Field Survey Extent
- Project Area

Koala Habitat

- Breeding, foraging and shelter
- Climate refugia
- Dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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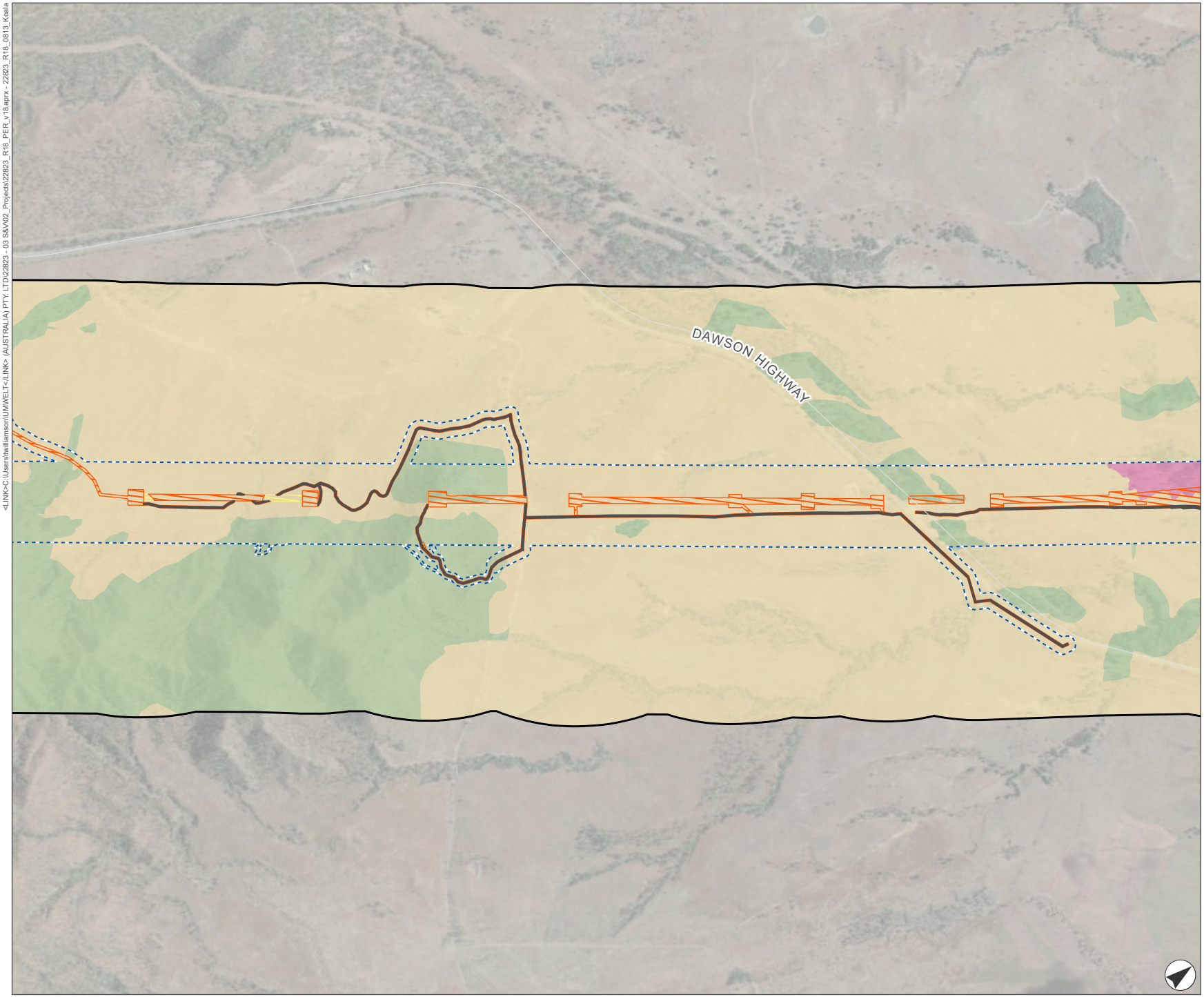


FIGURE 8.13-8

Koala Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

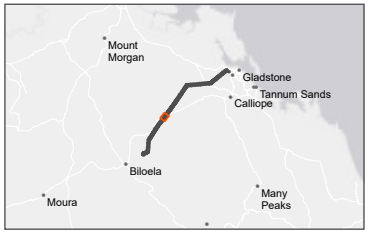
- Roads
- Field Survey Extent
- Project Area

Koala Habitat

- Breeding, foraging and shelter
- Climate refugia
- Dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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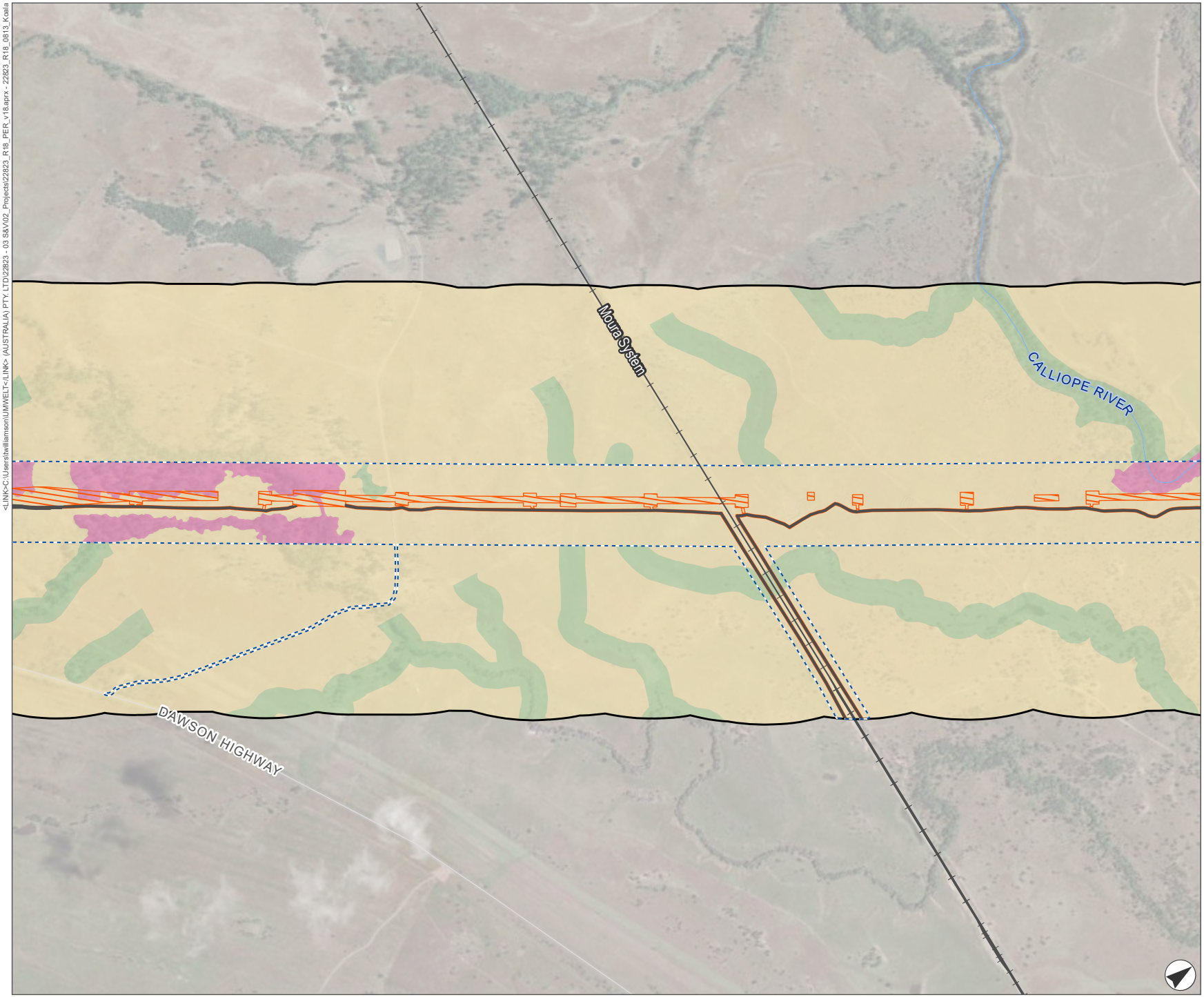


FIGURE 8.13-9

Koala Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

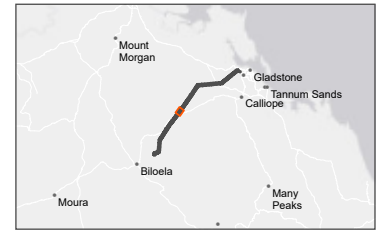
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Koala Habitat

- Breeding, foraging and shelter
- Climate refugia
- Dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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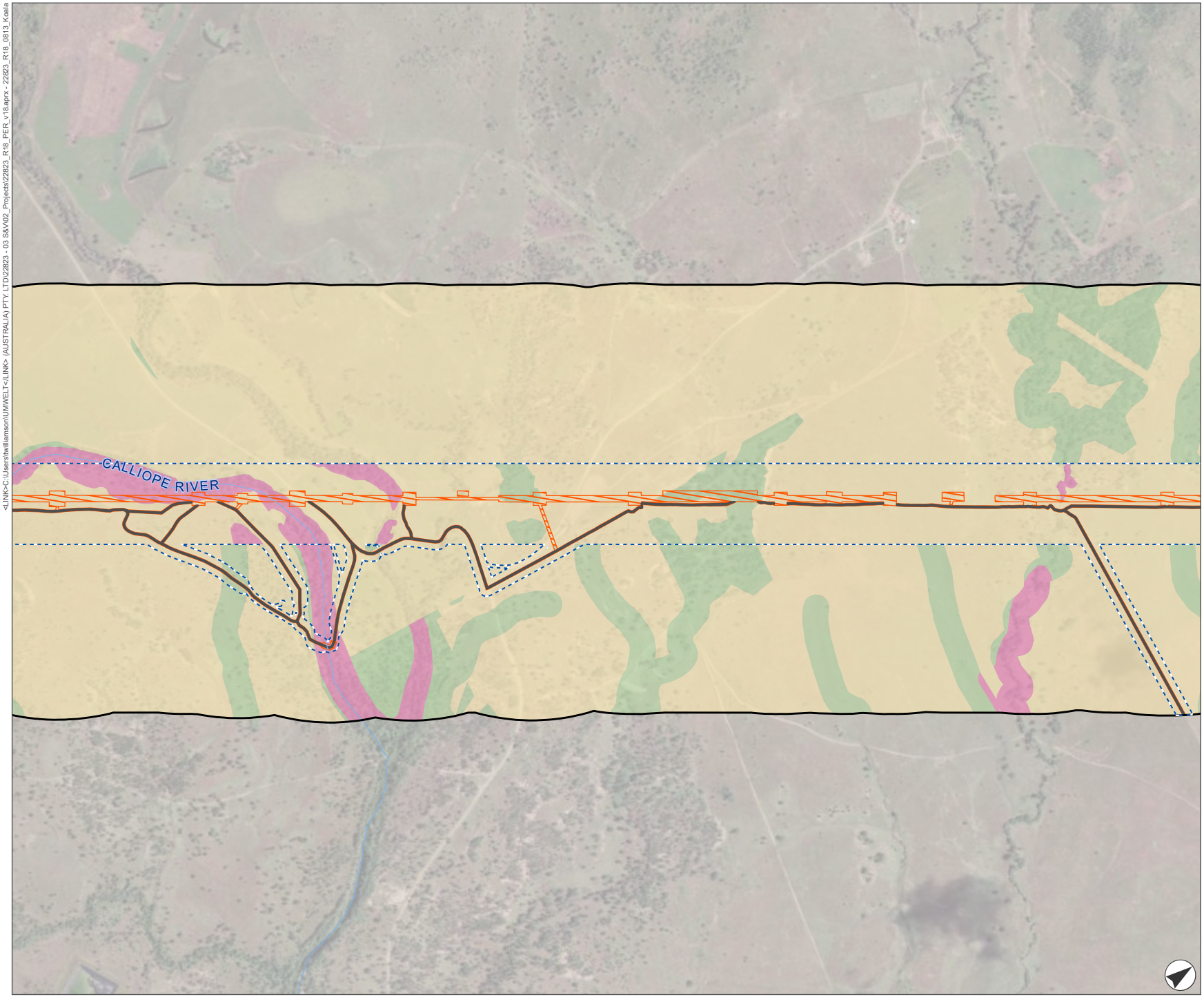


FIGURE 8.13-10

Koala Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

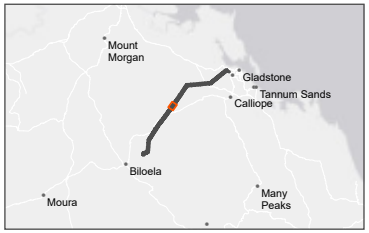
- Watercourse
- Field Survey Extent
- Project Area

Koala Habitat

- Breeding, foraging and shelter
- Climate refugia
- Dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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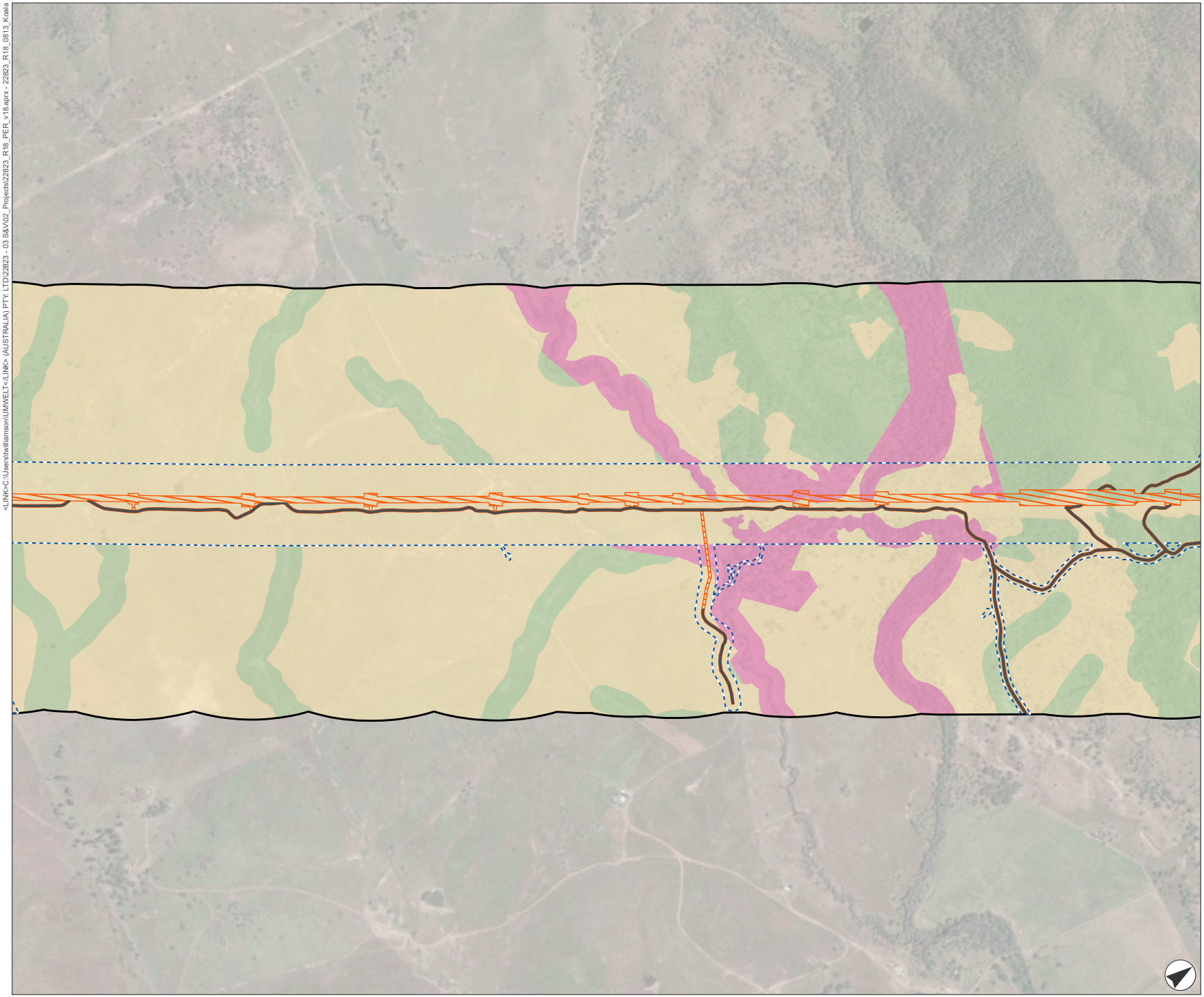


FIGURE 8.13-11

Koala Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

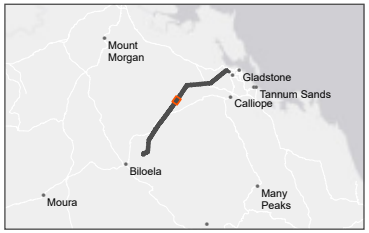
- Field Survey Extent
- Project Area

Koala Habitat

- Breeding, foraging and shelter
- Climate refugia
- Dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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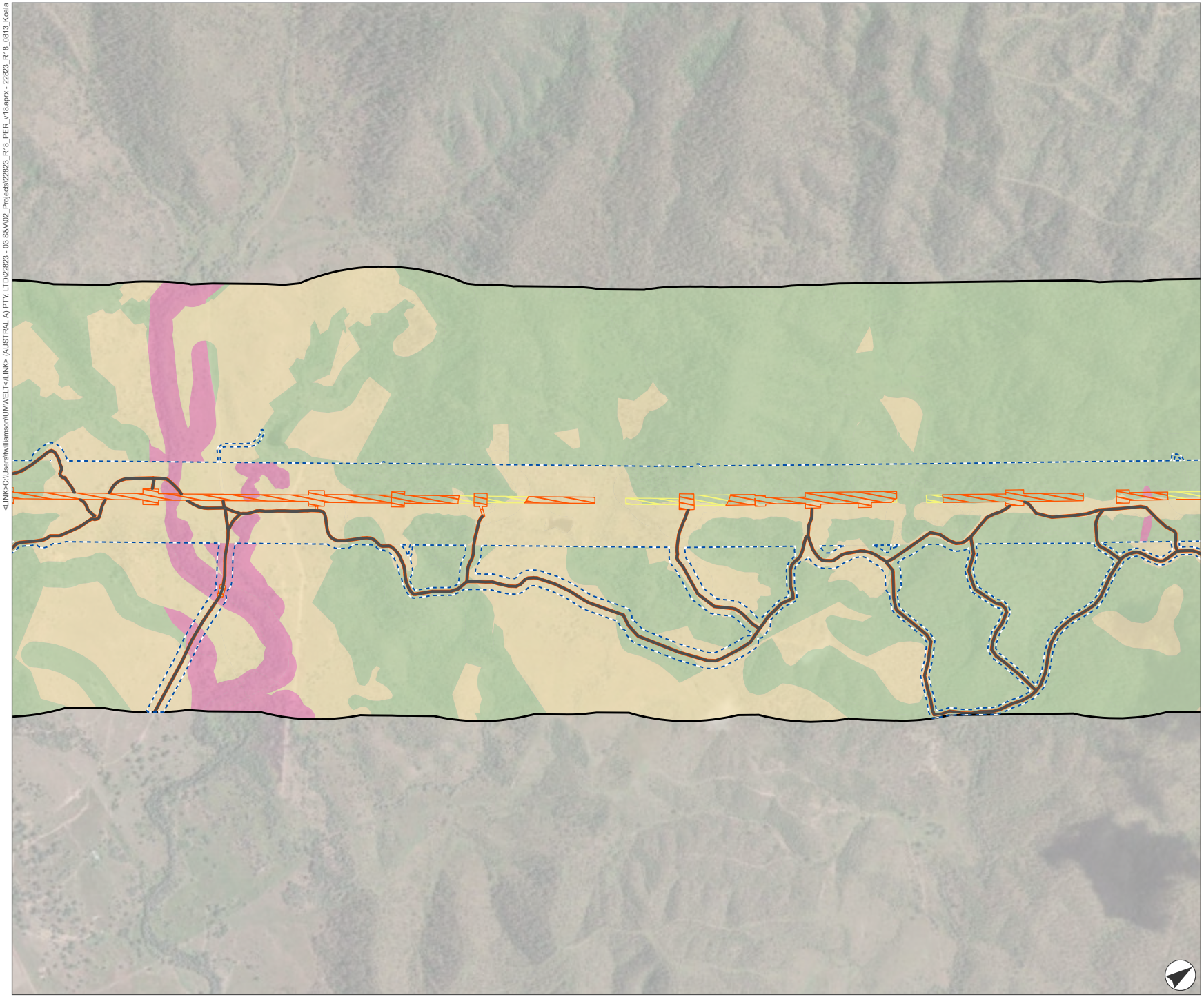


FIGURE 8.13-12

Koala Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

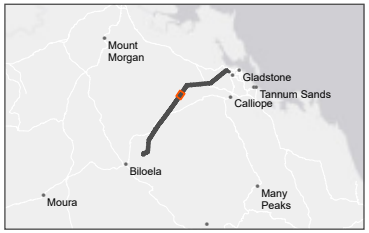
- Field Survey Extent
- Project Area

Koala Habitat

- Breeding, foraging and shelter
- Climate refugia
- Dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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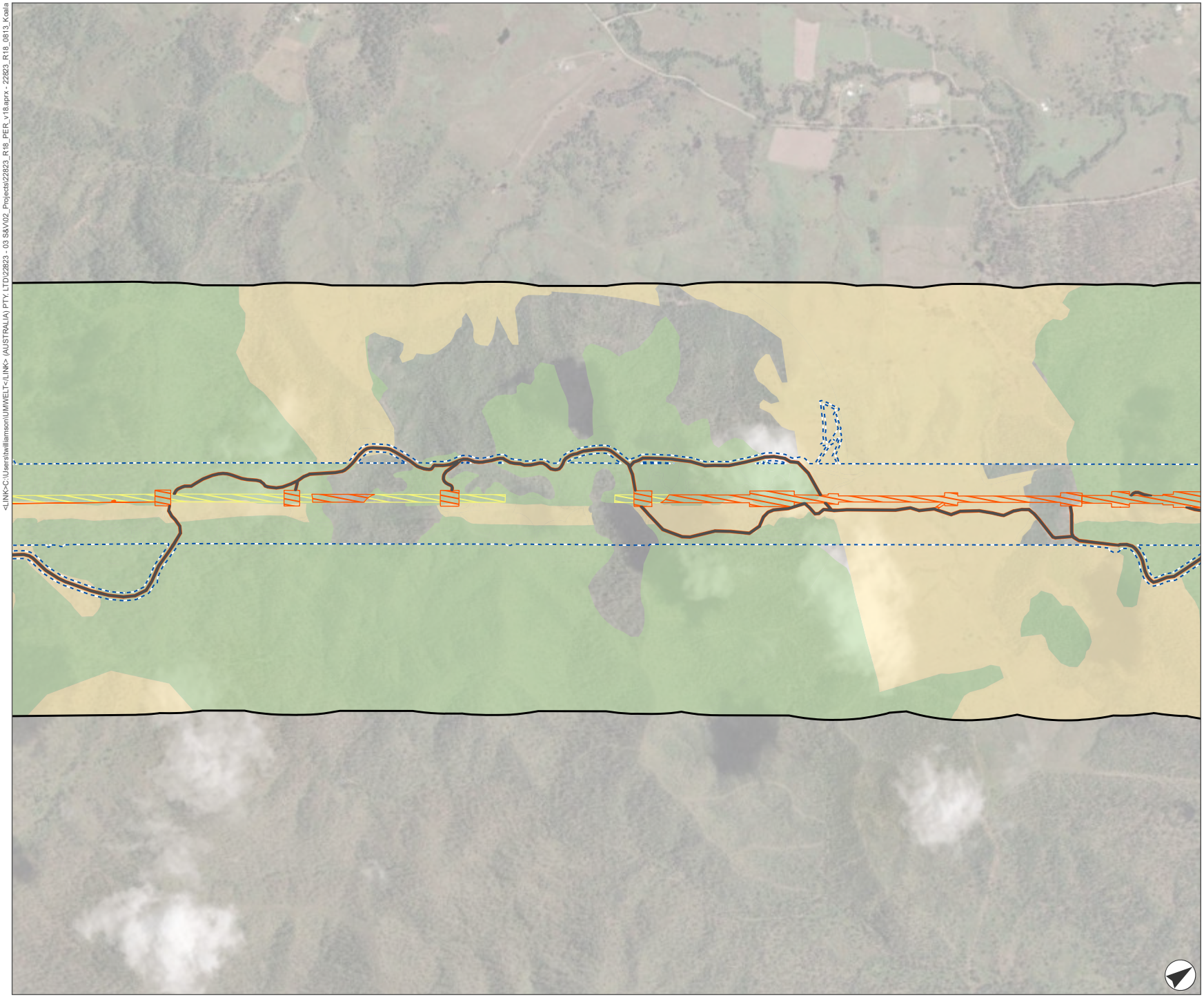


FIGURE 8.13-13

Koala Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

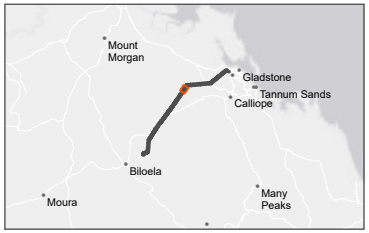
- Field Survey Extent
- Project Area

Koala Habitat

- Breeding, foraging and shelter
- Dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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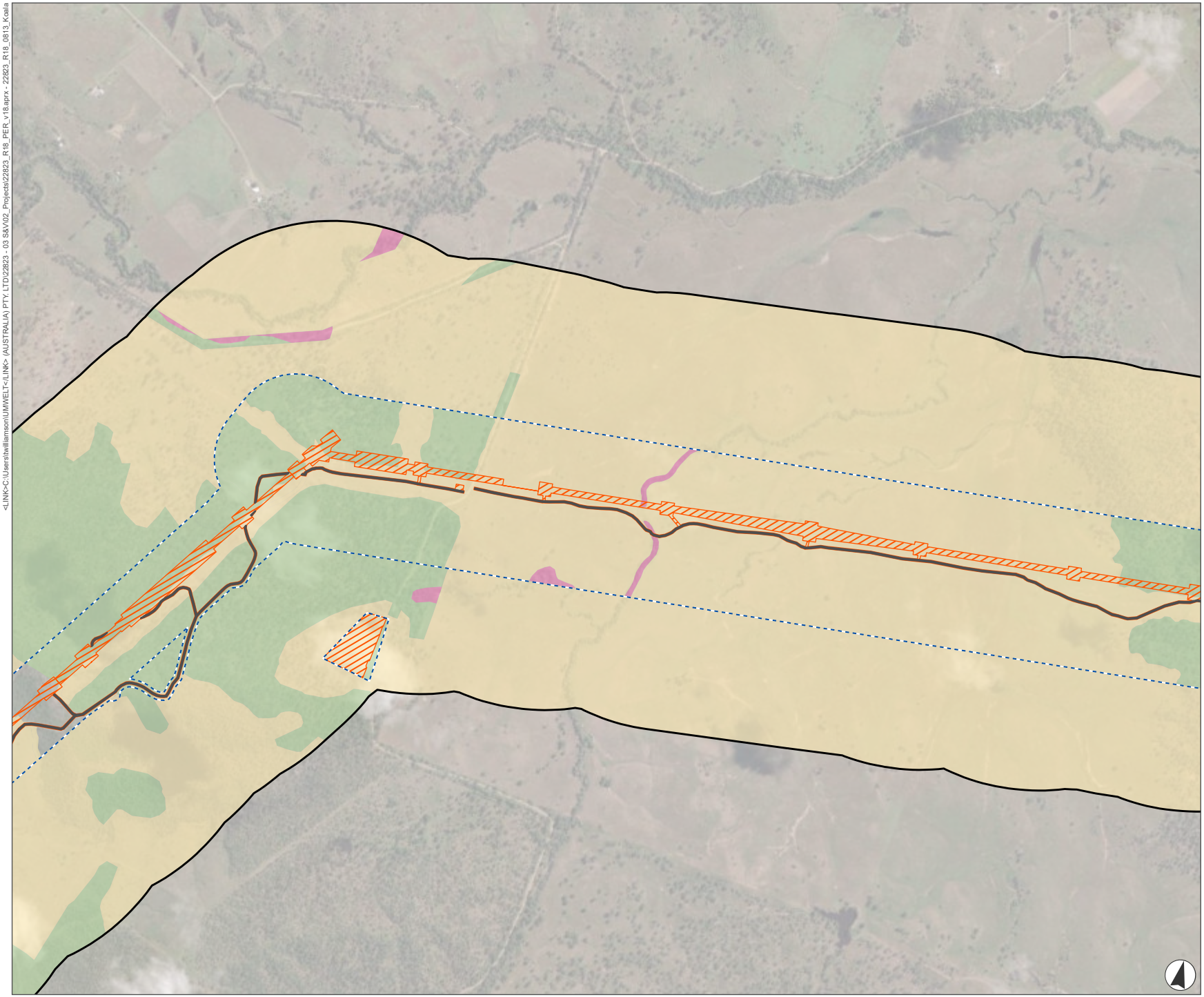


FIGURE 8.13-14

Koala Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

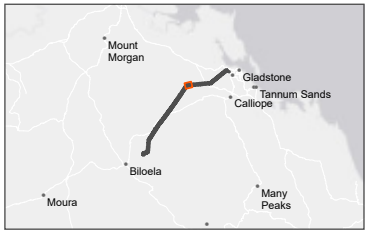
- Field Survey Extent
- Project Area

Koala Habitat

- Breeding, foraging and shelter
- Climate refugia
- Dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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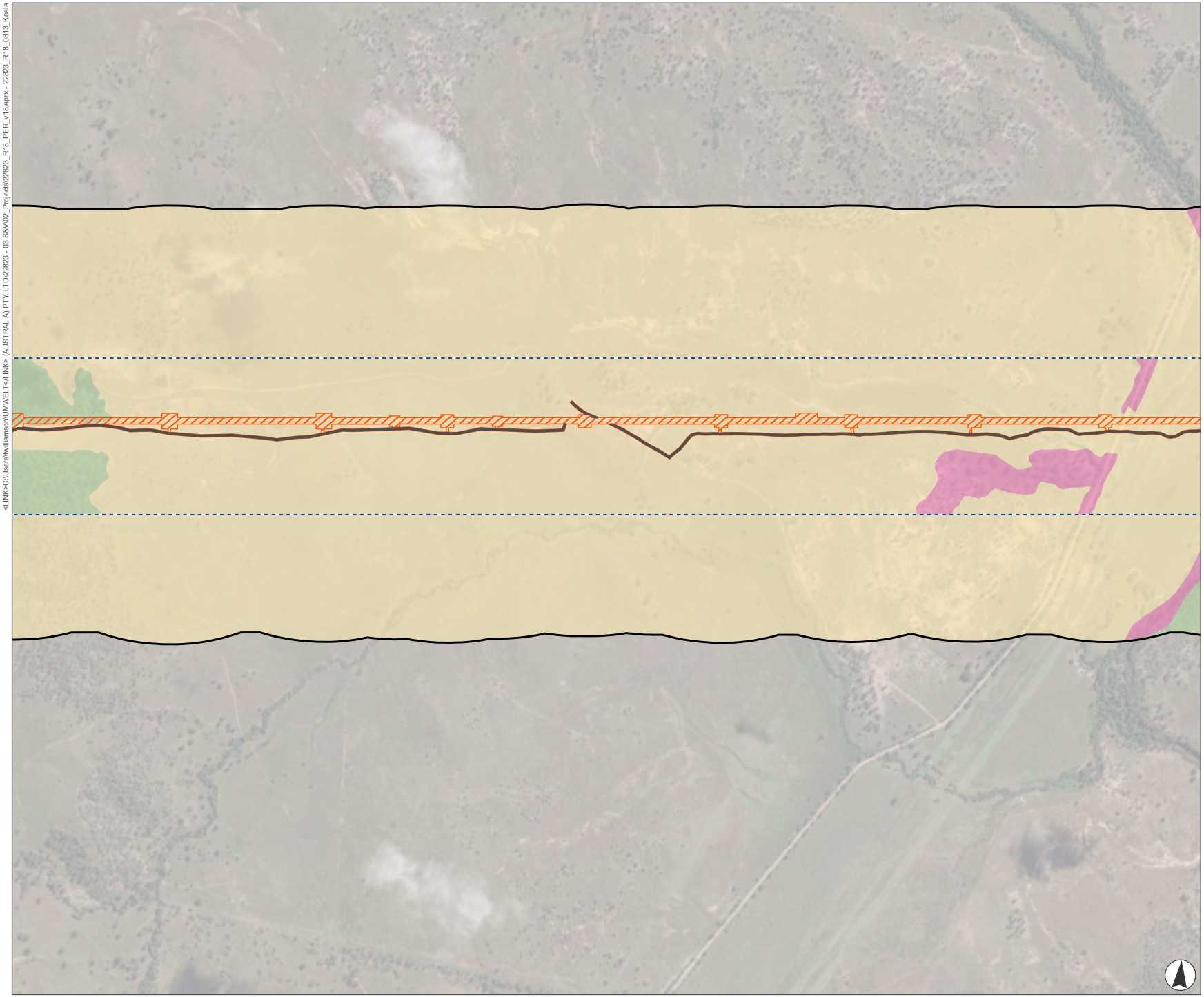


FIGURE 8.13-15

Koala Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

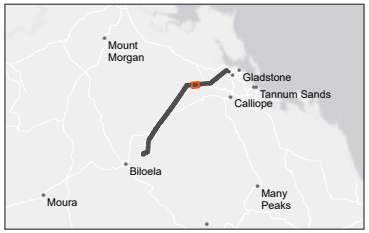
- Field Survey Extent
- Project Area

Koala Habitat

- Breeding, foraging and shelter
- Climate refugia
- Dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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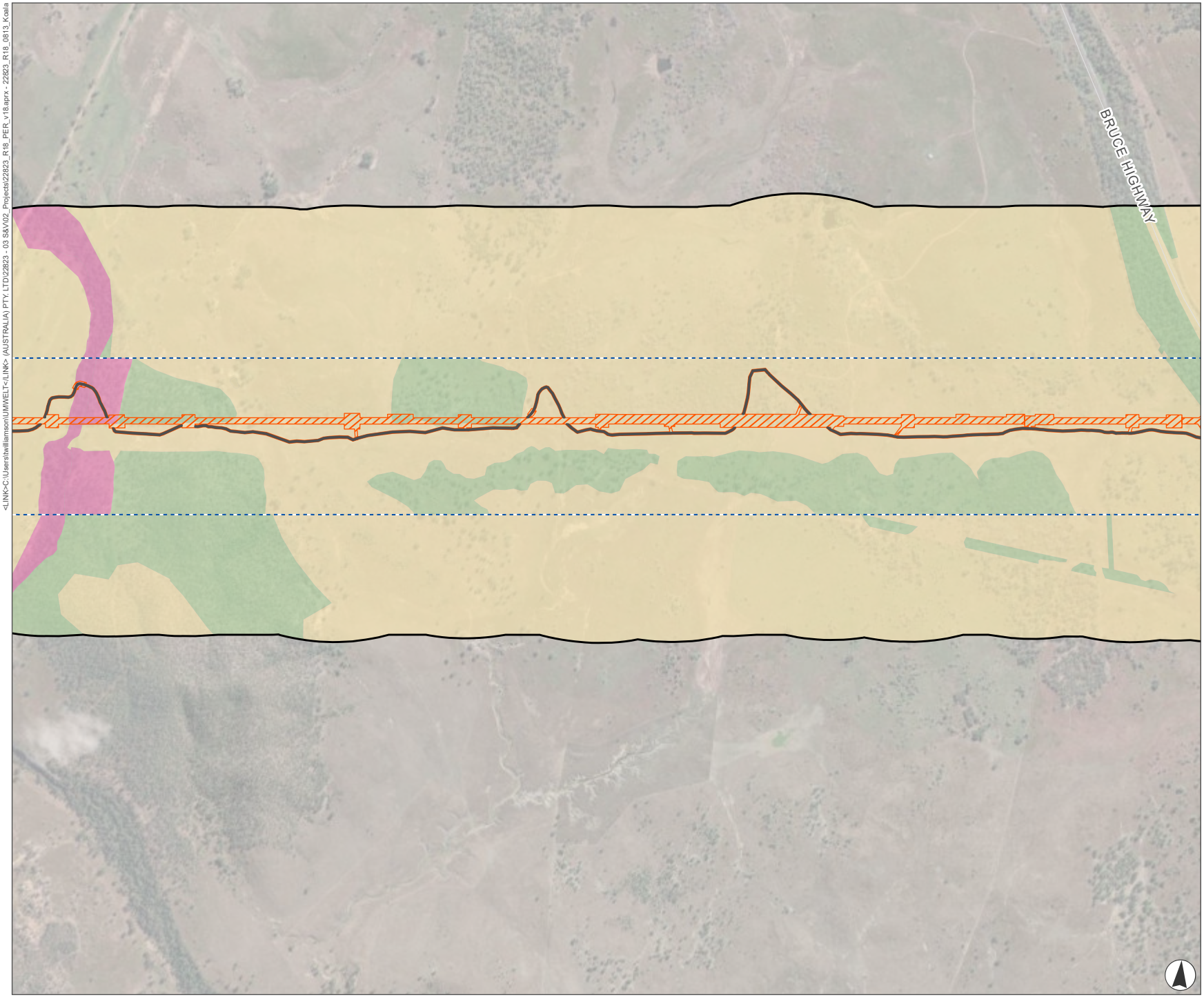


FIGURE 8.13-16

Koala Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

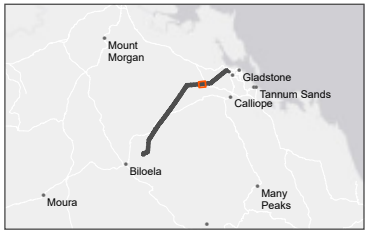
- Roads
- Field Survey Extent
- Project Area

Koala Habitat

- Breeding, foraging and shelter
- Climate refugia
- Dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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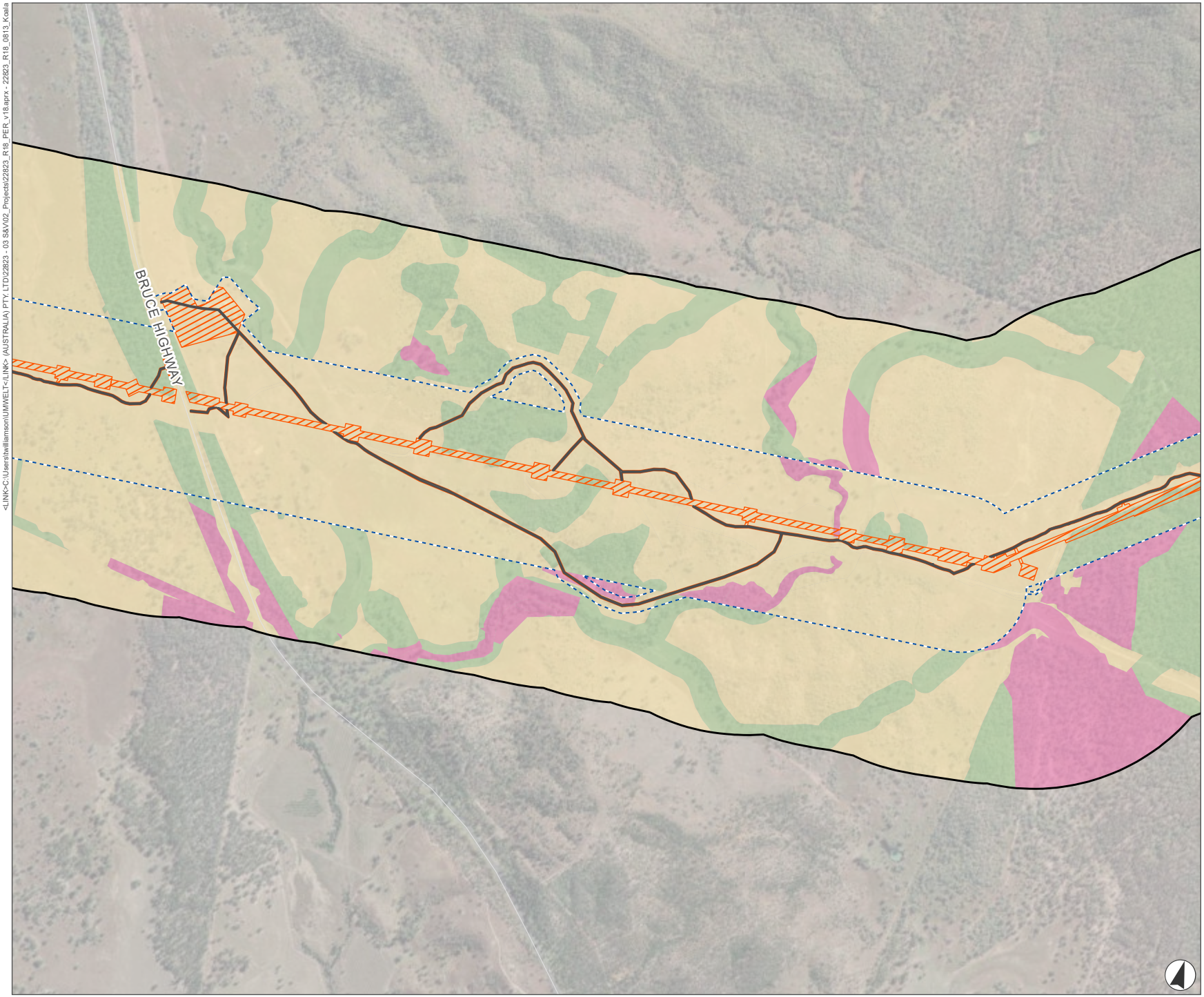


FIGURE 8.13-17

Koala Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

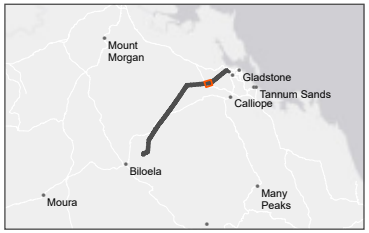
- Roads
- Field Survey Extent
- Project Area

Koala Habitat

- Breeding, foraging and shelter
- Climate refugia
- Dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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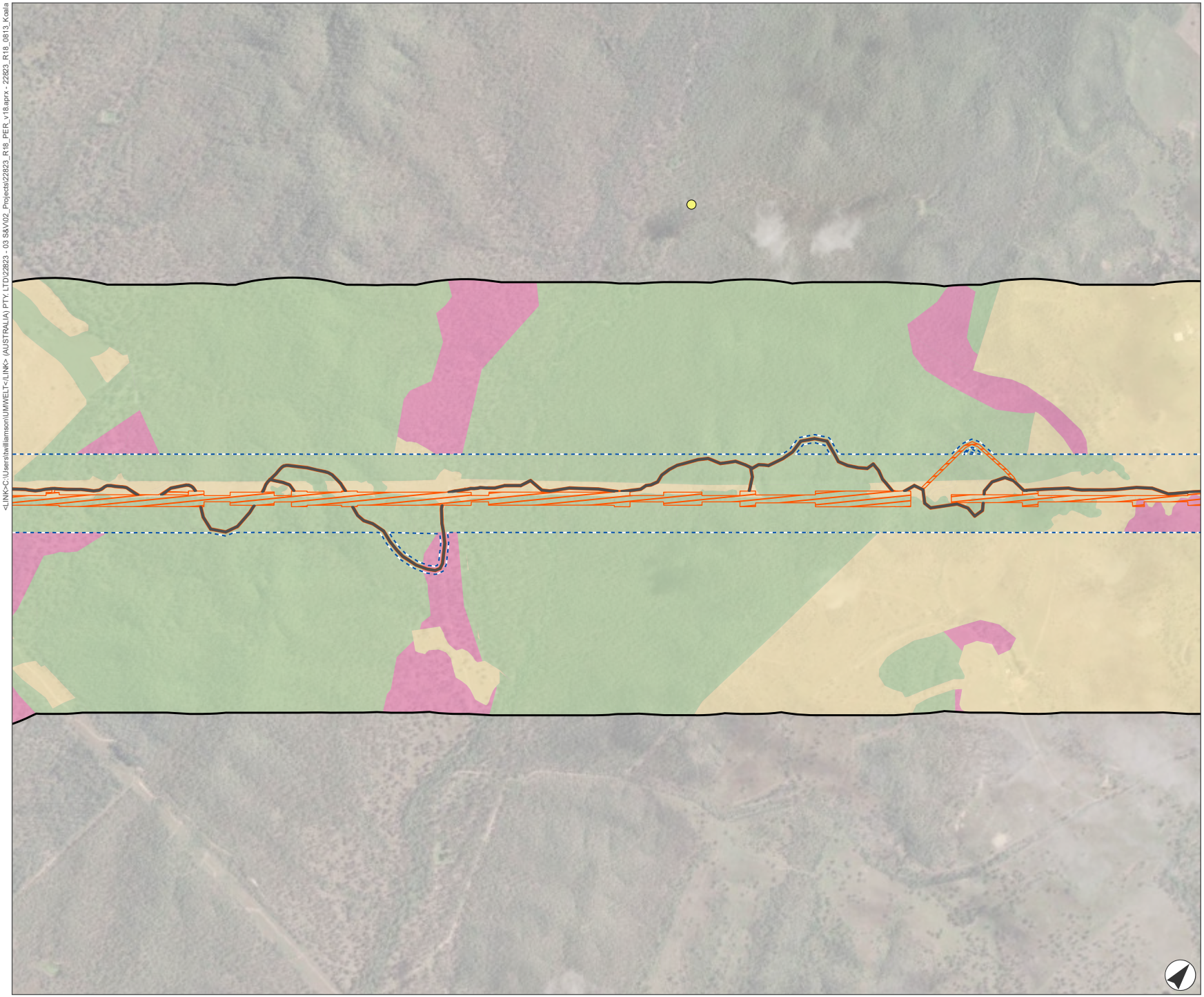


FIGURE 8.13-18

Koala Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

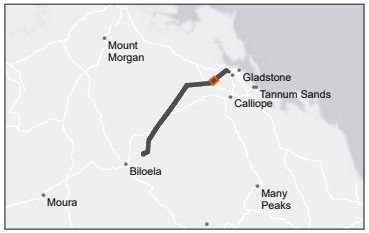
- Field Survey Extent
- Project Area
- Koala Records (ALA)

Koala Habitat

- Breeding, foraging and shelter
- Climate refugia
- Dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

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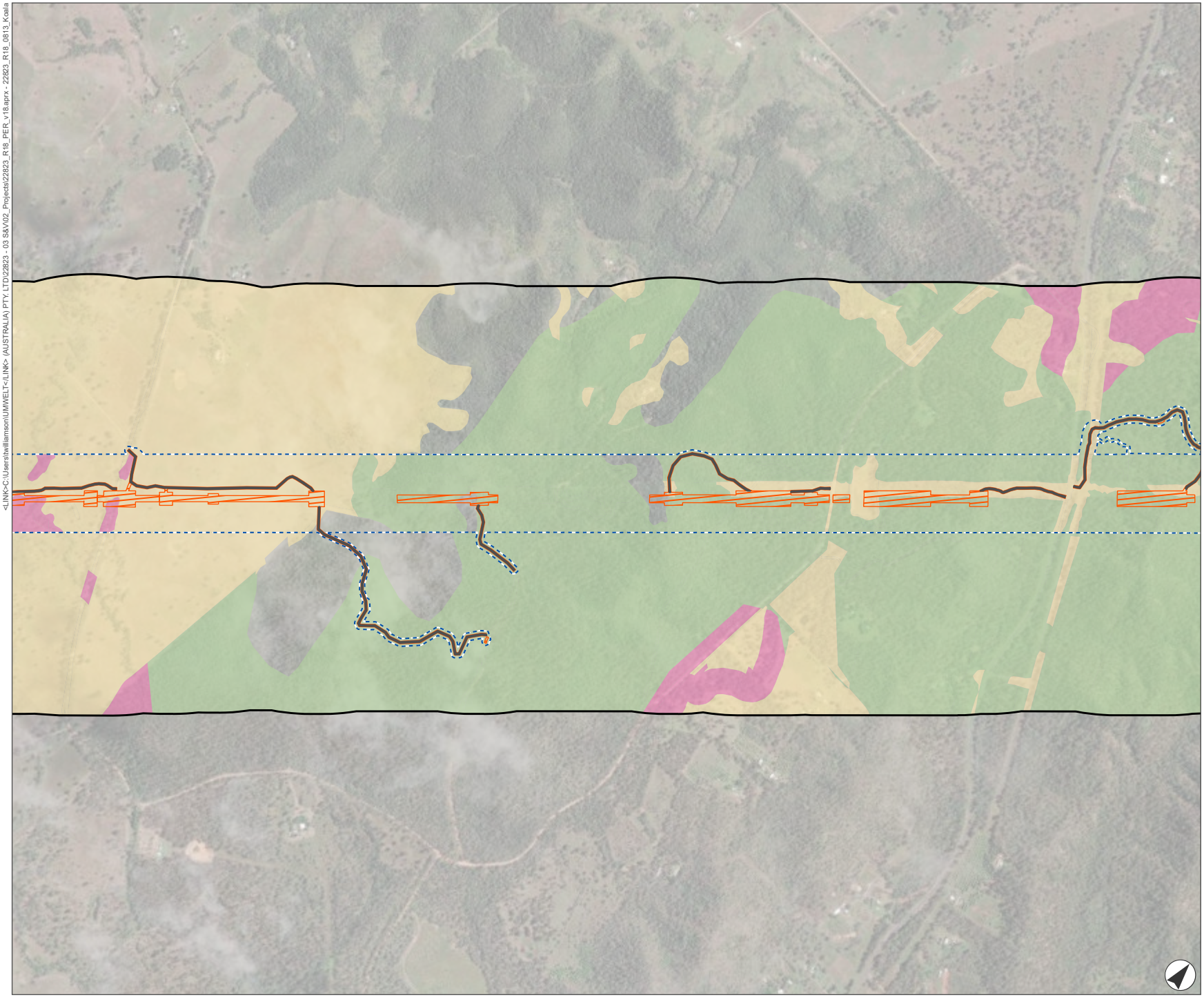


FIGURE 8.13-19

Koala Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

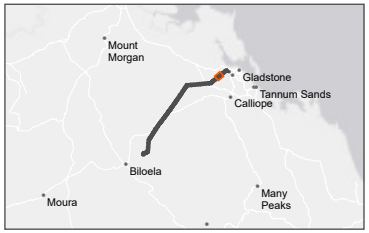
- Field Survey Extent
- Project Area

Koala Habitat

- Breeding, foraging and shelter
- Climate refugia
- Dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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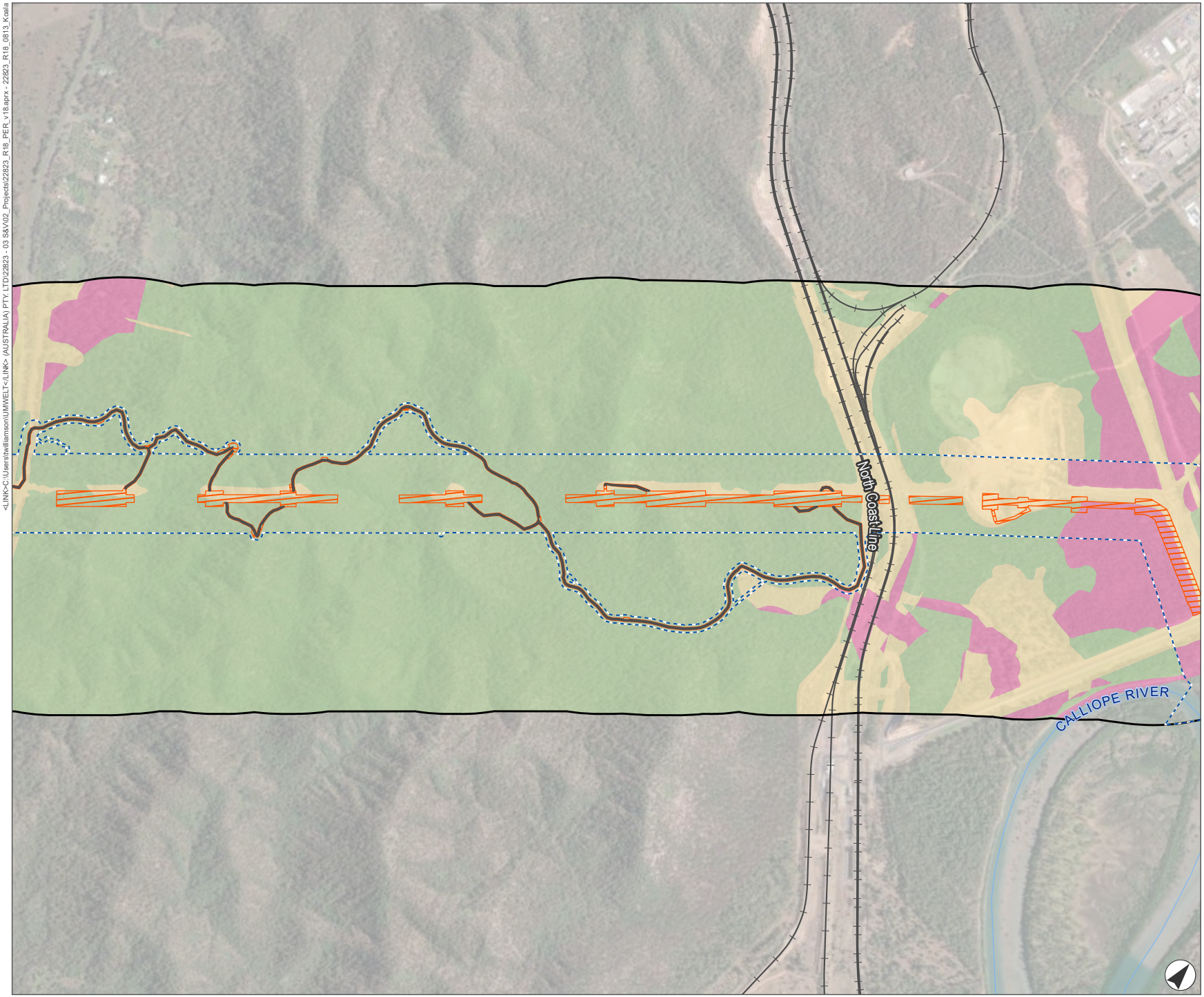


FIGURE 8.13-20

Koala Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

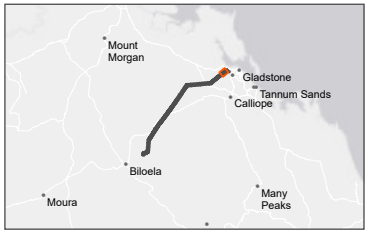
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Koala Habitat

- Breeding, foraging and shelter
- Climate refugia
- Dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

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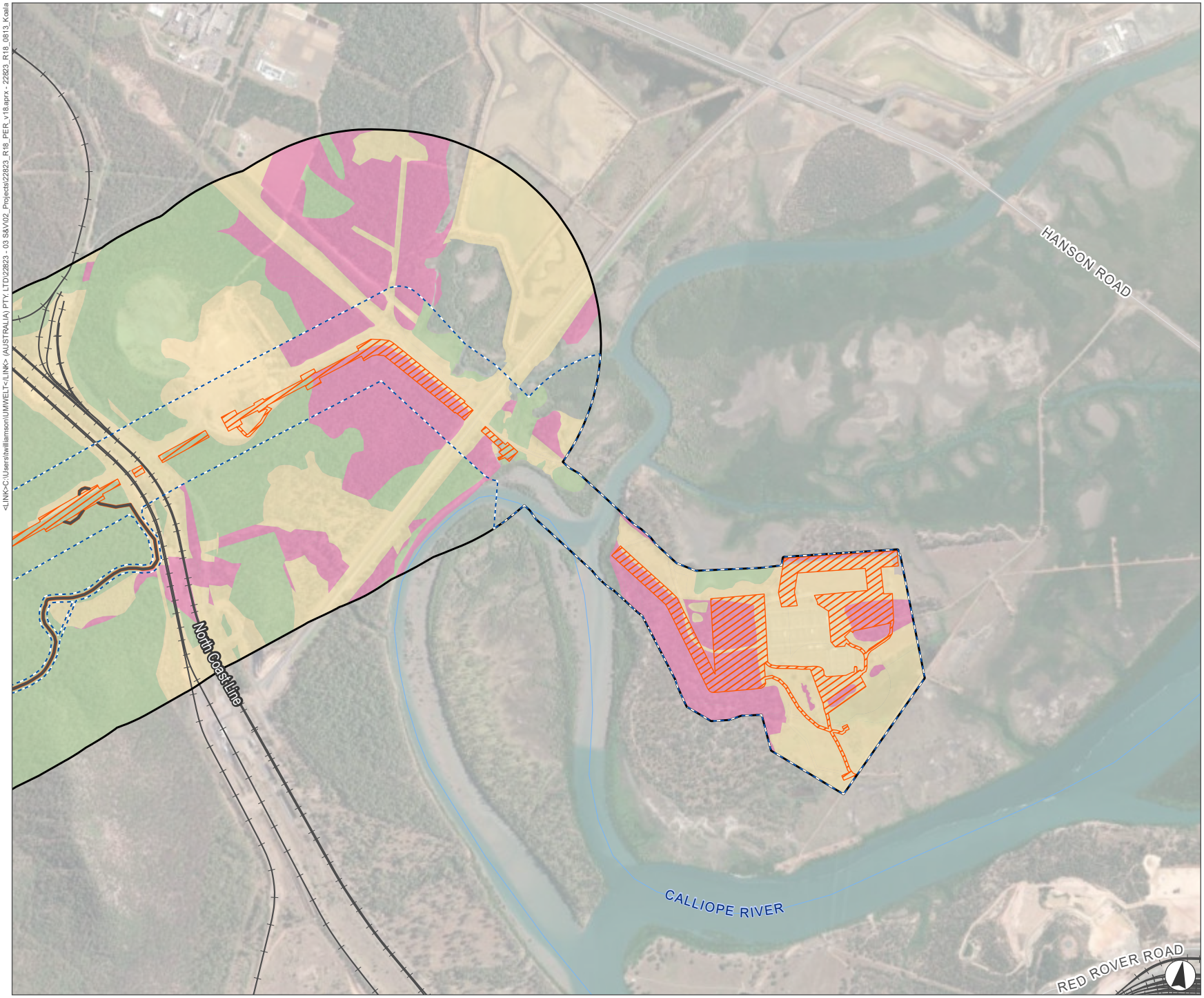


FIGURE 8.13-21

Koala Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

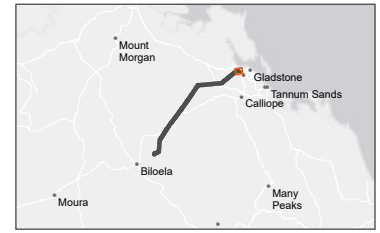
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Koala Habitat

- Breeding, foraging and shelter
- Climate refugia
- Dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

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8.2.6.4 Loggerhead Turtle (*Caretta caretta*)

Table 8.41 Loggerhead Turtle: Ecology and Relevance to the Project Area

Loggerhead Turtle	
Profile	**Conservation status** Endangered and Migratory **Distribution** This species has a global distribution and occurs in tropical, sub-tropical and temperate waters. In Australia, loggerhead turtle occurs in coral reefs, bays and estuaries in tropical and warm temperate waters off the coast of Queensland, Northern Territory, Western Australia and New South Wales. The eastern Australian population nests on the southern Great Barrier Reef and adjacent mainland coastal areas, including Mon Repos, Wreck Rock, Wreck Island, Erskine Island, and Tryon Island (Department of Climate Change, Energy, the Environment and Water, 2025e). **Population** Populations within Australia are considered to comprise two distinct genetic stock; eastern and western Australia, and interbreeding does not occur between them. Any individuals in the vicinity of the Project Area are considered members of the south-west Pacific population of loggerhead turtles according to the *Recovery plan for marine turtles in Australia* (Department of the Environment and Energy, 2017b). **Historical records within the desktop search extent** One WildNet record occurs within the desktop search extent from 1989, 2.3 km north-east of Section E, at the mouth of the Calliope River. A more recent WildNet record occurs at Tannum Sands in 2021, 20 km south-east of Section E. Additional ALA records occur from 2021, with one located approximately 5.3 km east of Section E but with spatial uncertainty. **Habitat** This species nests on tropical, open sandy beaches. Loggerhead turtle utilises shallow, coastal waters, bays, lagoons, estuaries and open ocean for foraging and dispersal. As hatchlings and up to the age of 15 years old, they are pelagic (Department of Climate Change, Energy, the Environment and Water, 2025e). **Habitat critical to the survival of the species** The *Recovery plan for marine turtles in Australia* (Department of the Environment and Energy, 2017b) defines habitat critical to the survival of the species as: • Nesting habitat that includes at least 70% of nesting for the stock and areas that are geographically dispersed, major and minor rookeries, mainland and island beaches and winter or summer nesting areas • All index beaches

Loggerhead Turtle

- Intersecting habitat located immediately seaward of designated nesting habitat critical to the survival of the species (with a buffer of 20 km).

Biologically important areas (BIAs) are areas where protected species display biologically important breeding foraging, resting and migration behaviour. All identified 'habitat critical to the survival of the species' has been included in the BIA database and are summarised in Table 6 of the Recovery plan for marine turtles in Australia (Department of the Environment and Energy, 2017b). The closest BIA buffer for loggerhead turtle occurs approximately 32 km north-east of Section E of the Project Area, associated with nesting habitat on Mast Head and Erskin Islands. Major nesting areas include mainland coast Mon Repos to Wreck Rock and minor nesting areas include Wreck Island, Heron Island, Lady Musgrave Island, Tyron Island, Erskine Island, Northwest Island, Swains Reef and New Caledonia. The Project Area doesn't intersect any of these nesting area and Erskine, Tyron, Wreck, Northwest and Heron Islands are situated over 60km north-east of the Project Area.

While the Project Area does support some marginal suitable foraging and dispersal habitat for the species (within the shallow waters of Calliope River adjacent to Section E), it does not overlap with any BIAs or habitat critical to the survival of the species.

Current threats to the species

The main threats to loggerhead turtle, as identified in the *Recovery plan for marine turtles in Australia* (Department of the Environment and Energy, 2017b) are:

- disturbance (e.g. noise and light disturbance)
- habitat damage due to coastal development and dredging
- by-catch form fisheries and shark control measures
- nest predation
- boat strikes
- entanglement and ingestion of marine debris
- Indigenous harvesting (only in particular areas)
- potential threats include changes to the sea surface temperature, particularly changes to the Southern Oscillation Index, which determines breeding intervals, chance disasters (e.g. oil spills), and feral predator invasions.

Recovery plan

Recovery plan for marine turtles in Australia (Department of the Environment and Energy, 2017b)

In the Project Area	**Surveys** Targeted surveys for marine turtles were not undertaken as suitable habitat for these species occurs outside of the Disturbance Footprint. Surveys relevant to marine turtles were limited to intertidal systems to confirm the presence of suitable nesting habitat however suitable habitat was not identified. **Species occurrence and habitat**

Loggerhead Turtle

The species was not detected during field surveys. Given the presence of isolated pockets of suitable habitat, it has been determined that this species has a moderate likelihood of occurring within the Project Area.

Habitat within the Project Area

Habitat Type	Habitat modelling criteria	Area (ha)	
		Project Area	Disturbance Footprint
Nesting	Not present within Project Area	-	-
Foraging	Calliope River. Foraging occurs within both inshore and offshore waters.	12.8	-

Table 8.42 Assessment of Potential Project Impacts and Mitigation and Management Commitments for Loggerhead Turtle

Potential Impact	Assessment	Mitigation Commitments
Indirect		
Introduction or proliferation of pest and weed species resulting in degradation of habitat	Majority of works for the Project are confined to already disturbed areas with minimal connectivity to marine habitats. The risk of weed or pest introduction in marine turtle habitat near the Project Area is negligeable, and any potential effects would be short-term and highly manageable.	• Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • All waste to be secured • Biosecurity Instrument Permit to be obtained for moving materials out of or within different biosecurity zones • Educate workforce in the identification of pest fauna species

Potential Impact	Assessment	Mitigation Commitments
		• Avoid inclusion of any water retaining voids or pits • Refer to Table 5.5 and Table 5.6 of the MNES Management Plan for further details on mitigation measures.
Soil exposure resulting in an increased risk of erosion and sedimentation of water bodies, reducing water quality and degrading aquatic habitats	While soil disturbance has the potential to increase sedimentation and reduce water quality in nearby aquatic habitats, the scale of works is limited and the application of established management practices will minimise risk. Any potential effects are expected to be temporary, localised, and manageable.	• Soil sampling and testing to inform both erosion and sediment control (ESC) and rehabilitation • Develop Erosion and Sediment Control Plan (ESCP) in accordance with the IECA Best Practice Erosion and Sediment Control Guidelines 2008 • Extent and duration of soil exposure will be minimised • Disturbed areas will be promptly stabilised • Site is monitored and controls adjusted to maintain required performance standard • Minimum personnel requirements will apply for ESCP development and verification • A Water Quality Monitoring Plan must be developed by an appropriately qualified person • Dewatering Management Plan will be developed • Acid Sulphate Soil Management Plan will be developed • Awareness training for identification and management of ASS will be undertaken • Water extraction activities will be strictly controlled and monitored to ensure no waterbodies are completed drained • Erosion and sediment control measures in accordance with IECA 2008 • Refer to Table 5.4 and Table 5.12 of the MNES Management Plan for further details on mitigation measures.
Increased risk of contamination associated with activities such as refuelling or storage of chemicals	Although fuel, oil, or chemical spills have the potential to reduce water quality and degrade aquatic habitats, the likelihood of such events is low given the limited scale of works and strict management measures in place. Any risk is expected to be minimal and	• Hazardous materials must be stored and handled appropriately • An Emergency Response Plan will be developed • Spill kits will be available during construction • Hazardous materials locations will be bunded • All waste disposed of in accordance with legislative requirements • No refuelling within 50 m of a watercourse • Application of herbicides in accordance with legislative requirements

Potential Impact	Assessment	Mitigation Commitments
	effectively managed through established controls.	• Refer to Table 5.4 of the MNES Management Plan for further details on mitigation measures.
Temporary changes in hydrology from installation of infrastructure creating a barrier to surface flow and increasing stormwater run-off	While temporary changes to surface water flow and stormwater run-off may occur during installation of infrastructure, these are expected to be minor, localised, and reversible once works are complete. With appropriate siting and management, the risk of impacts to aquatic habitats is minimal.	• A Water Quality Monitoring Plan must be developed by an appropriately qualified person • Dewatering Management Plan will be developed • Acid Sulphate Soil Management Plan will be developed • Awareness training for identification and management of ASS will be undertaken • Water extraction activities will be strictly controlled and monitored to ensure no waterbodies are completed drained • Erosion and sediment control measures in accordance with IECA 2008 • Soil sampling and testing to inform both erosion and sediment control (ESC) and rehabilitation • Develop Erosion and Sediment Control Plan (ESCP) in accordance with the IECA Best Practice Erosion and Sediment Control Guidelines 2008 • Extent and duration of soil exposure will be minimised • Disturbed areas will be promptly stabilised. • Site is monitored and controls adjusted to maintain required performance standard • Minimum personnel requirements will apply for ESCP development and verification • Refer to Table 5.4 and Table 5.12 of the MNES Management Plan for further details on mitigation measures.

Table 8.43 Significant Impact Assessment: Loggerhead Turtle

Impact Criteria	Assessment
Lead to a long-term decrease in the size of a population	**Unlikely** Project infrastructure will not be located within suitable foraging habitat for loggerhead turtles in the Project Area. The design of the transmission line has specifically avoided placing any infrastructure within the Calliope River, including intertidal zones which may support turtle activity. The method chosen to span the river—using helicopters or drones rather than marine vessels—ensures that no boat traffic will occur during construction, thereby eliminating the risk of boat strike, propeller injury, and underwater noise disturbance. Additionally, no lines, bunding, or other physical structures will be placed in the river, removing the potential for entanglement.

Impact Criteria	Assessment
	Loggerhead turtles are vulnerable to suspended plastic debris, which can be mistaken for food, and to entanglement in fishing gear and crab pots. Chemical and terrestrial runoff from agriculture, industry, and urban development can also degrade nearshore habitats, including seagrass beds that support foraging. Construction activities have the potential to disturb acid sulfate soils, which, when exposed to oxygen, can trigger chemical reactions that release sulfuric acid and mobilise heavy metals, potentially impacting water quality and turtle habitat. To mitigate these risks, the project will implement measures consistent with the key objectives outlined in the MNES Management Plan. The elevated tower pad near the northern bank of the Calliope River has the potential to disturb acid sulfate soils. Acid sulfate soils will be managed in accordance with a Project ASS Management Plan as outlined within Table 5.4 and 5.12 of the MNES Management Plan. Runoff and sediment will be controlled through an ESCP, which includes the installation of silt fences and sediment traps, particularly around tower locations closest to the Calliope River in Section E, adjacent to potential foraging habitat. A Water Quality Management Plan will also be implemented to assess conditions before, during, and after construction and identify corrective actions as required. This plan will monitor for chemicals, turbidity, metals and nutrient levels during construction and identify suitable corrective actions where exceedances are recorded. Through these carefully planned and site-specific mitigation strategies, the Project will maintain the ecological integrity of the Calliope River and ensure that habitat availability and quality for loggerhead turtles is not compromised in a way that would contribute to a long-term decline in population size.
Reduce the area of occupancy of the species	**Unlikely** Project infrastructure will not be located within suitable foraging habitat in the Calliope River. The Project has been designed to avoid any infrastructure in the Calliope River including the intertidal areas and fringing mangroves. The construction process for spanning the Calliope River will not involve the use of marine craft and the transmission lines at this location will be strung with the use of helicopter or drone. As a consequence, boat strike (including propeller) and noise will not be present. Similarly, no lines or bunding will be placed in the Calliope River avoiding the potential for entanglement. Loggerhead turtles are known to be vulnerable to plastic debris suspended in the water column, which can be mistaken for food, and to entanglement in fishing gear and crab pots. Additionally, chemical and terrestrial discharge from agriculture, industry, and urban development can degrade seagrass beds, which are critical foraging habitats. Construction activities also carry the potential to disturb acid sulfate soils, which, if exposed to oxygen, can initiate chemical reactions that release sulfuric acid and mobilise heavy metals, thereby affecting water quality. To address these risks, the Project will incorporate measures consistent with the key objectives outlined in the MNES Management Plan, to effectively mitigate indirect impacts. The elevated tower pad near the northern bank of the Calliope River, which has the potential to initiate acid sulfate soil reactions, will be constructed using soil sourced from outside the area. This soil will be free from contaminants and weed seeds, reducing the risk of chemical disturbance. Any acid sulfate soils encountered will be managed in accordance with a site-specific ASSMP.

Impact Criteria	Assessment
	Runoff and sediment will be controlled through an ESCP, which includes the installation of silt fences and sediment traps, particularly around tower locations closest to the Calliope River in Section E, adjacent to potential foraging habitat. In addition, a Water Quality Management Plan will be implemented to assess pre- and post-construction water quality in the Calliope River and identify corrective actions as required. This plan will monitor for chemicals, metals, pH, turbidity, and nutrient levels throughout the construction phase to detect any changes that could affect seagrass beds. Through these carefully designed mitigation measures, the Project will maintain the ecological integrity of the Calliope River and ensure that the area of occupancy of this species is not reduced.
Fragment an existing population into two or more populations	**Unlikely** Project infrastructure will not be located within suitable foraging habitat in the Calliope River. The Project has been designed to avoid any infrastructure in the Calliope River including the intertidal areas and fringing mangroves. As a consequence, no fragmentation impacts are expected to occur.
Adversely affect habitat critical to the survival of a species	**Unlikely** Project infrastructure will not be located within suitable foraging habitat in the Calliope River. The Project has been designed to avoid any infrastructure in the Calliope River including the intertidal areas and fringing mangroves. Although loggerhead turtles are sensitive to indirect threats such as pollution, habitat degradation, and chemical runoff, the proposed transmission line over the Calliope River has been designed to limit these impacts. Loggerhead turtles forage in seagrass beds and may be affected by suspended plastic debris, entanglement in fishing gear, and chemical discharge from surrounding land uses. Additionally, construction activities have the potential to disturb acid sulfate soils, which can release harmful substances into aquatic environments if not properly managed. To ensure that these risks do not result in habitat degradation or loss, the project incorporates a suite of mitigation measures. The elevated tower pad near the northern bank of the Calliope River will be constructed using soil sourced from outside the area, which will be free from contaminants and weed seeds. This approach avoids triggering acid sulfate soil reactions at the site. Any acid sulfate soils encountered will be managed under the Project ASSMP, which outlines procedures for neutralisation and containment. Runoff and sediment control will be addressed through an ESCP, which includes the installation of silt fences and sediment traps, particularly around tower locations closest to the river in Section E. These measures will prevent sediment and pollutants from entering the river and affecting any nearby seagrass beds. In addition, a Water Quality Management Plan will be implemented to assess the condition of the Calliope River before, during, and after construction and identify corrective actions as required. This plan will monitor for chemicals, turbidity, metals and nutrient levels during construction and identify suitable corrective actions where exceedances are recorded.

Impact Criteria	Assessment
	Through these carefully planned and site-specific mitigation strategies, the project will maintain the ecological integrity of the Calliope River and ensure that the Project is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that this species is likely to decline.
Disrupt the breeding cycle of a population	**Unlikely** No nesting habitat for loggerhead turtles is present within or adjacent to the Project Area.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely** To manage potential indirect impacts such as acid sulphate soil exposure, chemical use and water quality changes, the MNES Management Plan will be implemented. These will include (but not be limited to) an ASSMP and an ESCP. The Project is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a Endangered species becoming established in the Endangered species' habitat	**Unlikely** Invasive plants and predatory animals are both considered threats to marine turtles when on land. There are no nesting beaches situated within or adjacent to the Project Area. The Project will employ best practice control methods for weeds and pests and is unlikely to introduce or exacerbate weeds or pests beyond existing levels.
Introduce disease that may cause the species to decline	**Unlikely** Disease has not been identified as a threat to the species. Nevertheless, the Project will follow appropriate biosecurity protocols; therefore, introduction of a disease is unlikely.
Interfere with the recovery of the species	**Unlikely** The Recovery Plan for Marine Turtles in Australia identifies recovery actions for all marine turtle species in Australia. These include: • Maintain and improve efficacy of legal and management protection • Adaptively manage turtle stocks to reduce risk and build resilience to climate change and variability • Reduce the impacts from marine debris • Minimise chemical and terrestrial discharge

Impact Criteria	Assessment
	• Address international take within and outside Australia's jurisdiction • Reduce impacts from terrestrial predation • Minimise light pollution • Address the impacts of coastal development/infrastructure and dredging and trawling • Maintain and improve sustainable Indigenous management of marine turtles • Determine trends at index beaches • Understand population demographics at key foraging grounds • Address information gaps to better facilitate the recovery of marine turtle stocks. Project infrastructure will not be located within the Calliope River. Based on the implementation of the MNES Management Plan, indirect impacts are likely to be negligible. The Project is unlikely to interfere with any of the recovery objectives and is therefore unlikely to interfere substantially with the recovery of a loggerhead turtles.
Significant Residual Impact	**Unlikely to have a significant impact**



FIGURE 8.14-21

Loggerhead Turtle Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

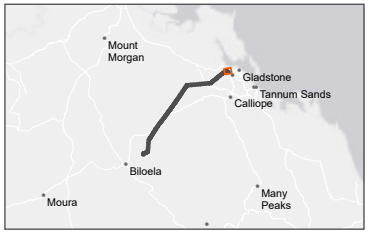
- Roads
- Watercourse
- Railway
- Field Survey Extent
- Project Area

Loggerhead Turtle Habitat

- Foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
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8.2.6.5 Northern Quoll (*Dasyurus hallucatus*)

Table 8.44 Northern Quoll: Ecology and Relevance to the Project Area

Northern Quoll	
Profile	**Conservation status** Endangered **Distribution** The distribution of northern quoll is discontinuous across northern Australia with core populations in rocky and/or high rainfall areas (Hill & Ward, 2010b). In Queensland, the species is known to occur as far south as Brisbane and Toowoomba in the south, as far north as Cape York and extends as far west into central Queensland to the Carnarvon Range National Park. The species' distribution is highly fragmented in Queensland and surveys by Woinarski *et al*. (J. C. Z. Woinarski et al., 2008) indicate severe reductions from the species' former distribution (Department of the Environment, 2016). **Population** While not generally applicable to species listed Endangered under the EPBC Act, the *EPBC Act referral guideline for the endangered northern quoll Dasyurus hallucatus* (Department of the Environment, 2016) states that populations important for the long-term survival of the species include populations which are: • High density quoll populations, which occur in refuge-rich habitat critical to the survival of the species, including where cane toads are present • Occurring in habitat that is free of cane toads and unlikely to support cane toads upon arrival i.e. granite habitats in WA, populations surrounded by desert and without permanent water • Subject to ongoing conservation or research actions i.e., populations being monitored by government agencies or universities or subject to reintroductions or translocations • For the purposes of this assessment, populations important for the long-term survival of the species are considered the same as important populations conceptually. The *EPBC Act referral guideline for the endangered northern quoll Dasyurus hallucatus* (Department of the Environment, 2016) identifies a high density population as being characterised by numerous camera triggers of multiple individuals across multiple cameras and or traps. It characterises a low-density population by infrequent captures of one or two individuals confided to one or two traps. Throughout the field survey program, a large array of camera traps was deployed for a combined total of 1,061 trap nights. Northern quoll was not detected on any cameras. Based on the survey findings and referral guideline characterisation, any potential population within the Project Area is regarded as low density. Given the low-density population determination, the prevalence of cane toad and absence of ongoing conservation action or research, a potential population of northern quoll in the Project Area is not regarded as an important population (noting the definition of an important population is irrelevant for impact assessments for species listed as Endangered, as per the Significant Impact Guidelines).

Northern Quoll

Historical records within the desktop search extent

WildNet records were identified within the desktop search extent, dating from 2009 approximately 5.7 km south-east of Section E in Telina, Gladstone. Numerous ALA records are known from Kroombit Tops National Park, approximately 21 km south-east of Section A, with the most recent dating from 2018 (Atlas of Living Australia, 2025).

Habitat

Northern quoll occupies a diversity of habitats including rocky areas, eucalypt forest and woodlands, rainforests, sandy lowlands and beaches, shrubland, grasslands and desert. Habitat generally encompasses some form of rocky area for denning purposes with surrounding vegetated habitats used for foraging and dispersal. Eucalypt forest or woodland habitats usually have a high structural diversity containing large diameter trees, termite mounds or hollow logs for denning purposes. A study of northern quoll in Queensland found that the species is "more likely to be present in high relief areas that have shallower soils, greater cover of boulders, less fire impact and were closer to permanent water" (J. C. Z. Woinarski et al., 2008).

The *EPBC Act referral guidelines for the northern quoll Dasyurus hallucatus* (Department of the Environment, 2016) states that, "on current knowledge, foraging or dispersal habitat is recognised to be any land comprising predominantly native vegetation in the immediate area (i.e. within 1 km) of shelter habitat, quoll records or land comprising predominately native vegetation that is connected to shelter habitat within the range of the species".

Habitat critical to the survival of the species

According to the *EPBC Act referral guidelines for the endangered northern quoll Dasyurus hallucatus* (Department of the Environment, 2016), habitat critical to the survival of northern quoll is habitat within the modelled distribution of the species which provides shelter for breeding, refuge from fire/or predation and potential poisoning from cane toads. As stated in the *EPBC Act referral guidelines for the endangered northern quoll Dasyurus hallucatus* (Department of the Environment, 2016), critical habitat usually occurs in the form of:

- off-shore islands where northern quoll is known to exist
- rocky habitats such as ranges, escarpments, mesas, gorges, breakaways, boulder fields, major drainage lines or treed creek lines
- structurally diverse woodland or forest areas containing large diameter trees, termite mounds or hollow logs.

Dispersal and foraging habitat associated with/connecting 'populations important for the long-term survival of the northern quoll' is also considered critical habitat. Populations important for the long-term survival are defined within the *EPBC Act referral guidelines for the endangered northern quoll Dasyurus hallucatus* (Department of the Environment, 2016) and are defined above.

Modelled habitat within the Project Area is not considered to meet the definition of habitat critical to the survival of the species as it does not "provide shelter for breeding, refuge from fire/or predation and potential poisoning from cane toads". Denning and refuge habitat is mapped within the Project Area and Disturbance Footprint, however it is not considered high quality. This habitat is impacted by fragmentation, edge effects, weeds and pests including cane toad and feral predators which are likely to compete with and prey upon northern quolls. No major watercourses occur in adjacent areas of suitable habitat and permanent water is limited to occasional farm dams. Although some sections of habitat contain granite rocks, potential breeding and denning sites are rare.

Northern Quoll

Any population of northern quoll which may occur within the Project Area is unlikely to be a population important for the long-term survival of the species. Given appropriate survey effort has been undertaken, and no evidence of northern quoll was recorded, any population of northern quolls that may occur is not a high-density population, in line with the characterisation of a 'high density population' in the referral guidelines. As described above, the Project Area is not free from cane toads, nor does it contain individuals which are subject to conservation or research actions. Based on this, mapped habitat for the species within the Project Area is not considered habitat critical to the survival of the species.

Current threats to the species

Key threats to northern quoll include the loss, degradation and fragmentation of habitat, inappropriate fire regimes, and lethal toxic ingestion caused by cane toads (a key threatening process listed under the EPBC Act). As per the species SPRAT profile (Department of Climate Change, Energy, Environment and Water, 2025), other recognised potential threats to the species include:

- introduction of invasive species leading to increased competition, direct predation and habitat degradation (i.e. gamba grass, which may limit dispersal)
- direct mortality as a result of vegetation clearing and traffic
- pastoralism, leading to altered fuel loads and fire regimes
- disease (e.g. toxoplasmosis).

Recovery plan

National Recovery Plan For the Northern Quoll Dasyurus hallucatus (Hill & Ward, 2010b).

In the Project Area

Surveys

Field surveys have been undertaken within the Project Area from March 2023 to July 2025, which included 422 habitat assessments, (including searches for suitable denning sites) and deployment of 28 remote cameras during the reconnaissance survey (in March 2023), and 32 remote cameras during the targeted survey (in July 2024) in locations identified as potential habitat. Cameras were baited using a combination of chicken coupled with a bolus of rolled oats, peanut butter, honey and vanilla essence, for a total of 1,061 camera trap nights in suitable habitat.

Species occurrence

Northern quoll is considered to have a moderate likelihood of occurrence within the Project Area due to the presence of denning and refuge, and foraging and dispersal habitat.

Habitat within the Project Area

Habitat type	Habitat modelling criteria	Area (ha)	
		Project Area	Disturbance Footprint

Northern Quoll			
Denning and refuge	This habitat type is eucalypt woodland on hills and slopes (RE 11.11.15, 11.11.4, 11.12.1) and vine thicket (RE 11.10.8 and 11.11.18). Vegetation, watercourse, and 1-10 m contour mapping was examined in conjunction with survey data (including floristics and habitat assessments) and high-quality Queensland Globe satellite imagery to manually identify hilly and rocky habitats including gullies, creek lines and structurally diverse woodlands. No regrowth woodlands, shrublands or grasslands (including marine habitats) were considered suitable due to a lack of denning opportunities as per the findings of the field survey.	2,475.4	38.4
Foraging and dispersal	All remnant and regrowth vegetation communities within 1 km of denning and refuge habitat is considered foraging and dispersal habitat. Habitat captured by buffering denning and refuge habitat by 1 km and excluding non-remnant areas where pressure from threats including agricultural activities, inappropriate fire regimes, weeds and feral animal predation is severe (i.e. exotic grasslands).	2,550.9	53.8

Table 8.45 Assessment of Potential Project Impacts and Mitigation and Management Commitments for Northern Quoll

Potential Impact	Assessment	Mitigation Commitments
Direct		
Vegetation clearing causing habitat loss and fragmentation	Removal of 92.2 ha of habitat is unavoidable for construction of the Project. This will result in localised reductions of denning and foraging resources, however, the species utilises a variety of denning resources, so localised loss is unlikely to be limiting given the vast areas of suitable habitat in the surrounding landscape. Clearing will occur along narrow corridor and connectivity within and to adjacent protected areas	• Identify MNES fauna habitat and individuals through pre-clearance surveys • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Disturbance activities must be contained to Disturbance Footprint • Habitat features will be retained and relocated to the edge of the Disturbance Footprint or to nearby areas of suitable habitat. • During the pre-clearance survey, the fauna spotter-catcher will locate, record and mark the habitat features (including those to be retained in situ) • Refer to Table 5.1 and Table 5.8 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
	will be largely maintained, therefore the proposed clearing is unlikely to fragment habitat for this highly mobile species.	
Direct mortality	Physical trauma and mortality have the potential to occur during all phases of the Project; however, the highest likelihood will be during construction activities that involve vegetation clearing. Traffic movement will be heaviest during construction, increasing the risk of vehicle collision, however, as northern quoll is nocturnal, it is unlikely to be on roads during the busiest construction hours (typically 6.30 am to 6.30 pm).	• Appropriately qualified fauna spotter catcher to undertake pre-clearance habitat assessment and be present during clearing and disturbance to habitat features • Clearing must be staged, with non-habitat trees felled first • Clear delineation of habitat features to be retained • Restrict vehicles to approved access tracks • Vehicle travelling speed restricted to <40 km/hr • Excavations must be secured (e.g. covered) • Pre-clearance surveys to include den searches • Active dens to be managed in accordance with high risk Species Management Program • Any material stockpiled (that may be utilised by northern quolls) for greater than 24 hours must be inspected by fauna spotter prior to disturbance • Clearing within denning and refuge habitat will aim to be completed outside of breeding season • Refer to Table 5.3 of the MNES Management Plan for further details on mitigation measures.
Indirect		
Alterations to fire regimes including uncontrolled fires	Changes to fire frequency within the Project Area could result in injury or mortality, habitat loss and degradation, increased competition for food resources and loss of denning resources. Although the increased plant and vehicle presence will result in an increased number of potential ignition sources, employment of	• Bushfire Management Plan will be developed • Burning of vegetation strictly prohibited unless a permit is obtained • Designated parking areas for vehicles and machinery • During operation, vegetation within the Disturbance Footprint will be managed in accordance with Powerlink's vegetation specification • Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance

Potential Impact	Assessment	Mitigation Commitments
	standard construction protocols will ensure the risk of bushfire is actively managed. Proliferation of weeds that increase fuel loads would also be managed.	• Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • Refer to Table 5.5 and Table 5.9 of the MNES Management Plan for further details on mitigation measures.
Increased incidence of feral predators and cane toads.	The widening of access tracks may promote easier access for introduced predators; however, feral species already exist within the Project Area and the movement of predators from neighbouring areas is highly likely.	• All waste to be secured • Biosecurity Instrument Permit to be obtained for moving materials out of or within different biosecurity zones • Educate workforce in the identification of pest fauna species • Avoid inclusion of any water retaining voids or pits • In temporary/permanent washdown facilities, the inclusion of structures and vegetation unsuitable for cane toad persistence and reproduction will be employed • Refer to Table 5.6 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Noise, artificial light and vibration generated during construction and operation interrupting foraging, breeding or dispersal behaviours	Northern quoll is a nocturnal species; therefore, its peak activity period is outside of the normal construction hours (6.30am to 6.30pm) when noise and vibration levels will be highest. During operation noise generated by the high voltage transmission line infrastructure could result in some avoidance of the immediate area, however this is unexpected to be significantly greater than the noise generated by the existing adjacent transmission line. Artificial lighting has potential to increase visibility of northern quoll to predators and could result in avoidance of brightly lit areas, or avoidance of those areas by prey, which may result altered foraging areas. However, this species exhibits some resilience to such impacts as it is regularly recorded in urban areas, farm houses and worker camps where it benefits from increased scavenging resources.	• Plant and equipment to be fitted with appropriate noise attenuation and maintained • Deliveries and removal of material and equipment to and from site within approved hours for construction • Plant to be turned off when not in use • No unnecessary use of horns or other audible signals on mobile plant or equipment • Machinery and equipment will be maintained in good working condition • Refer to Table 5.10 of the MNES Management Plan for further details on mitigation measures.

Table 8.46 Significant Impact Assessment: Northern Quoll

Impact Criteria	Assessment
Lead to a long-term decrease in the size of a population	**Unlikely** Despite a comprehensive search effort, no northern quolls have been recorded within the Project Area. The Project Area does however occur within the 'likely to occur' extent of the species mapped distribution as per the SPRAT database. On this basis, it is considered possible that within the life of the Project northern quoll individuals may temporarily utilise habitat within the Project Area, likely while dispersing to other more suitable patches of intact habitat that exist in the surrounding region. Given the lack of structural diversity and complexity as well as limited denning sites, and the presence of cane toads, habitat in the Project Area is not habitat critical to the survival of the species as defined in the *EPBC Act referral guideline for the endangered northern quoll Dasyurus hallucatus*. Under worst-case scenario, a maximum of 92.2 ha of northern quoll habitat will be directly impacted for construction of the Project, including 38.4 ha suitable for denning and refuge and 53.8 ha suitable for foraging and dispersal. Habitat is of low quality due to the presence of cattle, weeds and pests including feral cats, which were recorded during the field survey program, and historical clearing for the existing transmission line. Potential habitat is also considered highly unlikely to support an important population, given the results of the targeted northern quoll survey which was in line with the recommended survey methodology. Habitat proposed to be cleared lies adjacent to an existing transmission line, however, as the species is highly mobile, the Project is unlikely to fragment habitat or create a barrier to movement to large areas of suitable habitat that exist in the surrounding region. Denning resources are very scarce in the Project Area and would be searched during pre-clearance surveys to flush out any individuals prior to direct impacts occurring. A suite of best practice mitigation measures will be implemented to protect the habitat that is to be retained from indirect impacts such as habitat degradation and exacerbation of feral predator populations. There may be a period of avoidance in response to increased noise and activity at the clearing front, however, the species is resilient to human disturbance and therefore it is not expected that local populations would decline in the long-term. As the species, if present, is only present in very low numbers and the Project would not impact habitat critical to the survival of the species or an important population, the Project is unlikely to lead to a long-term decrease in the size of a population.
Reduce the area of occupancy of the species	**Unlikely** Northen quoll populations are fragmented in Queensland, and its range is in decline (Hill & Ward, 2010b). Removal of up to 92.2 ha of habitat is unavoidable for construction of the Project. Habitat in the Project Area extends along a narrow corridor adjacent to an existing transmission line and is subject to a number of threatening processes, including weeds, cane toads and feral predators. Denning resources are limited, and the species was not recorded in the Project Area despite extensive survey effort. The Project Area is not located at the edge of the species range and would not create a barrier to movement for northern quoll into areas of surrounding suitable habitat. Where habitat features such as hollow logs must be removed, efforts will be made to reinstate or relocate features to adjacent areas of habitat where safe to do so, and where this can be achieved without disturbing the habitat. Overall, the quantum of

Impact Criteria	Assessment
	habitat and habitat features that will remain following construction of the Project is considered sufficient to maintain the potential low-density population present. The Project is unlikely to reduce the area of occupancy of the species.
Fragment an existing population into two or more populations	**Unlikely** The northern quoll is highly mobile and may utilise open habitats such as grasslands while foraging or dispersing through the landscape. The Project Area has a relatively high degree of connectivity to external areas, and this connectivity will be largely maintained following the construction of the Project. During construction, increased vehicle activity, open excavations, vegetation clearing and associated indirect impacts such as noise and lighting may present temporary barriers to dispersing individuals. However, the risk of mortality from clearing and vehicle collision will be actively managed via measures consistent with the key objectives outlined in the MNES Management Plan. Potential den sites would be inspected during pre-clearance surveys immediately prior to clearing and vehicle traffic will be localised to the construction site with speed limits will be enforced. Any open excavations will be appropriately covered or fenced. These excavations would be temporary and only present in a small area within the site at any one time. Once constructed, the Project itself will not create a barrier to movement as ground surfaces will be reinstated, and towers will occur only in discrete locations. Based on the above reasons, the Project is unlikely to present significant barriers to a potential population to the extent where it would become fragmented into two or more populations.
Adversely affect habitat critical to the survival of the species	**Unlikely** Northern quoll was not recorded in the Project Area despite a comprehensive targeted survey program. Habitat in the Project Area does not meet the definition of habitat critical to the survival of the species, due to the presence of multiple threatening processes and a lack of structural and resource complexity. Habitat proposed to be cleared for the Project is low quality and likely represents dispersal habitat into areas of relatively high-quality intact habitat in the surrounding region. Given the species high mobility capacity, the Project is unlikely to create a barrier to movement to those areas. Vegetation clearing will be completed in phases, ensuring only a subset of the Disturbance Footprint is impacted at one time and allowing time for individuals to relocate. Although there may be a period of avoidance while clearing is underway, it is not expected the species would permanently vacate the area. Where habitat features such as hollow logs must be removed, efforts will be made to reinstate or relocate features to adjacent areas of habitat where safe and not overly disruptive to the environment. As northern quoll utilises a variety of habitat resources, it is anticipated that sufficient habitat and habitat features will remain following construction of the Project to support the low-density population that may be present. Given the species is likely present in low-densities or transiently, and the fact that critical habitat is not present, the Project is unlikely to adversely affect habitat critical to the survival of the species.

Impact Criteria	Assessment
Disrupt the breeding cycle of a population	**Unlikely** Northern quolls breed once per year, after which the males typically die off, leaving populations particularly vulnerable to local extinction (Hill & Ward, 2010b). The breeding season occurs in winter and lasts a few weeks, with an average litter of seven pups being produced (DAWE 2021). Although it is expected that northern quoll is present in low densities in the Project Area, individuals are most active during the breeding season as they move around in search of a mate, therefore during construction increased vehicle activity and vegetation clearing present a greater risk of injury or mortality to northern quoll individuals. However, as the species is nocturnal, most of its activity will occur outside of typical construction hours (6.30 am–6.30 pm). The Project will actively manage the risk of mortality and vehicle collision in accordance with a suite of management plans which all personnel will be required to abide by to protect the local breeding population of northern quoll. Vegetation clearing will be completed in phases, ensuring only a subset of the Disturbance Footprint is impacted at one time, allowing individuals to self-relocate. Immediately prior to clearing occurring, qualified fauna spotter catchers will inspect and clear all potential den sites. Fauna spotter catchers will also be required to search and clear all stockpiled materials which may have inadvertently created a breeding place for northern quoll prior to those stockpiles being disturbed. If an active den is located it would be managed in accordance with Table 5.3 of the MNES Management Plan. Denning resources are scarce in the Project Area and, where safe to do so, habitat features such as large hollow logs would be retained and relocated into habitat adjacent to the clearing area. Given the Project Area northern quoll in low densities, through proper implementation of management protocols, pre-clearance inspections and retention of habitat features, the Project is unlikely to disrupt the breeding cycle of a population.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely** The Project will remove up to 92.2 ha of northern quoll habitat that is of low quality due to the presence of cattle, weeds and pests, including cane toad and feral cats. There is limited availability of microhabitat resources such as den sites due to low structural complexity in the Project Area. Large hollow logs that must be removed from areas of potential northern quoll habitat will be retained and relocated to the edge of the Disturbance Footprint or to nearby areas of suitable northern quoll habitat. Northern quoll was not recorded in the Project Area despite considerable survey effort, therefore, if it is present, it would be expected that the local population is of low density, and the Project Area is likely used transiently as individuals disperse to higher quality habitat in the surrounding region. Of the 92.2 ha, a small portion will be selectively cleared rather than fully cleared, providing the opportunity for the shrub layer and potentially low trees to be retained during construction and operation. The retention of lower vegetation may provide or assist in movement and ground level foraging opportunities for this species. The Project Area does not comprise habitat critical to the survival of the species and does not support an important population. The Project would not create a barrier to movement for the species which is highly mobile. Biosecurity measures will be

Impact Criteria	Assessment
	implemented to control indirect impacts such as weed incursions. Where suitable habitat features such as large hollow logs can be safely retained, they will be retained in-situ or will be relocated to adjacent areas. Given the above, the Project is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	**Unlikely** Several invasive species are a recognised threat to the northern quoll. Weeds may degrade habitat and increase bushfire intensity and exotic fauna species including feral cats, pigs, wild dogs and cattle may directly predate or compete with the northern quoll or spread disease. Cane toads in particular have known to cause significant local declines as ingestion usually results in death. Invasive species relevant to northern quoll, particularly weeds including exotic grasses, feral cats and cane toads, were recorded throughout the field survey program and are likely to be well established in the Project Area and surrounds. Although modelled habitat is generally moderately connected, existing conduits for movement do occur comprising cleared areas for tracks and the existing transmission line. Although the Project is unlikely to exacerbate invasive species levels beyond the current extent, the Project will employ best practice control methods for weeds and pests. To ensure cane toad breeding opportunities are not provided, where pits, voids or trenches are required they will be appropriately covered or drained to prevent extended water retention in these spaces. Monitoring will ensure any pest population outbreaks are detected and managed as required. Given the extent of existing threats and the Projects biosecurity obligations, the Project is unlikely to result in invasive species that are harmful to northern quoll becoming established, beyond the levels that currently exist.
Introduce disease that may cause the species to decline	**Unlikely** There have been limited studies into the effects of disease on northern quoll. Of the studies that have been undertaken, there is anecdotal, though no empirical evidence, that disease is a threatening process for the species. The Project will implement strict biosecurity protocols to prevent contaminated material entering the Project Area. Clearing will be linear in nature and will not isolate a population of northern quoll or present a barrier to gene flow so does not present a risk of increased susceptible to disease through reduced genetic diversity. Clearing will occur in stages so that only a subset of the Disturbance Footprint is affected at one time, allowing for self-relocation and reducing the likelihood of a stress response increasing an individual's susceptibility to disease. If any individuals showing signs of illness were captured during the course of the Project they would be appropriately managed by a fauna spotter catcher. No sick or injured individuals would be released into the wild unless at the discretion of a suitable qualified fauna spotter catcher confirming sick individuals as males undergoing a natural post-mating die-off. As the Project Area would support northern quoll in low densities, disease at a local scale would be unlikely to cause a decline in the species overall. The Project is unlikely to introduce disease that may cause the species to decline.

Impact Criteria	Assessment
Interfere with the recovery of the species	**Unlikely** *National Recovery Plan for the Northern Quoll Dasyurus hallucatus* (Hill and Ward 2010) identifies the following specific objectives for northern quoll recovery: • Protect northern quoll populations on offshore islands from invasion and establishment of cane toads, cats and other potential invasive species • Foster the recovery of northern quoll sub-populations in areas where the species has survived alongside cane toads • Halt northern quoll declines in areas not yet colonised by cane toads • Halt declines in areas recently colonised by cane toads • Maintain secure populations and source animals for future reintroductions/introductions, if they become appropriate • Reduce the risk of northern quoll populations being impacted by disease • Reduce the impact of feral predators on northern quolls • Raise public awareness of the plight of northern quolls and the need for biosecurity of islands and WA. The Project does not interfere with the recovery objectives listed above. The Project is not located on an offshore island or in Western Australia. Cane toads are already established in the Project Area. Northern quoll was not recorded despite considerable survey effort, and it is unknown how much of an impact cane toads or disease had or continue to have on the local population. As it is potentially present in low densities or on a transient basis, the local population would not comprise an appropriate population from which to source individuals for reintroductions elsewhere.
Significant Residual Impact	**Unlikely to have a significant impact**

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FIGURE 8.15-1

Northern Quoll Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

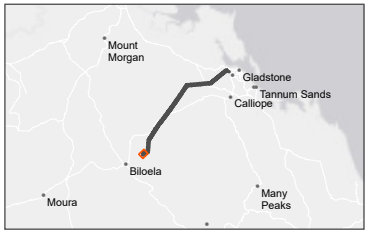
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Northern Quoll Habitat

- Denning and refuge
- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
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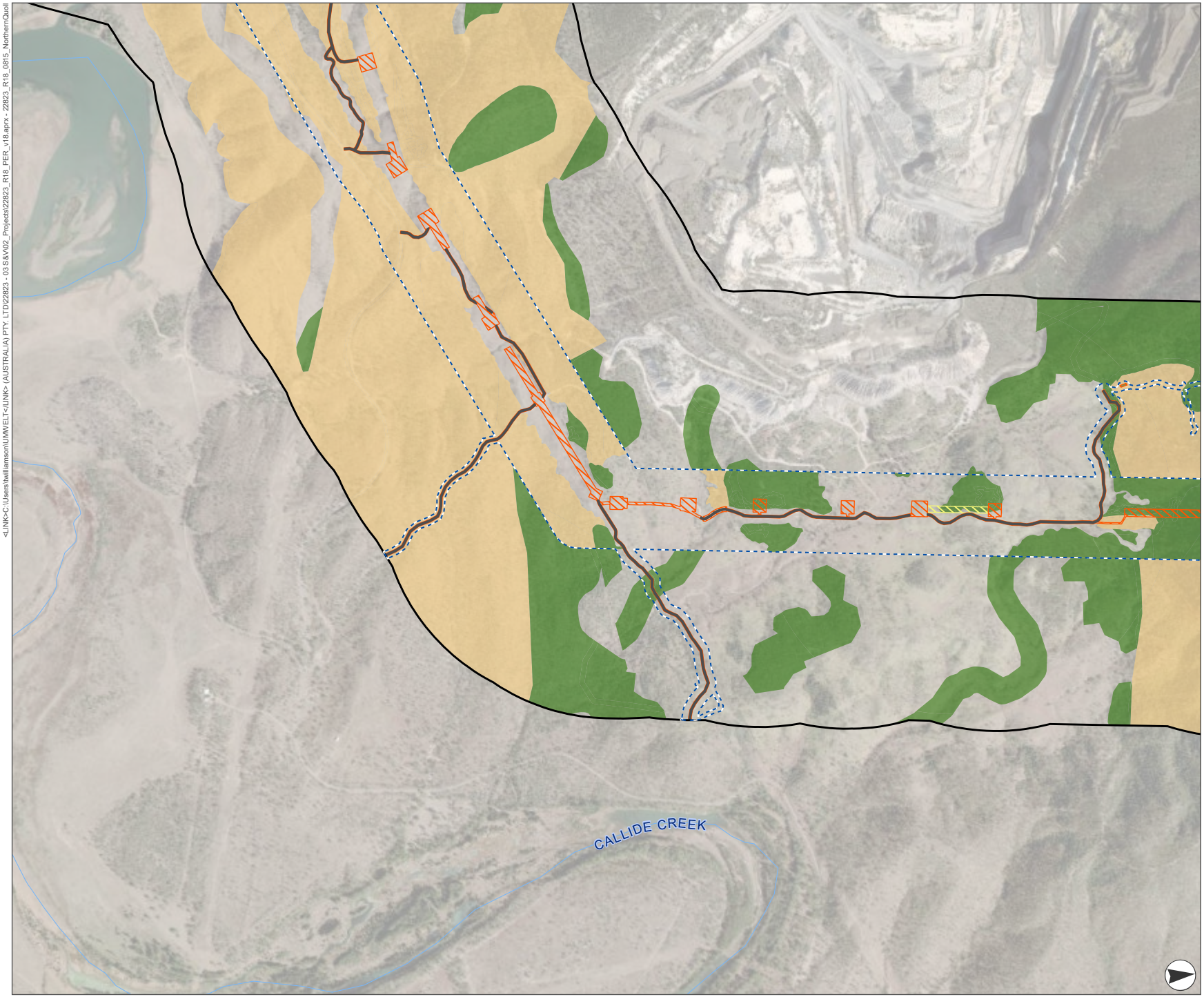


FIGURE 8.15-2

Northern Quoll Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

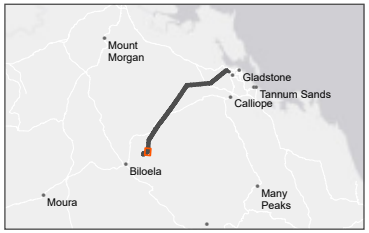
- Watercourse
- Field Survey Extent
- Project Area

Northern Quoll Habitat

- Denning and refuge
- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
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FIGURE 8.15-3

Northern Quoll Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

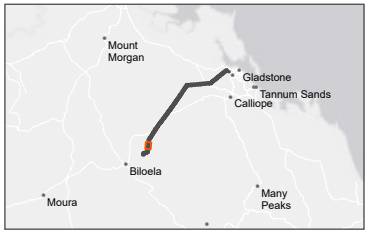
- Field Survey Extent
- Project Area

Northern Quoll Habitat

- Denning and refuge
- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
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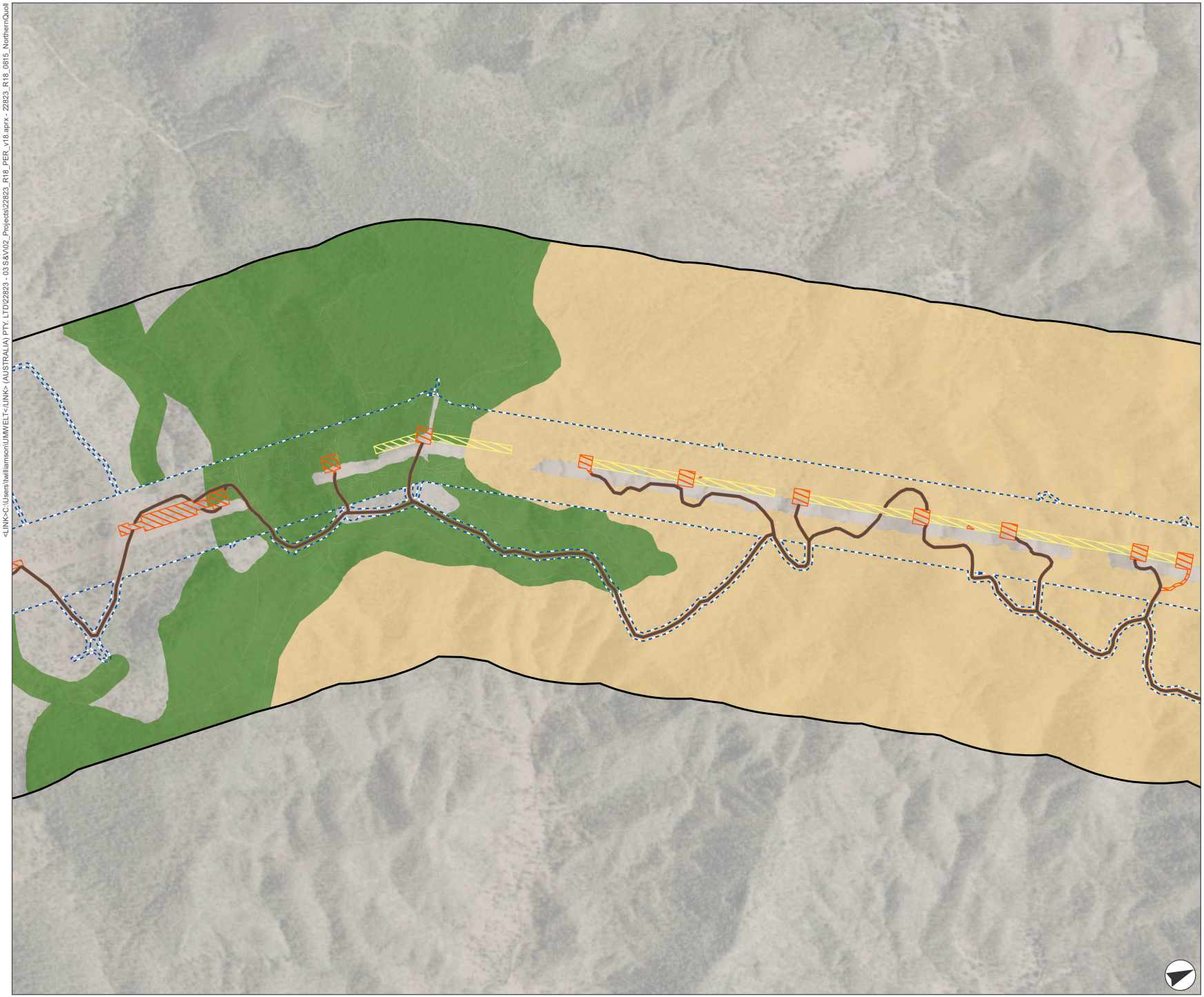


FIGURE 8.15-4

Northern Quoll Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

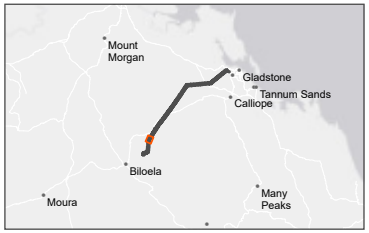
- Field Survey Extent
- Project Area

Northern Quoll Habitat

- Denning and refuge
- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



0 0.5 1

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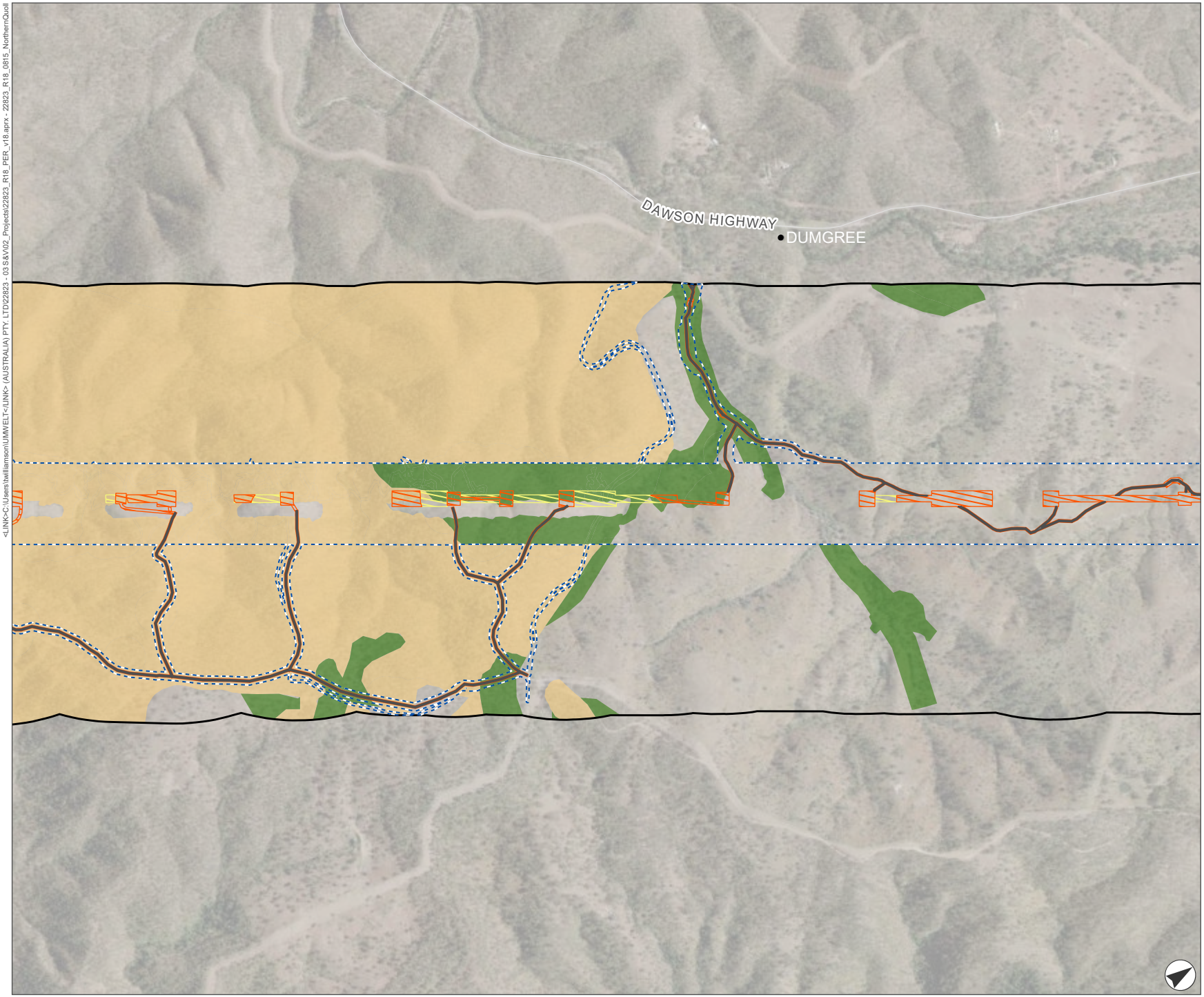


FIGURE 8.15-5

Northern Quoll Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

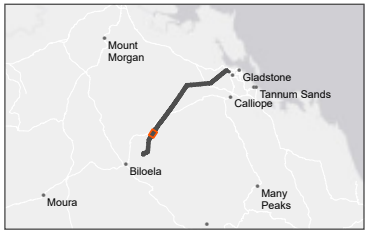
- Roads
- Field Survey Extent
- Project Area

Northern Quoll Habitat

- Denning and refuge
- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.15-7

Northern Quoll Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

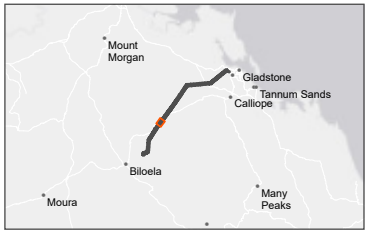
- Roads
- Watercourse
- Field Survey Extent
- Project Area

Northern Quoll Habitat

- Denning and refuge
- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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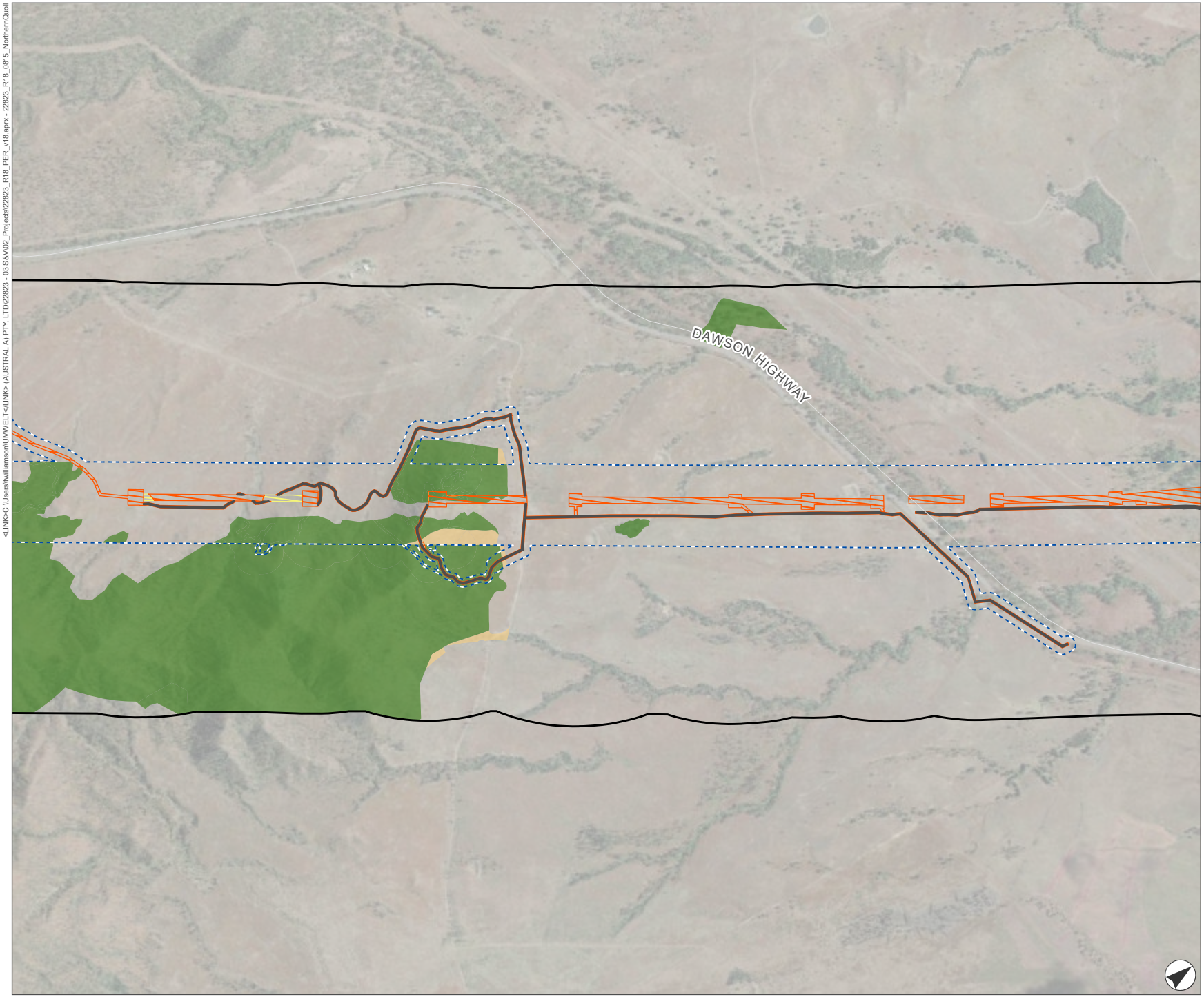


FIGURE 8.15-8

Northern Quoll Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

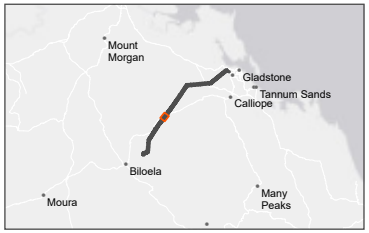
- Roads
- Field Survey Extent
- Project Area

Northern Quoll Habitat

- Denning and refuge
- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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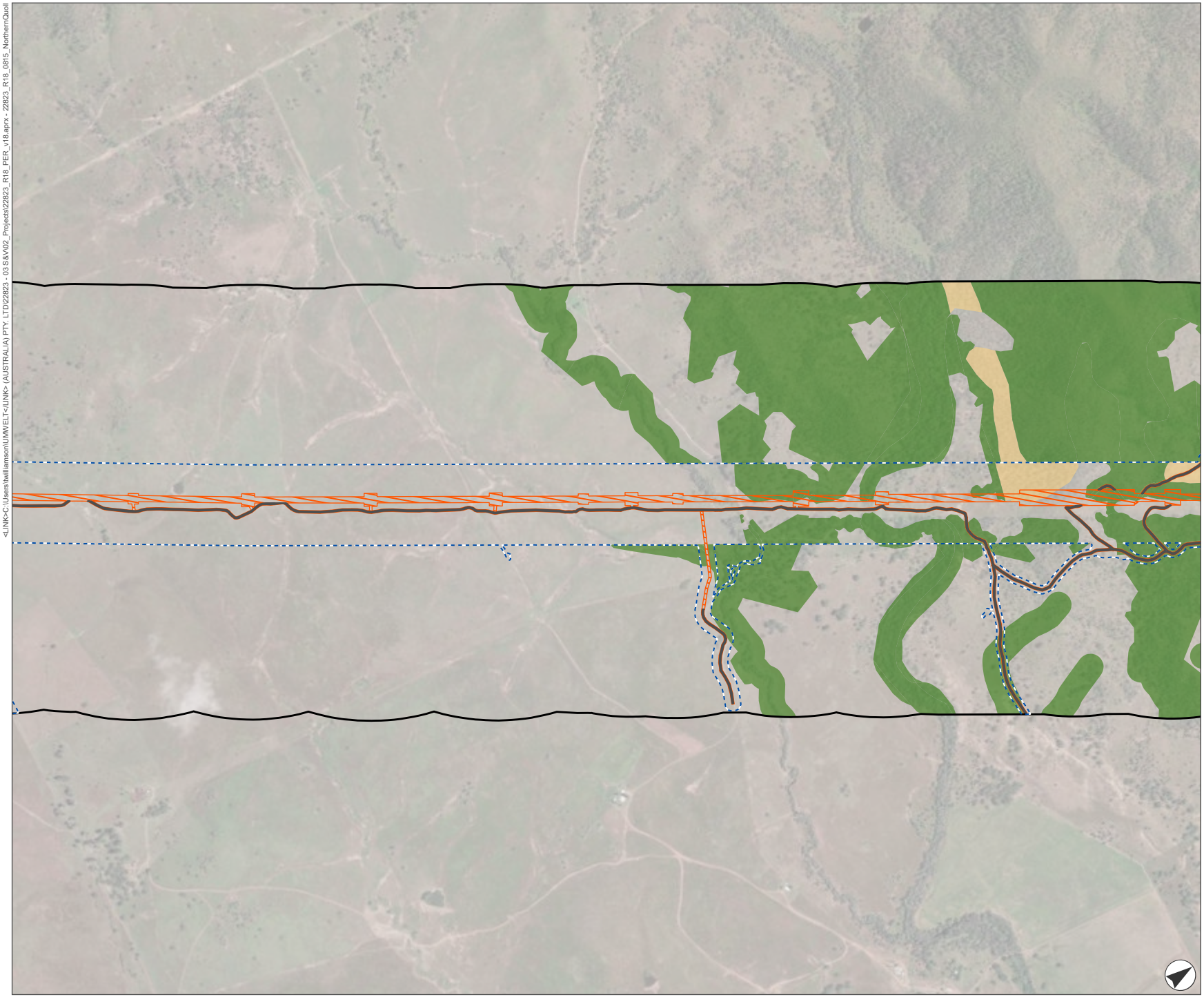


FIGURE 8.15-11

Northern Quoll Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

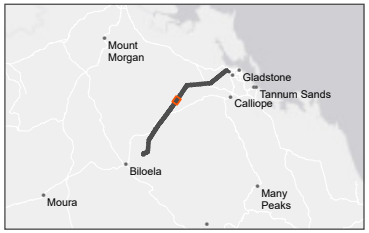
- Field Survey Extent
- Project Area

Northern Quoll Habitat

- Denning and refuge
- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.15-12

Northern Quoll Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

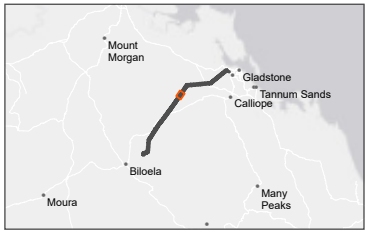
- Field Survey Extent
- Project Area

Northern Quoll Habitat

- Denning and refuge
- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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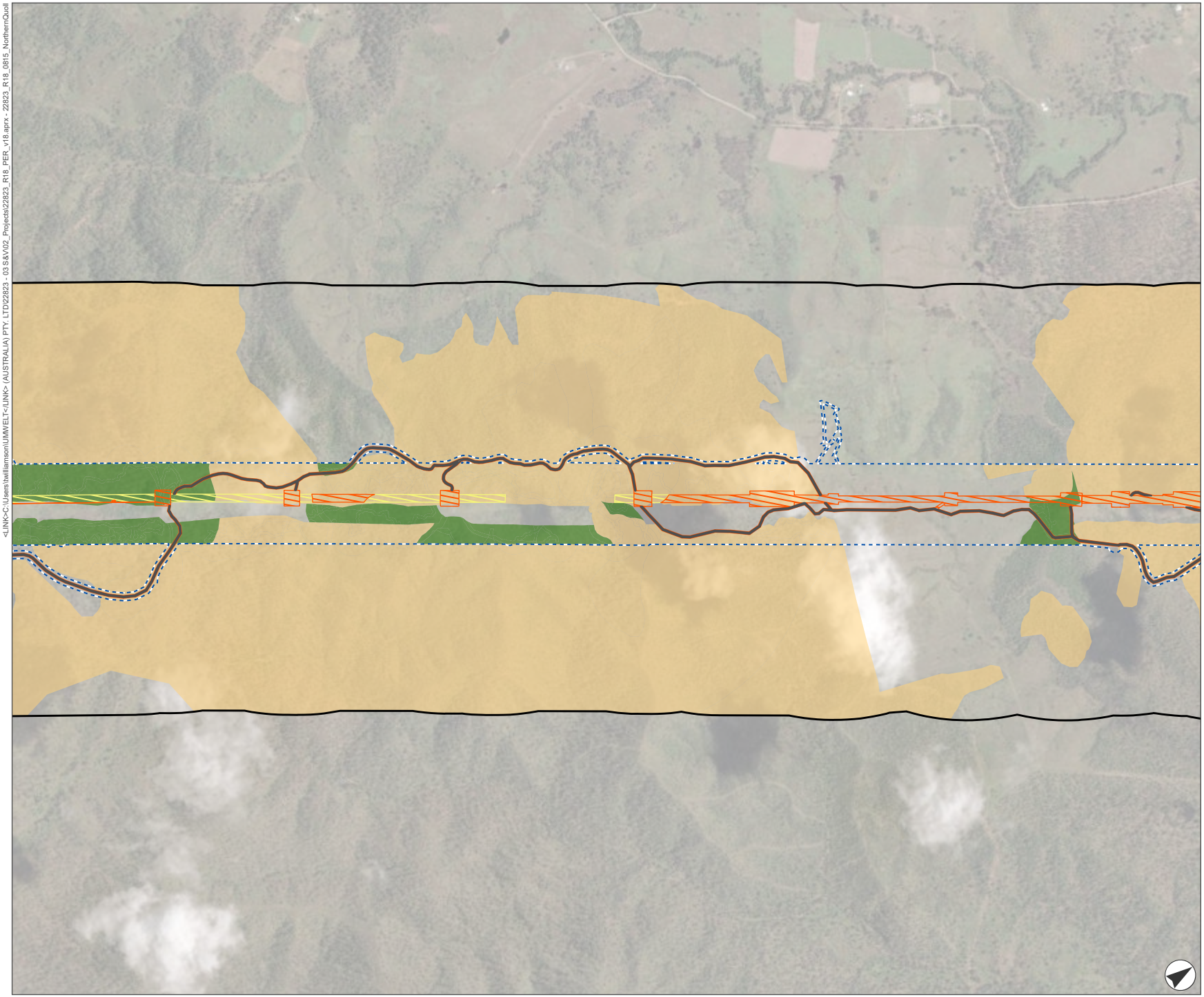


FIGURE 8.15-13

Northern Quoll Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

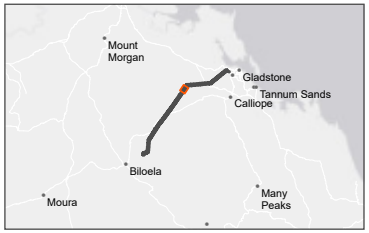
- Field Survey Extent
- Project Area

Northern Quoll Habitat

- Denning and refuge
- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.15-14

Northern Quoll Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

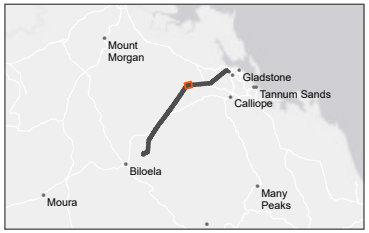
- Field Survey Extent
- Project Area

Northern Quoll Habitat

- Denning and refuge
- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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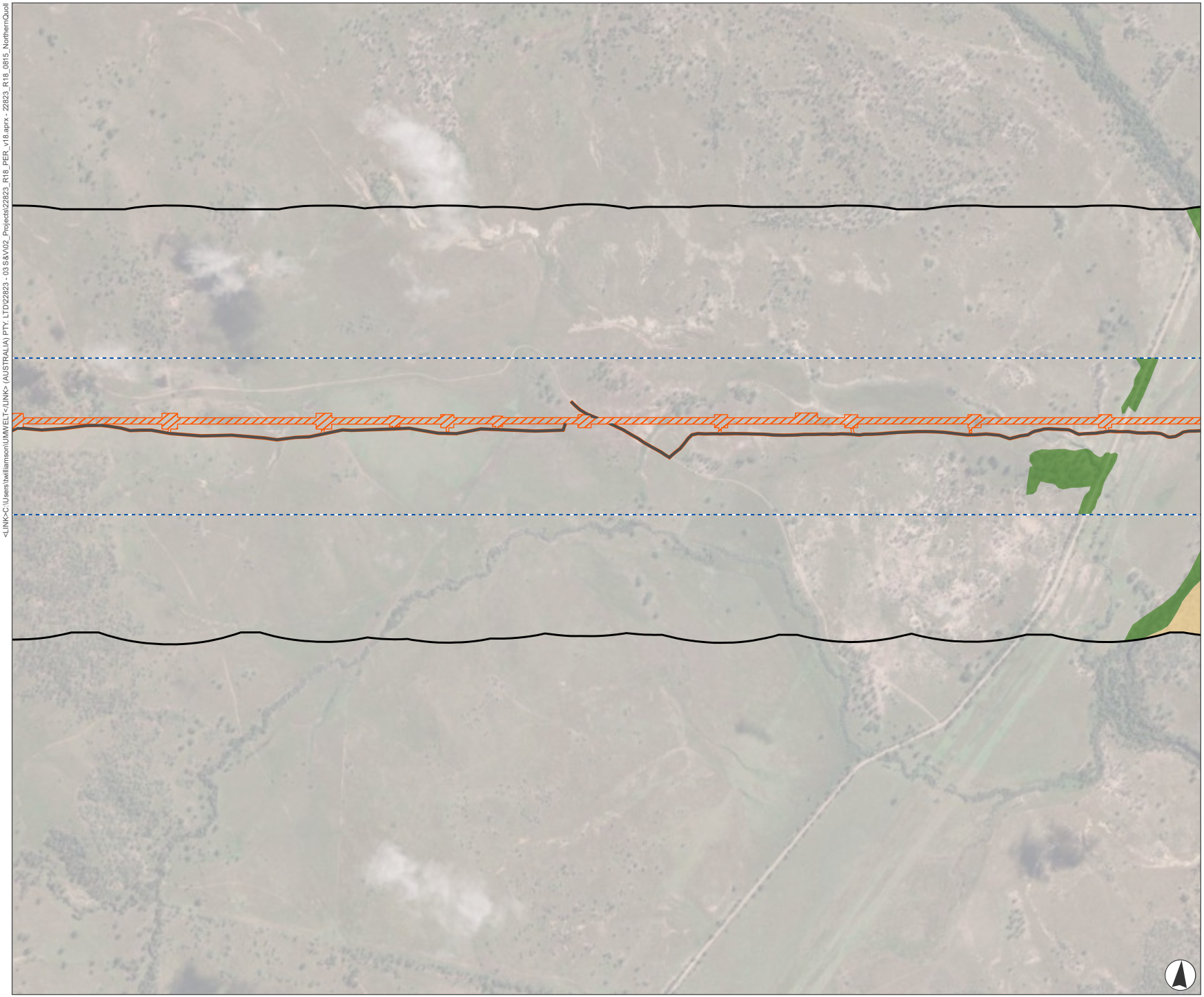
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FIGURE 8.15-15

Northern Quoll Records and Habitat within the Field Survey Extent and Disturbance Footprint



Legend

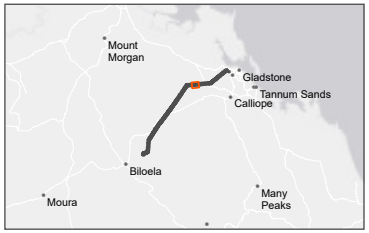
- Field Survey Extent
- Project Area

Northern Quoll Habitat

- Denning and refuge
- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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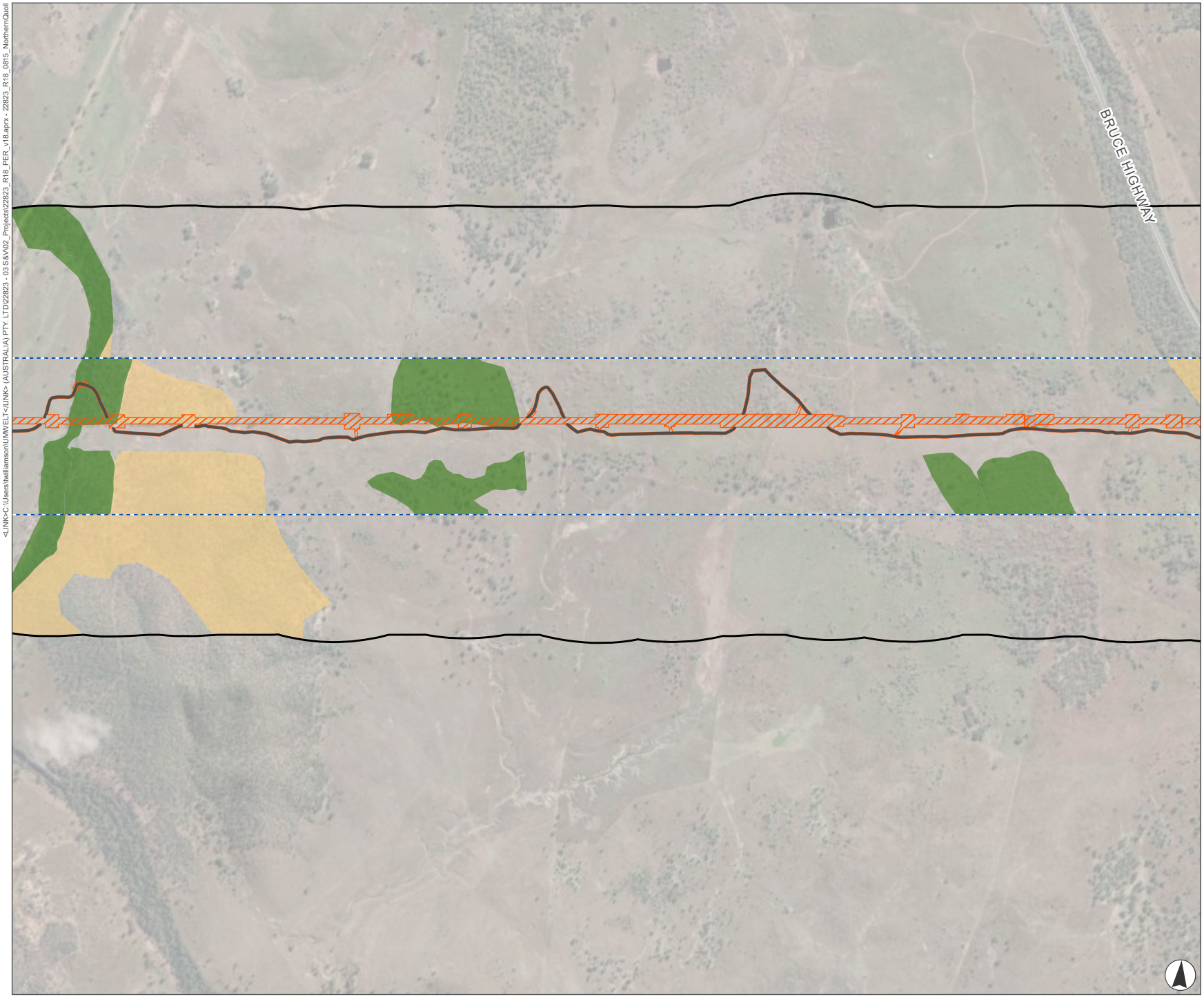


FIGURE 8.15-16

Northern Quoll Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

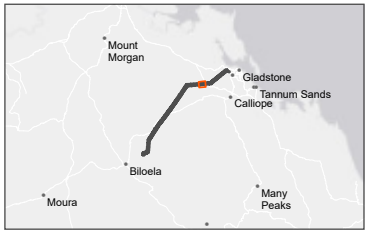
- Roads
- Field Survey Extent
- Project Area

Northern Quoll Habitat

- Denning and refuge
- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.15-17

Northern Quoll Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

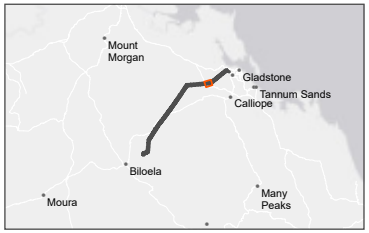
- Roads
- Field Survey Extent
- Project Area

Northern Quoll Habitat

- Denning and refuge
- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.15-18

Northern Quoll Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

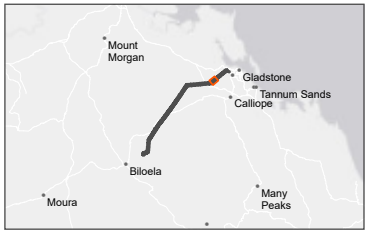
- Field Survey Extent
- Project Area

Northern Quoll Habitat

- Denning and refuge
- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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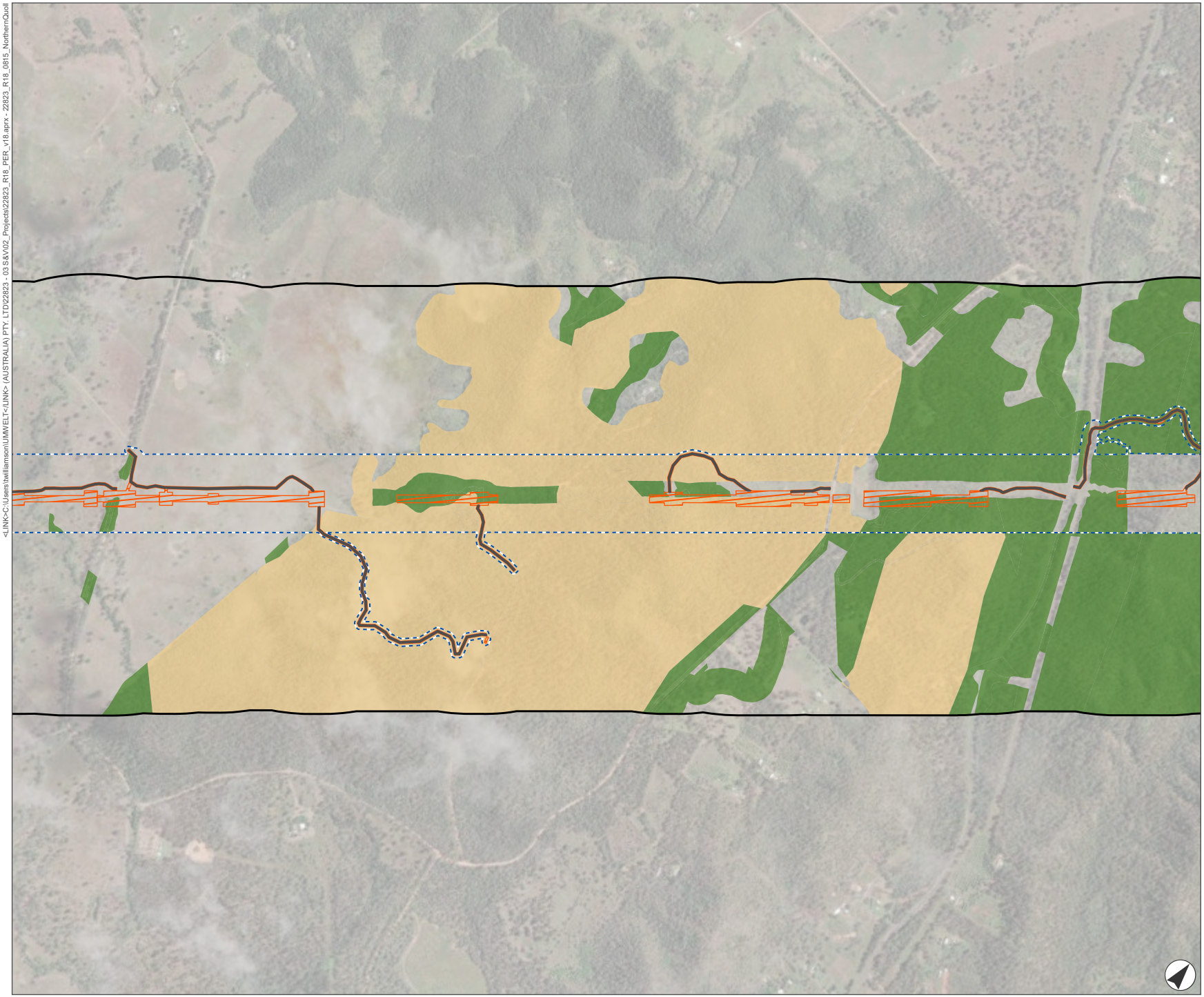


FIGURE 8.15-19

Northern Quoll Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

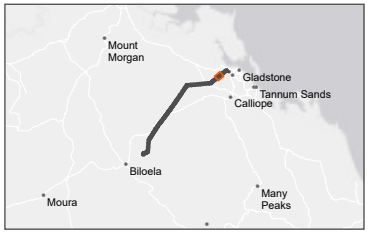
- Field Survey Extent
- Project Area

Northern Quoll Habitat

- Denning and refuge
- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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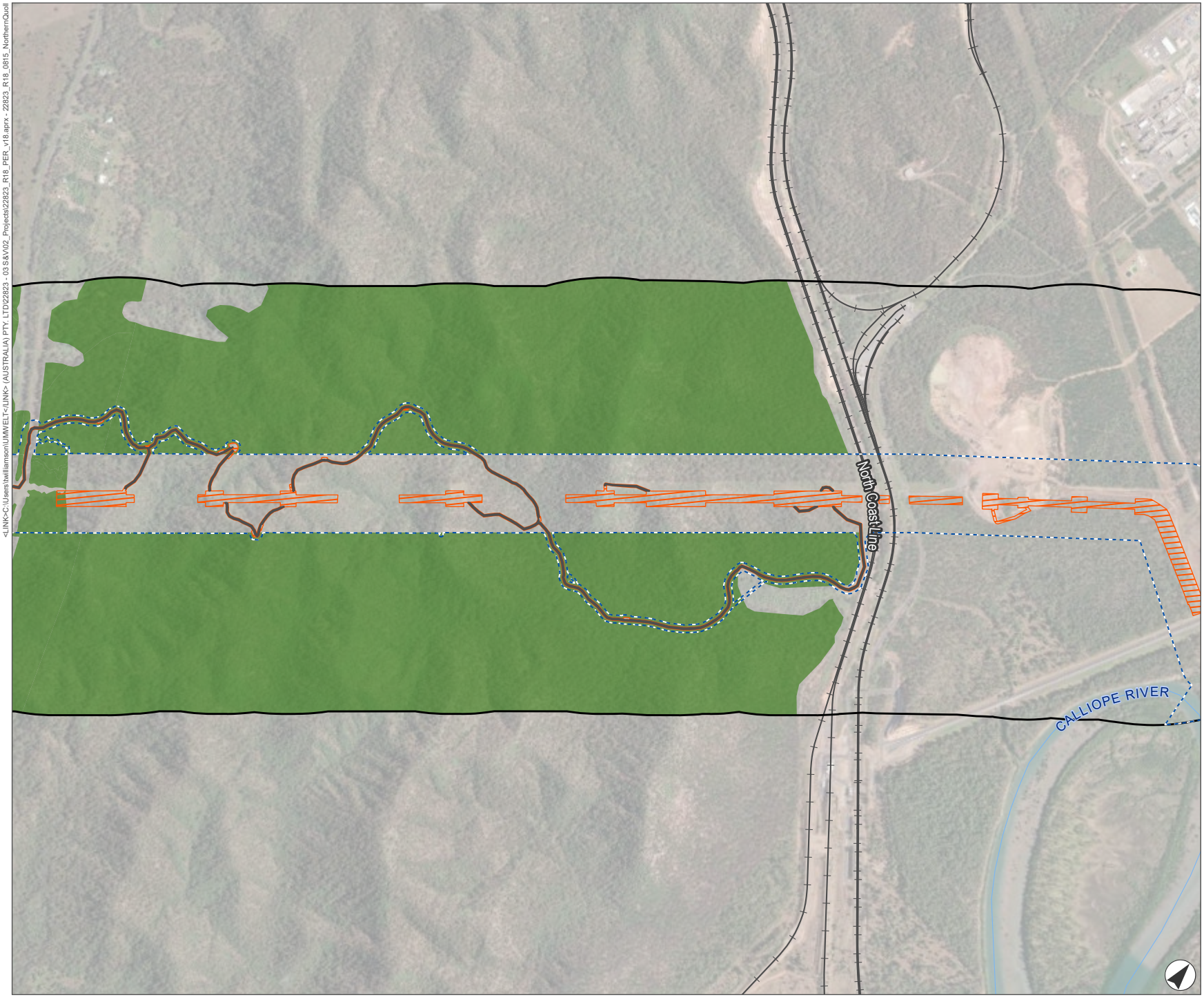


FIGURE 8.15-20

Northern Quoll Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

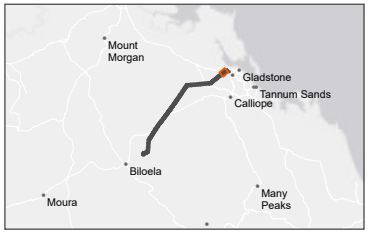
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Northern Quoll Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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Kilometres

Scale 1:20,000 at A4
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FIGURE 8.15-21

Northern Quoll Records and Habitat within the Field Survey Extent and Disturbance Footprint



Legend

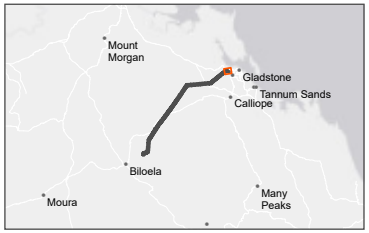
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Northern Quoll Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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8.2.7 Vulnerable Fauna Species

8.2.7.1 Black-breasted Button Quail (*Turnix melanogaster*)

Table 8.47 Black-breasted Button Quail: Ecology and Relevance to the Project Area

Black-breasted Button Quail	
Profile	**Conservation status** Vulnerable **Distribution** Black-breasted button quail occurs across south-eastern Queensland and parts of northern New South Wales. According to SPRAT, prior to about 1900, this species was probably widespread in the Dawson and Fitzroy River catchments in Queensland, but these populations have declined dramatically since then. Present-day known distribution in Queensland extends from near Byfield in the north, south to the New South Wales border and westwards to Palm Grove National Park and Barakula State Forest. The extent of occurrence is estimated to be approximately 5,200 km^2, however it is believed to have decreased, especially in Queensland where there have been few recent records from much of the Rockhampton and Dawson River areas. The dispersion patterns of this species are poorly known. It is generally considered to be sedentary, although it can appear intermittently or as a transient in other areas. **Important population** The species *National Recovery Plan for Black-breasted Button-quail (Turnix melanogaster)* (Department of Climate Change, Energy, the Environment and Water, 2022e) does not define important populations of this species, as such, the generic description as defined in the Significant Impact Guidelines has been used which includes populations 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. Any potentially occurring population of this species is unlikely to rely heavily on habitat within the Project Area for breeding and dispersal given the linear nature of the Project and the intermitted disturbance expected. Based on the above definition and the species' preference for fertile soils and/or coastal environments, any individuals within the Project Area are not considered to comprise an important population. **Historical records within the desktop search extent** The most recent WildNet record within the search extent dates from 1999, approximately 2 km north of Section D near Aldoga. Other ALA records are scattered more broadly, with one undated record located south of the Project Area at Kroombit Tops National Park, and records from 1997 and 1999 approximately 10 km north of Section D. Boyne Island also has scattered records ranging from 2007–2017 (ALA, 2025). **Habitat**

Black-breasted Button Quail

Black-breasted button quail is restricted to rainforests and dense forests, mostly in areas with 770–1,200 mm rainfall per annum. They prefer drier low closed forests, particularly semi-evergreen vine thicket and other vine forest communities. They have also been recorded in low thickets or woodlands with a dense understory containing brigalow (*Acacia harpophylla*) and belah (*Casuarina cristata*). These vegetation types generally possess a thick leaf layer of between 3 cm and 10 cm and provide suitable shelter habitat for foraging and evading predation. Many areas of optimum habitat are located on highly fertile soils. It is believed that the highly fertile soils promote rapid leaf growth on plants, which in turn create dense leaf little during dry periods (Department of Climate Change, Energy, the Environment and Water, 2022e).

The breeding season generally occurs from September to April-May. Nests are often in areas where the common understorey plants include species such as bracken (*Pteridium esculentum*), rasp fern (*Doodia aspera*) and lantana (*Lantana camara*). Nests consist of a scrape in the ground, lined with leaves, grass or moss. Nests are well-concealed and placed in the buttress root of a tree or sapling, the base of a fern or under a low bush or grass tussock.

Habitat critical to the survival of the species

Habitat considered critical to the survival of the black-breasted button-quail is defined in the National Recovery Plan for black-breasted button quail (Department of Climate Change, Energy, the Environment and Water, 2022e). Habitat critical to the survival of the species includes areas suitable for foraging and breeding, habitat use for the long-term maintenance of the species, areas with potential habitat and areas supporting the recovery of the species. These elements are outlined in further detail below.

- Foraging and breeding habitat critical to the survival of the species includes:
  - Vine thickets and rainforest vegetation types that are periodically water-stressed. These include: semi-evergreen vine thicket, low microphyll vine forest, Araucarian microphyll vine forest, Araucarian notophyll vine forest and brachychiton scrubs that may incorporate bottle trees (*Brachychiton spp.*), brigalow (*Acacia harpophylla*) and belah (*Casuarina cristata*).
  - Low thickets or woodlands with a dense understorey but little ground cover, typically dominated by *Acacia spp.*
  - In littoral situations, dry vine scrubs, acacia thickets and areas densely covered in shrubs, particularly midgen berry (*Austromyrtus dulcis*).
- Habitat for the long-term maintenance of the species includes all key biodiversity areas with black-breasted button quail as a trigger species. This includes suitable habitat in future climate niches as information becomes available.
- Areas which support suitable habitat for the species within the species modelled distribution and where the species has not been detected based on field survey data, are considered habitat critical to the survival of the species.
- Areas that are not currently occupied may support dispersing individuals and be critical for maintaining connectivity and genetic resilience. These biologically important areas are likely to:
  - Occur between areas of known or potential habitat,
  - Provide vegetation cover and temporary shelter resources to protect dispersing individuals from predation, and
  - Provide sufficient food resources during dispersal.

Black-breasted Button Quail

As potential habitat within the Project Area includes semi-evergreen vine thicket, all habitat modelled as vine thicket within the Project Area is considered to meet the definition of habitat critical to the survival of the species.

Current threats to the species

Currently the main threats to the species are:

- habitat degradation as a result of domestic livestock and feral pigs
- habitat loss or degradation from fires of increasing intensity or frequency
- predation by feral animals such as feral cats and foxes.

Furthermore, at least 90% of black-breasted button-quail habitat was cleared for agriculture or plantations of hoop pine, with the areas of bottle-tree scrubs being reduced from several hundred thousand hectares to only a few thousand hectares by the 1960s. However, almost all lands currently occupied are under State control and most are now conserved. Nevertheless grazing by domestic livestock may still be occurring across parts of the species range (Threatened Species Scientific Committee, 2015b).

Recovery plan

National Recovery Plan for Black-breasted Button-quail (Turnix melanogaster) (Department of Climate Change, Energy, the Environment and Water, 2022e)

In the Project Area

Surveys

Four hundred and twenty-two (422) habitat assessments were undertaken. Diurnal bird surveys were undertaken throughout all field surveys. Walking surveys/flushing, and active searches for platelets and scats were undertaken in suitable habitat.

Species occurrence

No evidence of this species was recorded within the Project Area during the field survey program, including indirect evidence such as platelets. Platelets within the Callide Timber Reserve adjacent to Section A were found within suitable habitat, however the nearby scats confirmed the painted button quail. Camera traps in this area also confirmed the presence of the painted button quail. However, it is acknowledged that these two species do occupy similar habitat.

A total of 265.5 ha of potential, black-breasted button-quail habitat was identified within the Project Area. Modelled habitat comprises semi-evergreen vine thicket. All Acacia woodland habitat within the Project Area (RE 11.10.4) was found in sparse regrowth condition only and does not contain the microhabitat features required by the species.

Habitat within the Project Area

Habitat type	Habitat modelling criteria	Area (ha)	
		Project Area	Disturbance Footprint

Black-breasted Button Quail			
Nesting and foraging	Select patches of semi-evergreen vine thicket communities (REs 11.10.8 and 11.11.18). Includes selected patches of these communities where suitable density of leaf litter was confirmed by field survey data.	264.8	3.7

Table 8.48 Assessment of Potential Project Impacts and Mitigation and Management Options for Black-breasted Button Quail

Potential Impact	Assessment	Mitigation Options
Direct		
Clearing of vegetation and removal of habitat	Clearing of habitat for this species will not be extensive (3.7 ha) and will occur as isolated patches where the Disturbance Footprint intersects mapped suitable habitat. In addition, suitable habitat for this species occurs adjacent to the Disturbance Footprint. Where habitat is removed, the species (if present) is expected to move to occupy areas surrounding the cleared area.	• Identify MNES fauna habitat and individuals through pre-clearance surveys • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Disturbance activities must be contained to Disturbance Footprint • Habitat features to be relocated to adjacent areas • During the pre-clearance survey, the fauna spotter-catcher will locate, record and mark the habitat features (including those to be retained in situ) • Refer to Table 5.1 and Table 5.8 of the MNES Management Plan for further details on mitigation measures.
Injury or direct mortality	Construction works will involve the modification, disruption or removal of habitat for the species; therefore, injury or mortality is a risk associated with clearing activities.	• Appropriately qualified fauna spotter catcher to undertake pre-clearance habitat assessment and be present during clearing and disturbance to habitat features • Clearing must be staged, with non-habitat trees felled first • Tampering with an animal breeding place to be carried out in accordance with an approved Species Management Program • Clear delineation of habitat features to be retained • Restrict vehicles to approved access tracks • Vehicle travelling speed restricted to <40 km/hr • Excavations must be secured (e.g. covered) • Pre-clearance surveys will include flushing • Refer to Table 5.3 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Options
Increased risk of vehicle or plant collision resulting in mortality.	Injury or mortality from vehicle strike is a potential impact to this species and is a possibility given the activity and movement of machinery associated with construction. It should be noted that this impact will be largely associated with the current point of construction (localised) and will not encompass the full breadth of the project at any single point in time.	• Restrict vehicles to approved access tracks • Vehicle travelling speed restricted to <40 km/hr • Refer to Table 5.3 of the MNES Management Plan for further details on mitigation measures.
Indirect		
Reduced or lost habitat connectivity	Although vegetation clearance is a known threat to the species, it is not anticipated that impacts from habitat clearance would result in isolation of populations of this species given the species capacity for movement through cleared areas and the low-density of any potential population. An existing transmission line is currently in operation within the Project Area. The Project is to be situated adjacent limiting additional fragmentation. In several patches of suitable habitat, Project refinement has ensured that these areas will be over spanned limiting impacts to connectivity.	• Habitat features to be relocated to adjacent areas • Retain habitat trees in-situ (e.g. habitat tree to be stem injected and left in easement) • Implement controls to prevent introduction or spread of weeds that may degrade MNES species • Refer to Table 5.7 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Options
Incursion of weeds may alter the presence, quality and structure of microhabitat features for use by the species.	Exotic grasses fringing vine thicket were regularly observed within the Project Area. Weed occurrence is widespread in the Project Area and exotic pasture grasses are often actively promoted by landholders to produce fodder for grazing. Further degradation of macro and microhabitat features may occur as the promotion of pasture grasses is likely to continue. Vehicle and plant movement within the Project Area has the potential to promote the distribution of exotic weed species, however this can be effectively managed through mitigation measures.	• Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • Refer to Table 5.5 of the MNES Management Plan for further details on mitigation measures.
Increased accessibility and incursion of feral species	Predators such as cats are a known threat to the predominantly ground dwelling species and were observed during field surveys. The widening of access tracks may promote easier access for introduced predators; however, feral species already exist within the Project Area movement of these species is likely already afforded by the adjacent transmission line. No additional movement is expected to be provided by the Project to introduced fauna species.	• All waste to be secured • Biosecurity Instrument Permit to be obtained for moving materials out of or within different biosecurity zones • Educate workforce in the identification of pest fauna species • Avoid inclusion of any water retaining voids or pits • Refer to Table 5.6 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Options
Noise, activity and vibration generated during construction and operation may temporarily or permanently displace individual	Construction and operation noise may displace the species if intensity is too great for the species. Construction activities will mostly occur during daylight hours (6.30 am to 6.30 pm), to avoid disturbance during roosting. As clearing will be staged, noise will be limited to discrete locations at the clearing front. Construction noise will primarily occur around infrastructure (not intact habitat). Noise in relation to operation is negligible.	• Plant and equipment to be fitted with appropriate noise attenuation and maintained • Deliveries and removal of material and equipment to and from site within approved hours for construction • Plant to be turned off when not in use • No unnecessary use of horns or other audible signals on mobile plant or equipment • Machinery and equipment will be maintained in good working condition • Refer to Table 5.10 of the MNES Management Plan for further details on mitigation measures.
Alterations to fire regimes and potential for increased accidental bushfire that may result from construction and/or operation.	Habitat loss or degradation from fires of increasing intensity or frequency is listed as a key threat to the species. Changes to fire frequency within the Project Area may impact on habitat and lead to degradation. Construction activities are unlikely to significantly alter existing grazing pressure or the implementation of land management practices currently employed by a landholder. Although the increased plant and vehicle presence will result in an increased number of potential ignition sources, employment of standard construction protocols will ensure the risk of bushfire is actively managed.	• Bushfire Management Plan will be developed • Burning of vegetation strictly prohibited unless a permit is obtained • Designated parking areas for vehicles and machinery • During operation, vegetation within the Disturbance Footprint will be managed in accordance with Powerlink's vegetation specification • Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • Refer to Table 5.5 and Table 5.9 of the MNES Management Plan for further details on mitigation measures.

Table 8.49 Significant Impact Assessment: Black-Breasted Button Quail

Impact Criteria	Assessment
Lead to a long-term decrease in the size of an important population of a species	**Unlikely**. The black-breasted button quail has not been recorded within the Project Area despite significant field survey effort. It is conservatively considered a potential occurrence within the Project Area due to the presence of potential habitat and ALA records within the wider region. Despite this, no important population of the species is expected to occur. Direct impacts to potential habitat are limited to clearing of 3.7 ha of nesting and foraging habitat. This loss of habitat is considered unlikely to significantly reduce the species' ability to persist in the local area given suitable habitat is also present within adjacent landholdings. Final clearing areas are expected to be smaller as clearing will only be completed as strictly necessary and will be minimised on the ground during construction. The species may be subjected to indirect impacts from the Project including the proliferation of weed and pest populations which may degrade habitat and increase predation risks. In addition, clearing within nearby habitats may alter fire regimes and increase the potential for accidental bushfires from Project activity to enter and damage mapped habitat. Indirect impacts to the species will be managed via the implementation of MNES-specific management measures, outlined in the MNES Management Plan. Appropriate biosecurity procedures will be adhered to, to mitigate the introduction or proliferation of pest species as outlined in Table 5.6 of the MNES Management Plan. Based on the justification provided above, any potentially occurring population of this species within the Project Area is not considered an important population. Given the implementation of the mitigation and management measures outlined above, it is considered unlikely that the Project will lead to a long-term decrease in the population.
Reduce the area of occupancy of an important population	**Unlikely**. The black-breasted button quail has a disjunct distribution across south-eastern Queensland and northern New South Wales. It's area of occupancy is estimated to be approximately 750 km^2 (75,000 ha). The Project Area is considered unlikely to support an important population based on the justification provided in **Table 8.48**. Direct impact to mapped black-breasted button-quail nesting and foraging habitat is limited to 3.7 ha, as a result of vegetation clearing for construction of the Project. This habitat is analogous with small patches of semi-evergreen vine-thicket that occurs at isolated locations along the alignment. Project refinement has enabled the over spanning of several of these patches to reduce the disturbance to this habitat. Indirect impacts are unlikely to materially affect mapped habitat for the species, nor are they expected to cause the species to leave areas mapped as suitable habitat. Nevertheless, a range of mitigation measures will be implemented as outlined within the MNES Management Plan. Given the Project Area does not support an important population, the Project is unlikely to reduce the area of occupancy of an important population of this species.

Impact Criteria	Assessment
Fragment an existing important population into two or more populations	**Unlikely**. The Project Area is considered unlikely to support an important population. The mapped habitat patches within the Project Area are already fragmented due to the existing powerline infrastructure situated adjacent to the proposed Disturbance Footprint. Consequentially, this Project is unlikely to fragment this habitat any further given the species' capacity for dispersal across cleared areas and the total cleared width not extending beyond 100 m. In addition, due to the lower canopy height of the suitable habitat (semi-evergreen vine thicket) and the frequent location of this habitat on the southern steep slopes of topography, many patches are likely to be spanned over with minimal interference. Overall, it is considered unlikely the Project will impact habitat to the extent that it fragments an important population of this species, given an important population is unlikely to occur.
Adversely affect habitat critical to the survival of a species	**Unlikely**. Mapped potential habitat within the Project Area is already highly fragmented and likely to only be utilised temporarily due to its marginal quality associated with exotic grass presence. However, given this habitat is comprised of semi-evergreen vine thicket, it meets the definition of habitat critical to the survival of the species. Direct impacts to potential habitat are limited to clearing of 3.7 ha of nesting and foraging habitat. Several patches of vegetation within the Disturbance Footprint, adjacent to the transmission line may remain in place if it does not violate the exclusion zones. This loss of habitat is considered unlikely to reduce the species' ability to persist in the local area. Indirect impacts on potential habitat will be actively managed in accordance with the MNES Management Plan. The species was not recorded, despite significant survey effort and habitat is not of high quality given it is fragmented and occurs in small, isolated patches. As such, the loss of 3.7 ha of potential habitat which broadly meets the definitions of habitat critical to the survival of the species despite being of marginal quality due to exotic grass presence, is unlikely to constitute an adverse impact as per the Significant Impact Guidelines.
Disrupt the breeding cycle of an important population	**Unlikely**. No important population of this species is expected to occur within the Project Area. Depending on climatic conditions, this species is capable of breeding year-round with nests usually located in association to bracken (*Pteridium esculentum*), rasp fern (*Doodia aspera*) and lantana (*Lantana camara**). Bracken and rasp fern were not recorded within the Project Area and lantana was occasional recorded within areas of mapped habitat. Habitat mapped within the Project Area has been identified as being suitable for breeding given the vegetative structure and cover provided. Presently 3.7 ha of nesting and foraging habitat will be impacted via vegetation clearing; however, the actual clearing required may be reduced with construction efficiencies. Areas of vegetation within the Disturbance Footprint, adjacent to the transmission line may remain in place if it does not violate the exclusion zones. Specific mitigation measures are also proposed to ensure no black-breasted button-quail nests are impacted during construction, including nest searches during pre-clearance surveys. Noise impacts during construction may impact breeding of the species in the short-term. Active animal breeding places will only be tampered with under an approved Species Management Program issued by the Queensland

Impact Criteria	Assessment
	Government. Additionally, to reduce vehicle or plant collision or crushing of nests, all vehicles and pedestrians will remain within designated access tracks. The Project is therefore unlikely to disrupt the breeding cycle of an important population.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely**. The mapped habitat within the Project Area is already fragmented and disturbed by exotic grass, cattle grazing and feral animals such as pigs. A maximum of 3.7 ha of nesting and foraging habitat will be directly impacted as a result of the Project. This habitat is not considered highly unique or important for refuge and habitat with similar characteristics, quality and condition occurs widely within the region. Clearing will only be conducted as strictly necessary. Indirect impacts including increased dust exposure, degradation from weeds, increased grazing and increased risk of bushfire have the potential to modify habitat for the species but the impacts are considered marginal and appropriately managed by the MNES Management Plan. Any indirect impacts are unlikely to impact habitat for the species to the extent that the species is likely to decline given the small amount and low quality of habitat within the Project Area. Given the absence or infrequent occurrence of the species within the Project Area as well as of the limited direct impact to the species habitat, it is considered unlikely that the Project could modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**Unlikely**. Invasive species including the feral cat, red fox and wild pigs were identified within the Project Area and are likely to commonly occur within the Project Area and wider region. These species are recognised threats to the black-breasted button quail. As a result of historical clearing for agriculture, roads, tracks and electrical infrastructure, existing conduits for exotic fauna movement already occur. Clearing for linear infrastructure associated with the Project is unlikely to functionally increase the movement opportunity of invasive species due to the existing conduit for movement provided by the existing transmission line. Appropriate biosecurity and weed washdown procedures will be adhered to, to mitigate the introduction or proliferation of pest and weed species as outlined in Table 5.5 of the MNES Management Plan.
Introduce disease that may cause the species to decline	**Unlikely**. Disease has not been identified as a threat to the species. Nevertheless, the Project will follow appropriate biosecurity protocols; therefore, introduction of a disease is unlikely.
Interfere substantially with the recovery of the species	**Unlikely**. Recovery actions are documented in the National Recovery Plan for black-breasted button-quail (Department of Climate Change, Energy, the Environment and Water, 2022e). These include: • Identify areas of habitat critical to the survival of the species including important sites for species persistence, and the key threats pressuring each site • Determine the relationship between invasive weeds and black-breasted button-quail abundance

Impact Criteria	Assessment
	• Ongoing management of invasive weeds at high quality sites rapidly and cost-effectively • Investigate and mitigate the threat of fire, including interactions with invasive weeds and drought, on black-breasted button-quail populations • Implement feral animal control programs at selected high priority sites • Control effects of domestic stock on black-breasted button quail and its habitat at priority sites • Investigate and mitigate climate change threats on black-breasted button quail • Review and implement land management guidelines to ameliorate impacts from human activities on identified black-breasted button-quail habitat • Ensure minimal impacts on black-breasted button quail and its habitat in all populations from urban developments. Proposed vegetation clearing for Project construction will occur to a maximum of 3.7 ha of nesting and foraging habitat. Based on the implementation of the MNES Management Plan, indirect impacts to the species are likely to be negligible. The Project is unlikely to interfere with any of the abovementioned recovery objectives and is therefore unlikely to interfere substantially with the recovery of the species.
Significant Residual Impact	**Unlikely to have a significant impact**



FIGURE 8.16-2

Black-breasted Button Quail Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

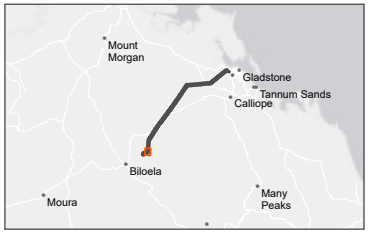
- Watercourse
- Field Survey Extent
- Project Area

Black-breasted Button Quail Habitat

- Nesting and foraging

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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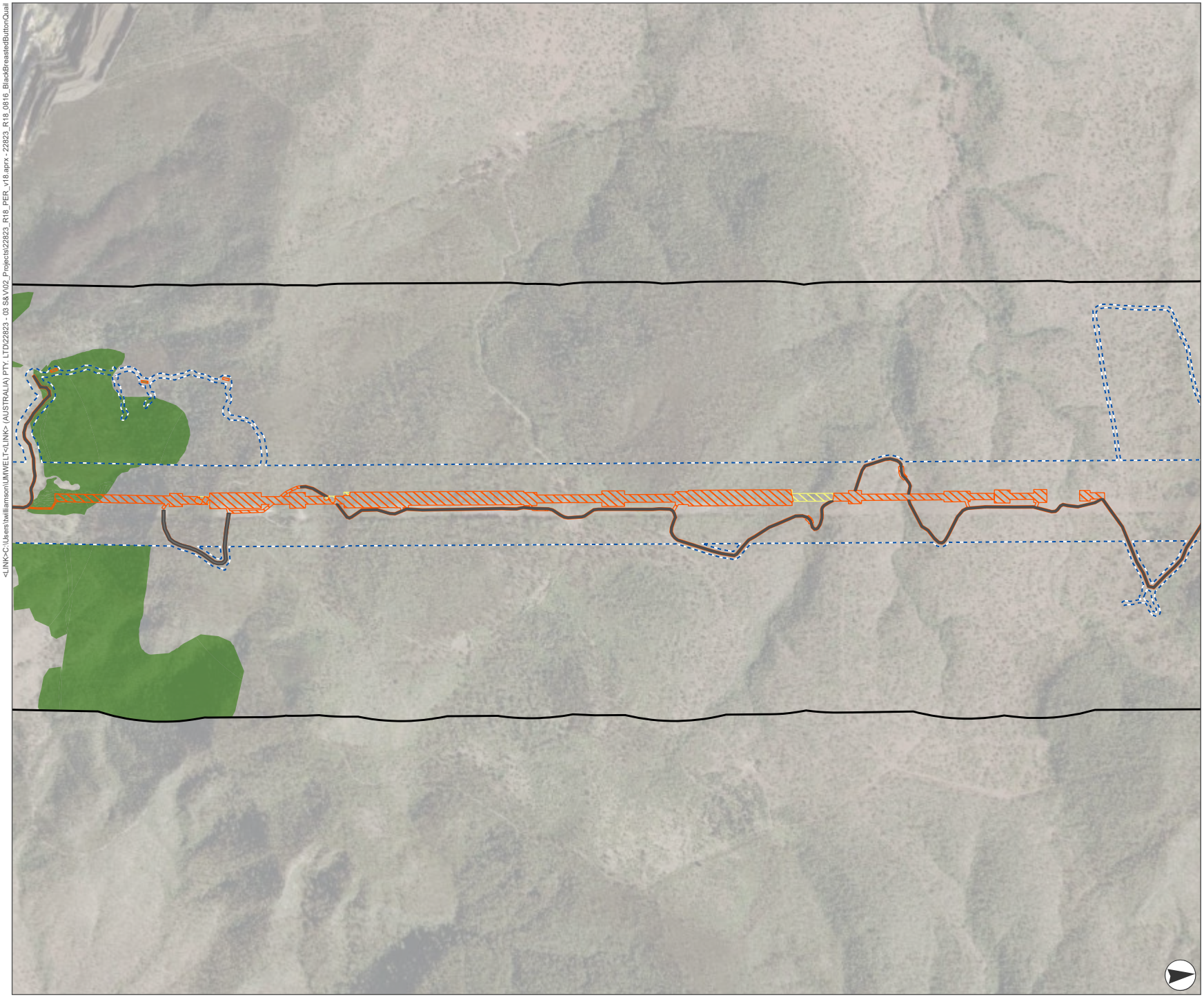


FIGURE 8.16-3

Black-breasted Button Quail Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

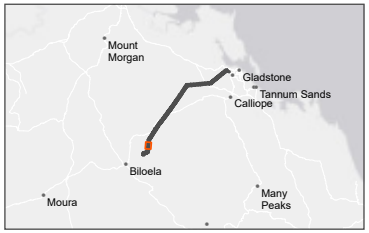
- Field Survey Extent
- Project Area

Black-breasted Button Quail Habitat

- Nesting and foraging

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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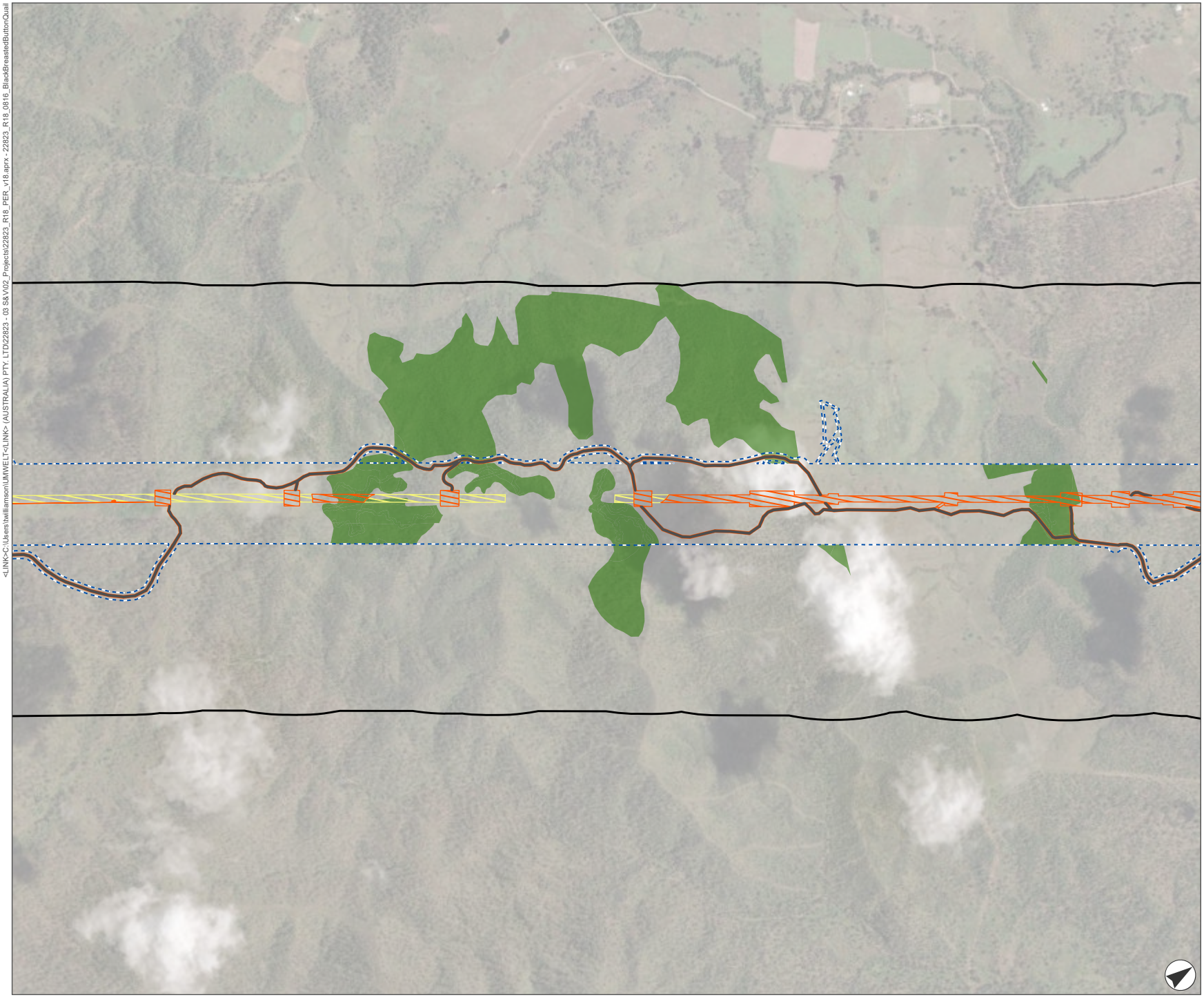


FIGURE 8.16-13

Black-breasted Button Quail Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

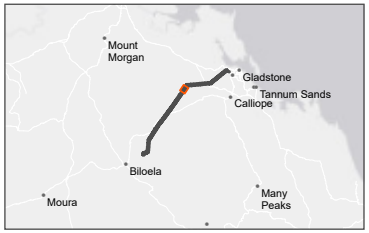
- Field Survey Extent
- Project Area

Black-breasted Button Quail Habitat

- Nesting and foraging

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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FIGURE 8.16-14

Black-breasted Button Quail Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

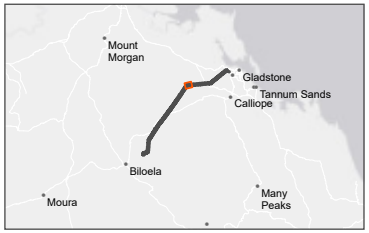
- Field Survey Extent
- Project Area

Black-breasted Button Quail Habitat

- Nesting and foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



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Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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FIGURE 8.16-19

Black-breasted Button Quail Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

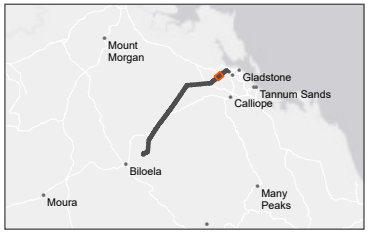
- Field Survey Extent
- Project Area

Black-breasted Button Quail Habitat

- Nesting and foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



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Kilometres

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8.2.7.2 Collared Delma (*Delma torquata*)

Table 8.50 Collared Delma: Ecology and Relevance to the Project Area

Collared Delma	
Profile	**Conservation status** Vulnerable **Distribution** Collared delma is endemic to Queensland. The species distribution extends from the western edges of Brisbane in south-east Queensland, north-west to the Blackdown Tablelands and west to the Roma region of inland Queensland (Wilson & Swan, 2025). The population is heavily fragmented with records occurring at the Bunya Mountains, Blackdown Tablelands NP, Bullyard Conservation Park, D'Aguilar Range NP Expedition NP, Naumgna and Lockyer Forest Reserves, Western Creek near Millmerran, the Toowoomba Range (Davidson, 1993; Ryan, 2006) and Kroombit Tops National Park (Atlas of Living Australia, 2025). Collared delma is thought to be sedentary with one study finding that individuals occupy a small (<20 m) home range (Porter, 1998). **Important population** Important population has not been defined for the species, however, given the difficulty in detecting this species, important habitat is considered a surrogate for important populations as outlined in the *Draft Referral Guidelines for the Nationally Listed Brigalow Belt reptiles* (Department of Climate Change, Energy, the Environment and Water, 2023e). Given the presence of the species within the Project Area, an important population is considered present. **Historical records within the desktop search extent** No WildNet records occurred within the desktop search extent and the closest records occur 30 km east of Section A at Kroombit Tops National Park from 2011. **Habitat** As per the Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles (Department of Climate Change, Energy, the Environment and Water, 2023e), suitable habitat includes open-forest, woodlands and adjacent exposed rocky areas in Queensland RE Land Zones 3, 9 and 10. Known important habitat is described as suitable habitat within the known or likely to occur distribution mapping for collared delma. The Approved Conservation Advice for Delma torquata (Department of the Environment, Water, Heritage and the Arts, 2008b) provides further detail on specific habitat requirements for collared delma. It states that habitat is 'eucalypt dominated woodland to open forest where it is associated with suitable microhabitats (exposed rocky outcrops) where ground cover is predominantly native grasses and forbs, such as *Themeda triandra, Cymbopogon refractus, Aristida* sp. and *Lomandra* sp.' (Peck & Hobson, 2007). The species is also known from two locations featuring woodlands of *Eucalyptus tereticornis* or *Acacia harpophylla* where significant rock components were absent (Wilson & Swan, 2025).

Collared Delma

As per the SPRAT profile, the presence of rocks, logs, bark and other coarse woody debris, and mats of leaf litter (typically 30–100 mm thick) appears to be an essential characteristic of the microhabitat and is always present where the species occurs (Brigalow Belt Reptiles Workshop, 2010).

Habitat critical to the survival of the species

There is no species-specific guidance for determining habitat critical to the survival of the collared delma and at present no recovery plan exists. As important habitat has been defined in the Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles (Department of Climate Change, Energy, the Environment and Water, 2023e), this terminology is considered to be interchangeable with habitat critical to the survival of the species.

Known important habitat for the collared delma includes:

- Suitable habitat within the known/likely-to occur distribution of the species and the Toowoomba Range
- Suitable habitat between grazed or cropped areas, along road reserves, and travelling stock routes, especially the Donnybrook Stock Route region.

For all Brigalow Belt reptile species, suitable habitat may comprise important habitat if one or more of the following applies:

- Habitat where the species has been identified during a survey
- Near the limits of the species' known range
- Large patches of contiguous, suitable habitat and viable landscape corridors (necessary for the purposes of breeding, dispersal or maintaining the genetic diversity of the species over generations)
- A habitat type where the species has been identified during a survey, but which was previously thought not to support the species.

The species was recorded during field surveys. Habitat where the species was recorded within the Project Area is considered critical to the survival of the species. Habitat patches within Sections B, D and E often exists in large, connected corridors along the ridges and slopes. The extent of habitat is such that it may be necessary for the purposes of maintaining genetic diversity and providing movement and breeding opportunities at a landscape scale. As such, these patches of suitable habitat within the Project Area broadly meets the definition of important habitat and therefore is also considered as habitat critical to the survival of the species. Across the Project Area the total area of habitat critical to the survival of the species is 5,045.9 ha.

Current threats to the species

Several factors are thought to have contributed to the decline of collared delma over the past few decades, including habitat loss through clearing for agriculture, habitat degradation by overgrazing of stock, removal of rocks, coarse woody debris and ground litter, use of agricultural chemicals, predation by feral cats and foxes and weed invasion (particularly *Lantana montevidensis**) (Department of Sustainability, Environment, Water, Population and Communities 2011).

Collared delma is considered sedentary and has a very small home range, possibly using the same rocks for shelter. This is thought to make them particularly susceptible to localised disturbance (Ryan, 2006). The removal of surface rock associated with development and

Collared Delma

landscaping activities is believed to pose a significant threat to the species as this removes important micro-habitat features and reduces the availability of shelter for the species (Brigalow Belt Reptiles Workshop, 2010; Davidson, 1993). Research on the species has revealed that collared delma will avoid disturbed rocky habitat (Porter, 1998).

The impact of fire on collared delma is not clearly understood, however declines in reptile populations have been observed following fire events (Peck & Hobson, 2007). Fire poses a potential threat to this species, particularly large fires and inappropriate fire regimes (Davidson, 1993).

Recovery plan

A recovery plan has not been adopted for this species.

In the Project Area

Surveys

A total of 404 habitat assessments were undertaken, noting the presence of key microhabitat features. 25 person hours of active searches in locations of identified potential habitat were undertaken. As pitfall trapping is considered less effective than active diurnal searches in locating the species (Porter, 1998), only active search were undertaken during the survey program.

Species occurrence

A total of two collared delma individuals were recorded during diurnal searches at one location during May 2025. They were recorded in the western portion of Section B. These records were associated with ironbark woodland (RE 11.11.15) with native tussock grasses, litter to a depth of 1.5 cm and a high abundance of stones approximately 20 cm by 20 cm in dimension.

Habitat within Project Area

Habitat type	Habitat modelling criteria	Area (ha)	
		Project Area	Disturbance Footprint
Suitable habitat	Select patches of REs associated with land zones 3, 10 and 11 in remnant and regrowth condition. It is noted that the list of REs provided describes all REs which may meet the habitat definition. The final mapping excluded some REs based on field data (i.e. unsuitable ground layer characteristics) or location (not within required distance from water source etc). Suitable habitat is associated with consistent trends in the characteristics identified during the field survey program (including known species location) and associated with nearby records which allowed for extrapolation as necessary. Areas of suitable habitat were identified to support canopy cover (encouraging leaf litter and minimising bare ground) and occur on similar landforms/slopes and geologies as species observations in the wider region. For example, areas of very steep terrain supported gravelly soil that	5,044.2	49.0

Collared Delma	
	was highly erodible and encouraged rock fall (thereby removing suitable rocks). Rocks were common within the communities on granite geologies (land zone 12); however, these were generally unsuitable for the species either due to size (boulders or rock platforms) and/or shape (very rounded rocks with minimal ground contact).

Table 8.51 Assessment of Potential Project Impacts and Mitigation and Management Commitments for Collared Delma

Potential Impact	Assessment	Mitigation Commitments
Direct		
Vegetation clearing causing habitat loss and fragmentation	Removal of up to 49.0 ha of habitat critical to the survival of the species is unavoidable for construction of the Project. Collared delma is a sedentary species, therefore vegetation clearing and habitat loss has potential to result in habitat fragmentation and direct mortality of the species.	• Identify MNES fauna habitat and individuals through pre-clearance surveys • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Disturbance activities must be contained to Disturbance Footprint subject to minor micro-siting within the Field Survey Extent • Habitat features to be relocated to adjacent areas • During the pre-clearance survey, the fauna spotter-catcher will locate, record and mark the habitat features (including those to be retained in situ) • Refer to Table 5.1 and Table 5.8 of the MNES Management Plan for further details on mitigation measures.
Injury or direct mortality	As the species is sedentary, direct mortality is likely to occur during vegetation clearing if the species remains in the clearing area.	• Appropriately qualified fauna spotter catcher to undertake pre-clearance habitat assessment and be present during clearing and disturbance to habitat features • Clearing must be staged, with non-habitat trees felled first • Tampering with an animal breeding place to be carried out in accordance with an approved Species Management Program • Clear delineation of habitat features to be retained • Habitat trees must be soft-felled • Restrict vehicles to approved access tracks • Vehicle travelling speed restricted to <40 km/hr • Excavations must be secured (e.g. covered) • Pre-clearance surveys by a suitable qualified fauna spotter-catcher at least one week prior to vegetation clearing to identify individuals and eggs

Potential Impact	Assessment	Mitigation Commitments
		• Suitable recipient sites to be identified in the offset areas and any identified individuals and eggs relocated within 12 hours of survey • Refer to Table 5.3 of the MNES Management Plan for further details on mitigation measures.
Loss of key habitat resources	The species relies on suitable microhabitat features such as thick leaf litter, woody debris and surface rocks for shelter and foraging and exhibits high fidelity to those features. Removal of suitable microhabitat features has potential to displace collared delma and render the area unsuitable for recolonisation.	• During the pre-clearance survey, the fauna spotter-catcher will locate, record and mark the habitat features (including those to be retained in situ) • Habitat features to be relocated to adjacent areas • Refer to Table 5.8 of the MNES Management Plan for further details on mitigation measures.
Indirect		
Alterations to fire regimes including uncontrolled fires	Fire has potential to remove key microhabitat resources the species relies on for shelter and foraging. Loss of those microhabitat features may be a limiting factor in the species being recolonise burnt areas. Construction activities are unlikely to significantly alter existing grazing pressure or the implementation of land management practices currently employed by a landholder. Although the increased plant and vehicle presence will result in an increased number of potential	• Bushfire Management Plan will be developed • Burning of vegetation strictly prohibited unless a permit is obtained • Designated parking areas for vehicles and machinery • During operation, vegetation within the Disturbance Footprint will be managed in accordance with Powerlink's vegetation specification • Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements

Potential Impact	Assessment	Mitigation Commitments
	ignition sources, employment of standard construction protocols will ensure the risk of bushfire is actively managed.	• Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • Refer to Table 5.5 and Table 5.9 of the MNES Management Plan for further details on mitigation measures.
Changes to habitat quality (degradation)	The Project has potential to degrade collared delma habitat if indirect impacts such as weed are not properly managed.	• Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • Refer to Table 5.5 of the MNES Management Plan for further details on mitigation measures.
Increased incidence of feral predators	Feral cats and foxes are a listed threat to the species. Widening of access tracks may promote easier access for introduced predators; however, feral species already exist within the Project Area and the movement of predators from neighbouring areas is highly likely. Habitat degradation may also occur from incursion by other feral	• All waste to be secured • Biosecurity Instrument Permit to be obtained for moving materials out of or within different biosecurity zones • Educate workforce in the identification of pest fauna species • Avoid inclusion of any water retaining voids or pits • Refer to Table 5.6 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
	and non-native species including cattle and feral pigs.	
Noise, artificial lighting, activity and vibration generated during construction and operation interrupting foraging, breeding or dispersal behaviours	The species is diurnal, therefore is most active during construction hours (generally 6.30am–6.30 pm). The species shelters under thick mats of leaf litter, woody debris and surface rocks, which likely blocks some of the noise and lighting impacts. As clearing will be staged, only a subset of the Disturbance Footprint would be impacted at a time, impacts of noise, vibration, artificial lighting and increased activity would be a temporary disturbance. As the species is sedentary it is not expected to exhibit an avoidance response. Construction noise will primarily occur around infrastructure (not intact habitat). Noise in relation to operation is negligible.	• Plant and equipment to be fitted with appropriate noise attenuation and maintained • Deliveries and removal of material and equipment to and from site within approved hours for construction • Plant to be turned off when not in use • No unnecessary use of horns or other audible signals on mobile plant or equipment • Machinery and equipment will be maintained in good working condition • Refer to Table 5.10 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Dust generated during construction activities disturbing behaviours or health/palatability of foraging resources	The species lives underneath leaf litter, woody debris, loose surface rocks. It is not anticipated that dust deposition would occur at high enough levels to elicit a response from the species as the Project will implement dust suppression measures.	• Dust suppression measures including vehicles restricted to approved tracks, cover all loose loads and set speed limits (<40 km/hr) • Application of dust suppressants as required • Dust generating activities will be limited on days with strong winds blowing towards sensitive receptors or dust sensitive locations • Regular monitoring and visual surveillance to trigger management actions will be undertaken • Refer to Table 5.4 of the MNES Management Plan for further details on mitigation measures.

Table 8.52 Significant Impact Assessment: Collared Delma

Impact Criteria	Assessment
Lead to a long-term decrease in the size of an important population of a species	**Likely**. The collared delma is known to occur within the Project Area and therefore an important population occurs. A maximum of 49.0 ha of suitable habitat will be cleared for construction of the Project. In accordance with the Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles (Department of Climate Change, Energy, the Environment and Water, 2023e), known habitat for the species comprises habitat critical to the survival of the species. As the species is sedentary, there is a risk of mortality during clearing works. To manage this risk, pre-clearance surveys will include targeted searches for the species in areas of potential habitat to be cleared, however, as the species is cryptic and difficult to locate, individuals may be overlooked, therefore there is potential for mortality of individuals that comprise an important population. Potential indirect impacts on the species including habitat degradation via weed incursion and altered fire regimes, will be actively managed via a Bushfire Management Plan that will be developed as part of the Emergency Preparation and Response Plan as outlined in Table 5.9 of the MNES Management Plan. The removal of up to 49.0 ha of habitat critical to the survival of the species has potential to lead to a long-term decrease in the size of an important population.

Impact Criteria	Assessment
Reduce the area of occupancy of an important population	**Unlikely**. The species' area of occupancy has not been estimated. However, as per SPRAT, the species has previously been reported to be relatively common in occupied areas. As described above, modelled potential habitat meets the definition of important habitat and therefore, important populations may occur. The extent of habitat removal will be a maximum of 49.0 ha. If the species is present, this quantum of impact is not sufficient to reduce the area of occupancy of an important population given the ongoing connectivity to suitable habitat in the surrounding area.
Fragment an existing important population into two or more populations	**Potential.** Little is known about the movement patterns of the species, though it is thought to be sedentary with one study finding that individuals occupy a small (<20 m^2) home range ((Porter, 1998b). A maximum of 49.0 ha of suitable habitat will be removed for the Project. The remaining habitat would continue to support the ecological requirements of the species. Nevertheless, it is likely that vegetation clearance for the Project would present a barrier to movement for the species, given its' low dispersal capacity. As an important population is present within the Project Area, there is a possibility that the linear nature of the clearing could result in fragmenting populations into two or more populations. Suitable microhabitat features such as ground timber and boulders will be retained where possible or relocated to adjacent areas of potential habitat. Pre-clearance surveys will also be undertaken and will aim to relocate any individuals present to adjacent Offset Areas within designated habitat. Any individuals or eggs observed, will be relocated within suitable adjacent habitat in the Offset Area. Despite the implementation of these mitigation and management methods, an important population of this sedentary species is known to occur and therefore any clearing has potential to fragment an existing important population into two or more populations.
Adversely affect habitat critical to the survival of a species	**Likely**. Up to 49.0 ha of modelled potential habitat within the Disturbance Footprint meets the definition of important habitat which is considered to be interchangeable with habitat critical to the survival of the species. The Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles states that clearing two or more hectares of important habitat is considered to have a 'high risk of significant impact'. Therefore, the Project is likely to adversely affect habitat critical to the survival of the species.
Disrupt the breeding cycle of an important population	**Potential**. As described above, the species was detected during field surveys and a conservative approach to the mapping of potential habitat has been applied. The breeding cycle of the species is not well understood, however females are known to produce two eggs in December that hatch between February–March (Peck & Hobson, 2007). Clearing and construction of the Project will be staged so only a subset of the Disturbance Footprint will be impacted at one time. Pre-clearance surveys will include targeted searches for individuals and any potential eggs. Where practical, microhabitat features that cannot be avoided through micro-siting will be relocated to areas of adjacent potential

Impact Criteria	Assessment
	habitat including adjacent Offset Areas. However, the species is cryptic and difficult to locate, therefore individuals may be overlooked during pre-clearance surveys. Further, relocated individuals may disturb interaction of breeding aged individuals which are poor dispersers and there is no research that demonstrates the survival rate of relocated eggs. The Project therefore has potential to disrupt the breeding cycle of an important population. Project works are therefore unlikely to disrupt the breeding cycle of a population or an important population.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely**. Habitat within the Project Area is generally of moderate quality as a result of ongoing disturbance from cattle, weeds and pests, however, it is considered habitat critical to the survival of the species, given the species is known to occur. The extent of habitat removal will be a maximum of 49.0 ha. Construction works involve the modification, disruption and removal of habitat critical for the survival of the species. However, habitat of similar quality is widely available in the landscape and large areas of retained habitat would continue to support the ecological requirements of the species. Pre-clearance surveys will include targeted searches for individuals and any potential eggs, which would be relocated outside of the clearing area, including adjacent Offset Areas. Despite this, some localised loss of individuals may occur due to the species being difficult to locate. However, local losses are not expected to cause a decline in the species overall. Of the 49.0 ha, a small portion will be selectively cleared rather than fully cleared, providing the opportunity for the shrub and ground layer and potentially low trees to be retained during construction and operation. As this species is strongly tied to ground layer structure, the retention of lower vegetation may maintain or potentially improve grass tussock development, invertebrate abundance and basking micro-sites for this species. In addition, maintaining shrubs and groundcover preserves refuge and foraging sites. As such, although the Project would result in impacts to habitat for the species, this is not considered to be of the magnitude that would result in the likely decline of the species.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**Unlikely**. Invasive species, particularly weeds including lantana (*Lantana camara**) were recorded throughout the field survey program. The feral cat, a recognised threat to the species, was also recorded multiple times. The Project is unlikely to introduce or exacerbate weeds or beyond existing levels.

Impact Criteria	Assessment
Introduce disease that may cause the species to decline	**Unlikely**. There are no known diseases affecting the species. Nonetheless, the Project will follow appropriate biosecurity protocols during both construction and operation. Any fauna that displays signs of illness would not be released back into the wild and would be appropriately managed under the direction of an experienced Fauna spotter catcher. The Project is unlikely to introduce disease that may cause the species to decline.
Interfere substantially with the recovery of the species	**Unlikely**. As outlined on SPRAT, a recovery plan for the Queensland Brigalow Belt Reptiles including the collared delma has been drafted by WWF-Australia in 2006 (Richardson, 2006). Several recovery objectives are outlined in the plan and on the species SPRAT profile and broadly cover a range of topics including identification of threats and key habitat, research priorities, conservation and the establishment of reserves, monitoring programs and the development of management guidelines. The Project is unlikely to hinder the success of any of the recovery actions. Furthermore, the Project will not exacerbate any known threats to the species including cattle grazing, urban and agricultural development, weed and pest levels and altered fire regimes. Potential indirect impacts on the species as a result of the Project will be actively managed. Given the above, the Project is unlikely to interfere substantially with the recovery of the species.
Significant Residual Impact	**Likely to have a significant impact**

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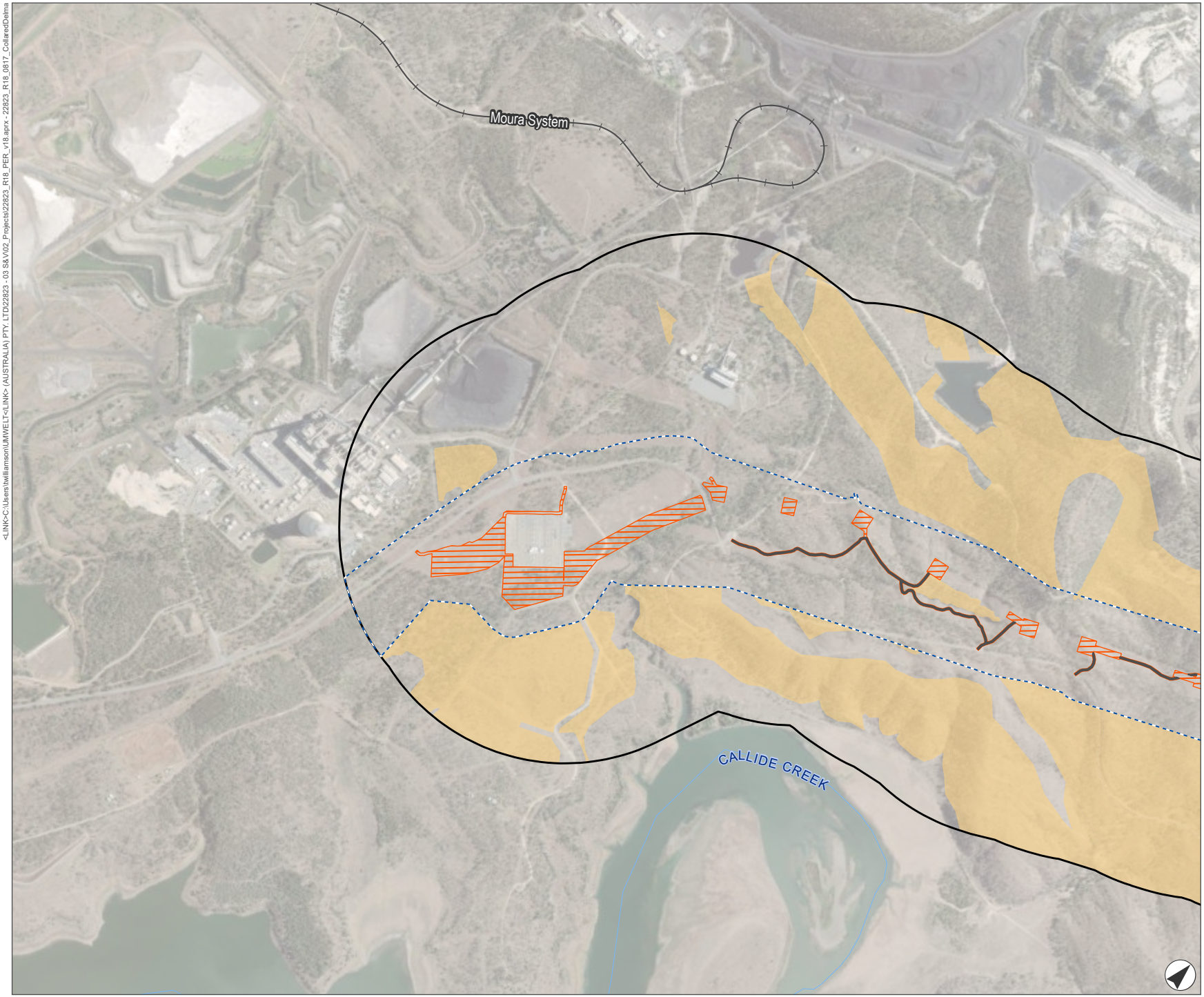


FIGURE 8.17-1

Collared Delma Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

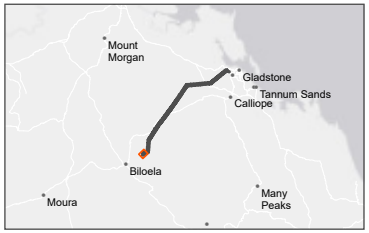
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Collared Delma Habitat

- Suitable habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

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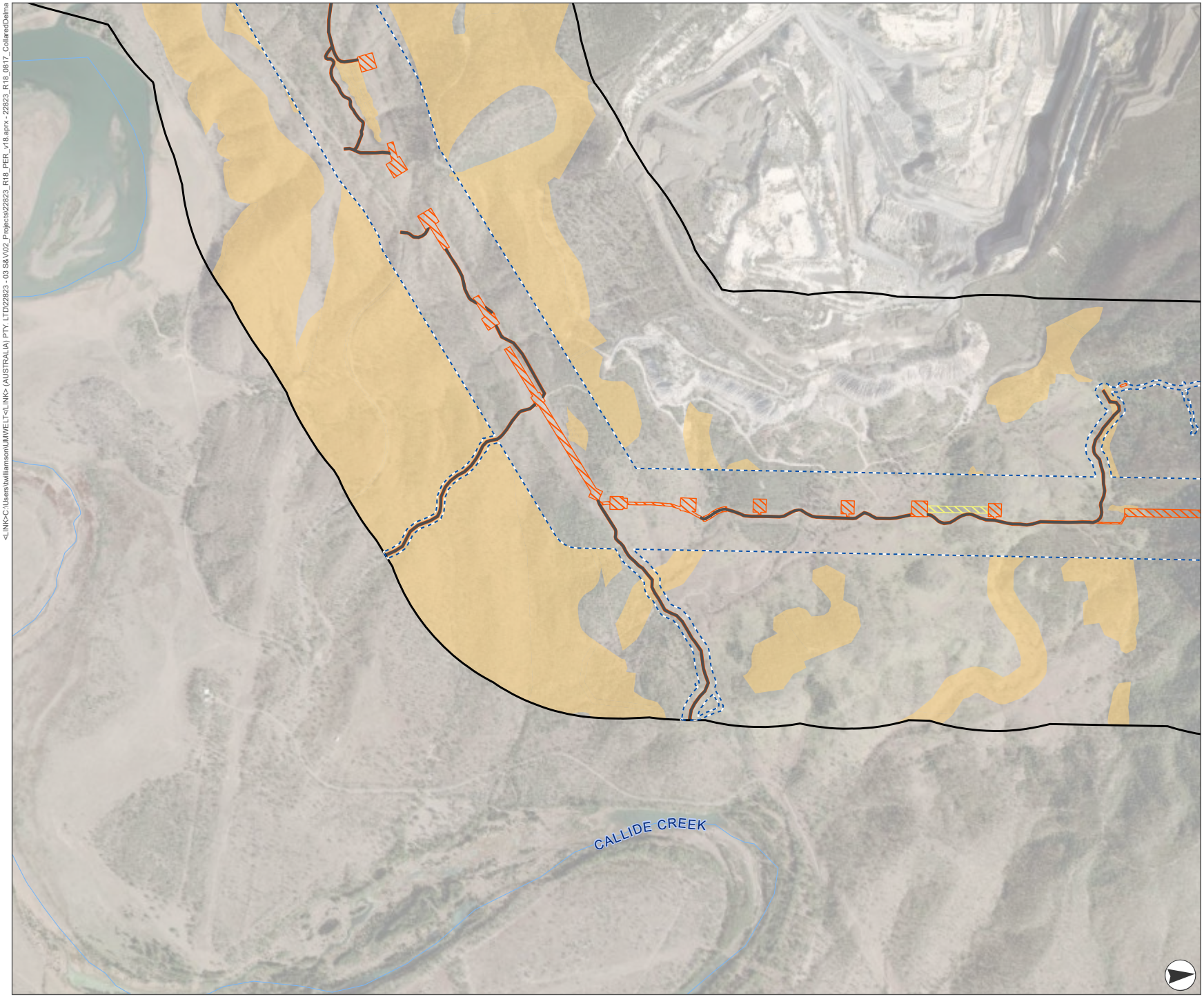


FIGURE 8.17-2

Collared Delma Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

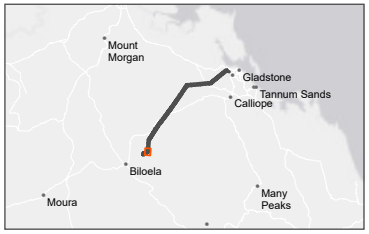
- Watercourse
- Field Survey Extent
- Project Area

Collared Delma Habitat

- Suitable habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
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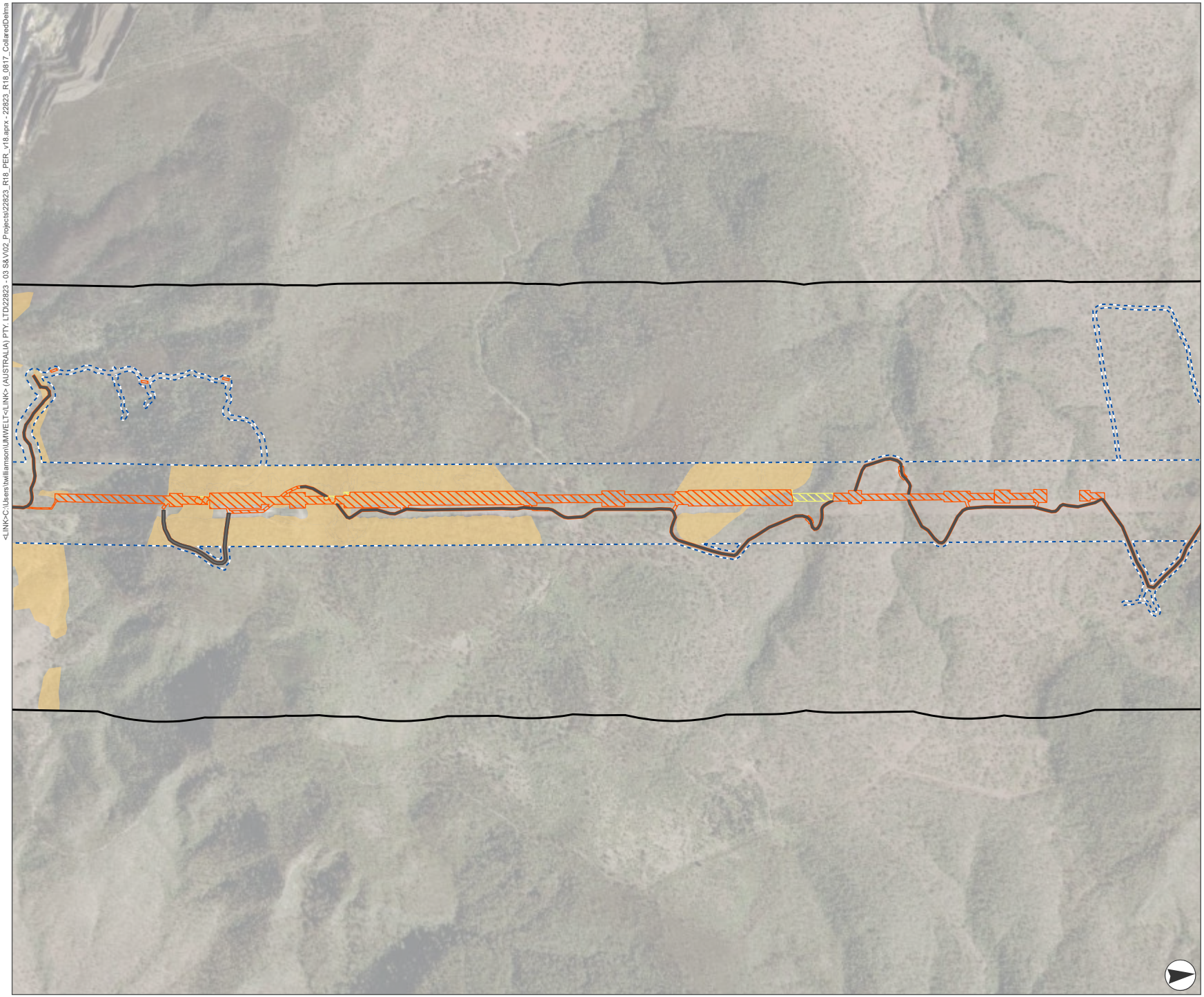


FIGURE 8.17-3

Collared Delma Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

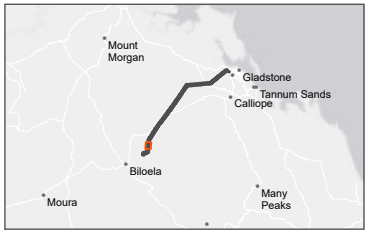
- Field Survey Extent
- Project Area

Collared Delma Habitat

- Suitable habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
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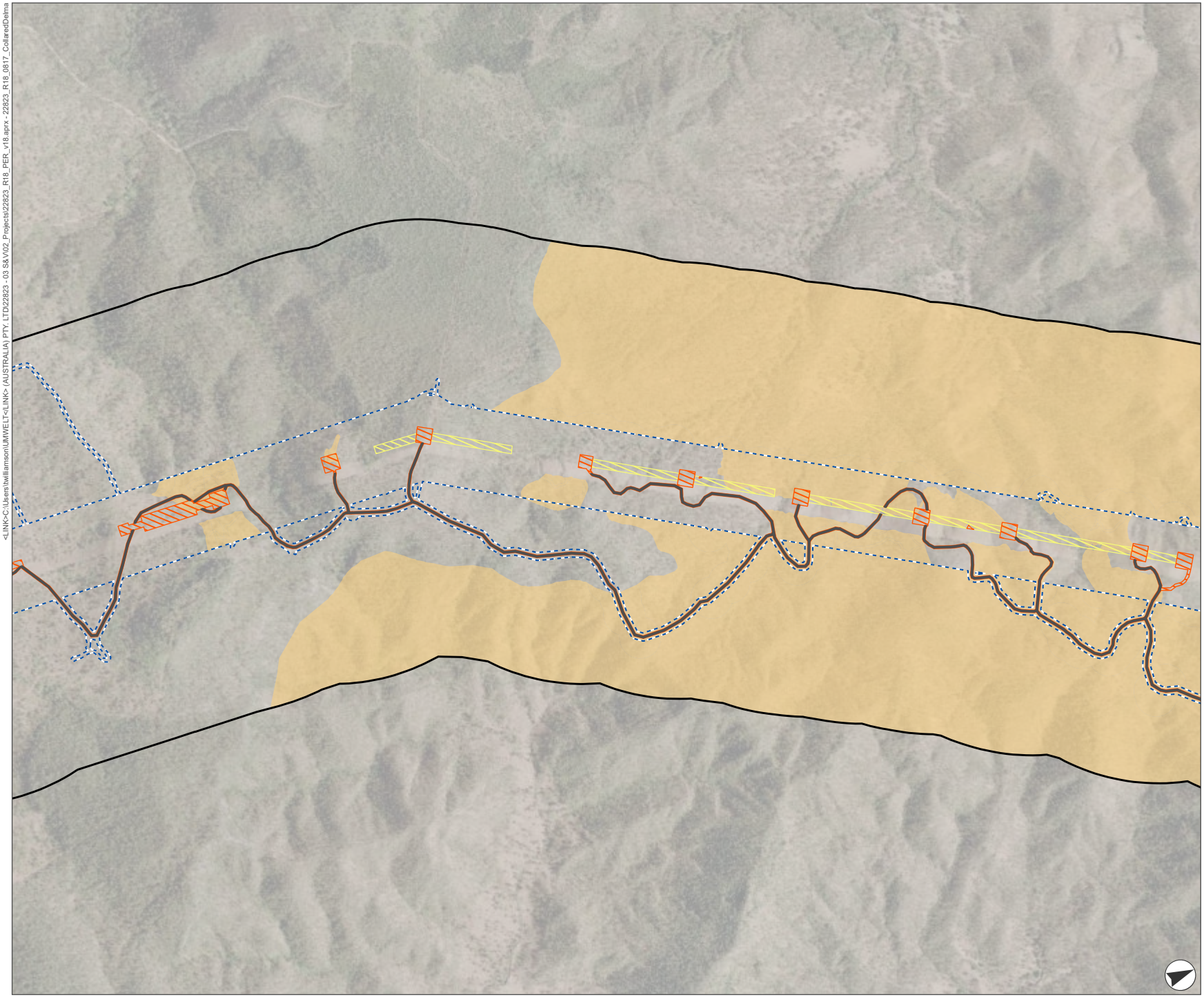
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FIGURE 8.17-4

Collared Delma Records and Habitat within the Field Survey Extent and Disturbance Footprint



Legend

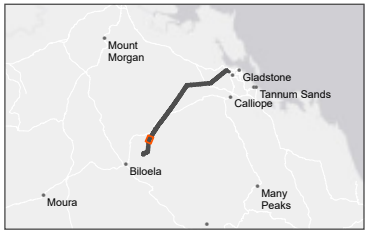
- Field Survey Extent
- Project Area

Collared Delma Habitat

- Suitable habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

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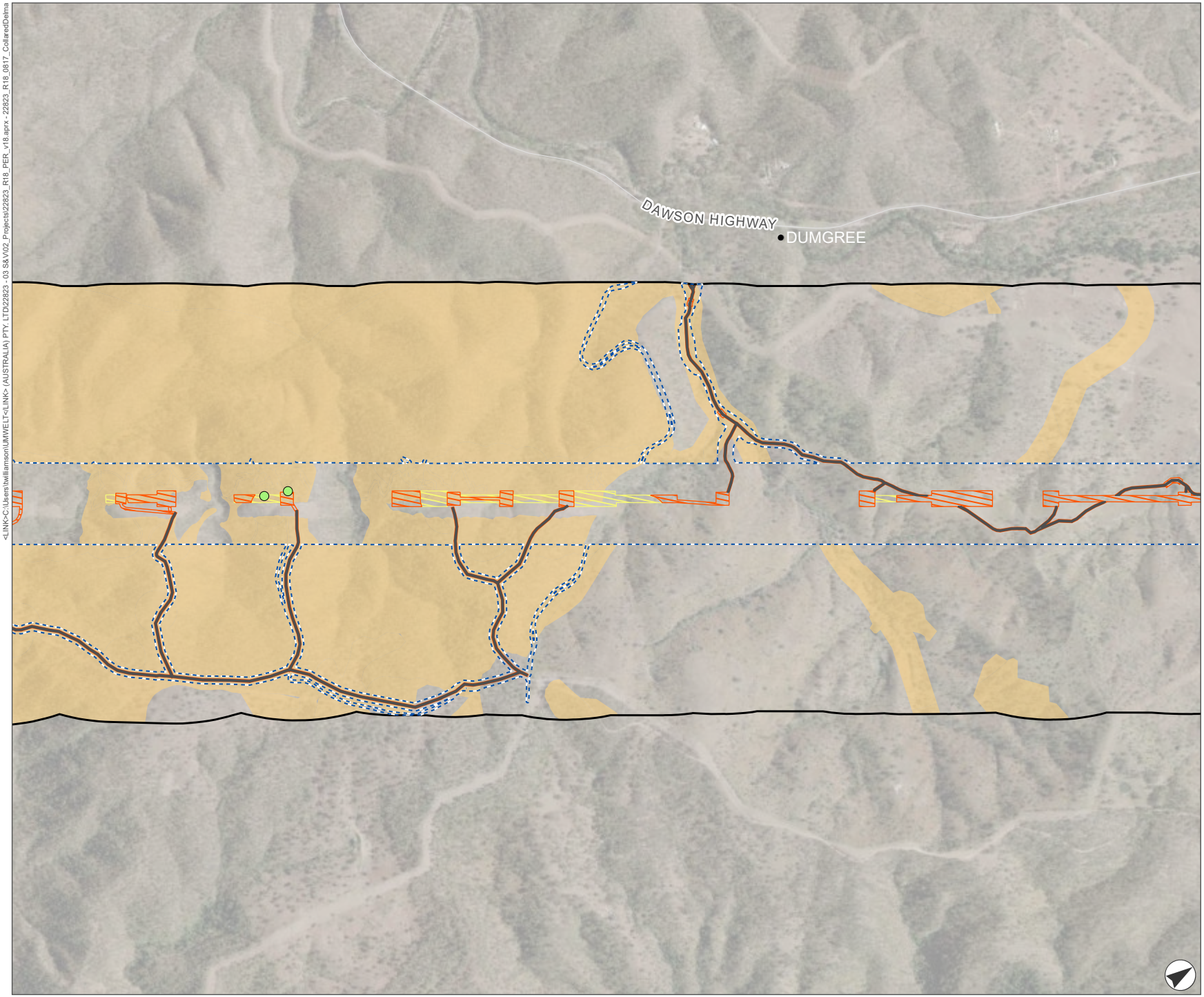


FIGURE 8.17-5

Collared Delma Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

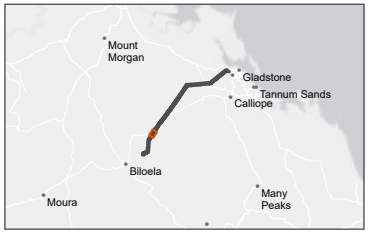
- Roads
- Field Survey Extent
- Project Area
- Collared Delma (Umwelt)

Collared Delma Habitat

- Suitable habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

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FIGURE 8.17-6

Collared Delma Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

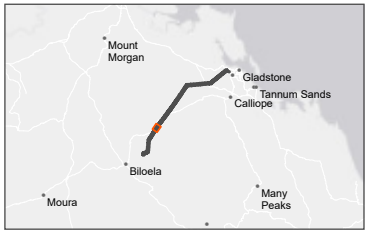
- Roads
- Watercourse
- Field Survey Extent
- Project Area

Collared Delma Habitat

- Suitable habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

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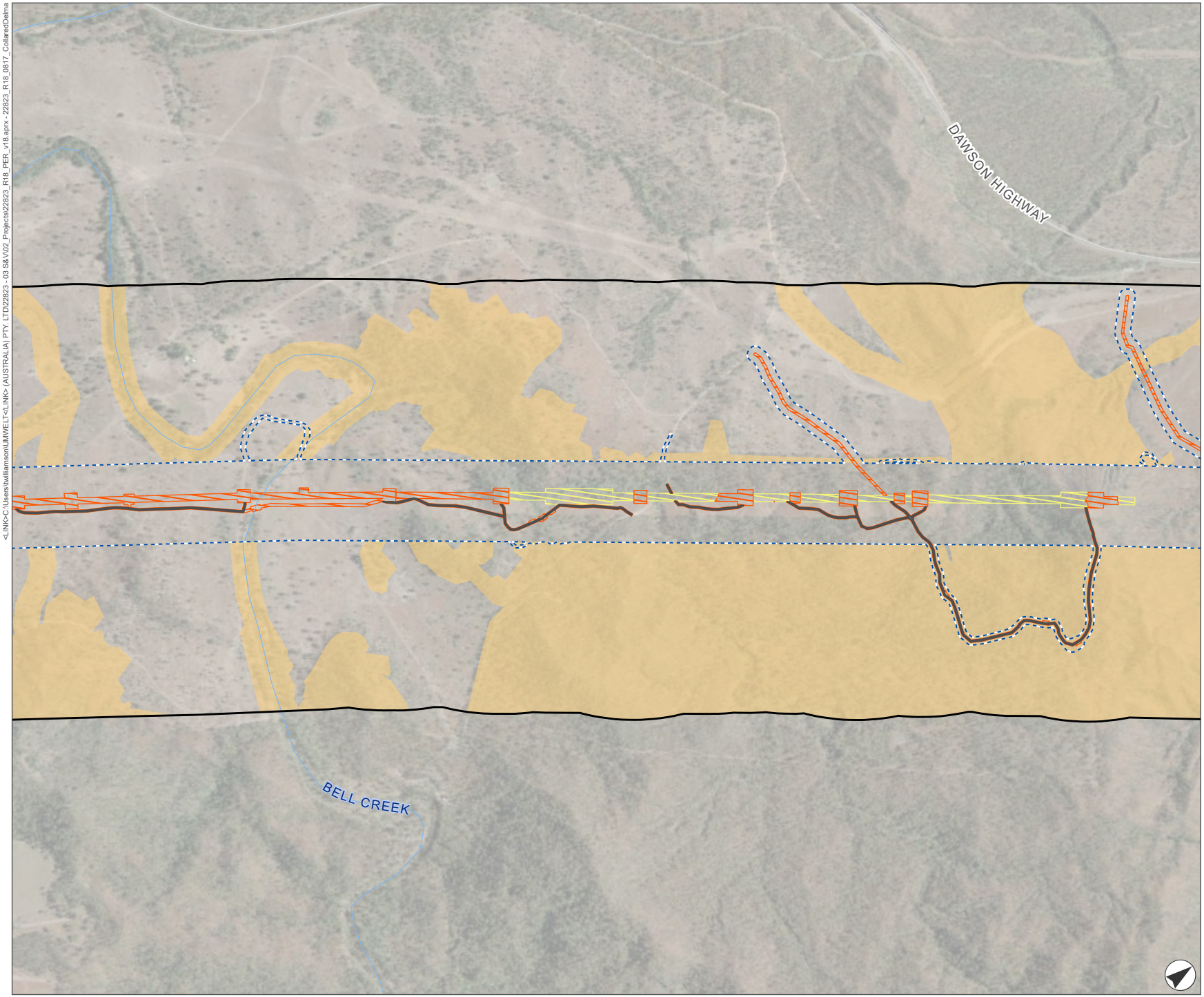


FIGURE 8.17-7

Collared Delma Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

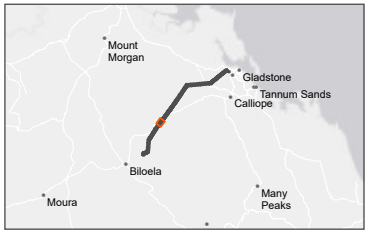
- Roads
- Watercourse
- Field Survey Extent
- Project Area

Collared Delma Habitat

- Suitable habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

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FIGURE 8.17-8

Collared Delma Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

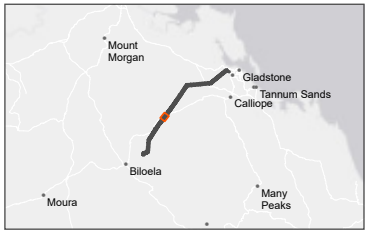
- Roads
- Field Survey Extent
- Project Area

Collared Delma Habitat

- Suitable habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



0 0.5 1

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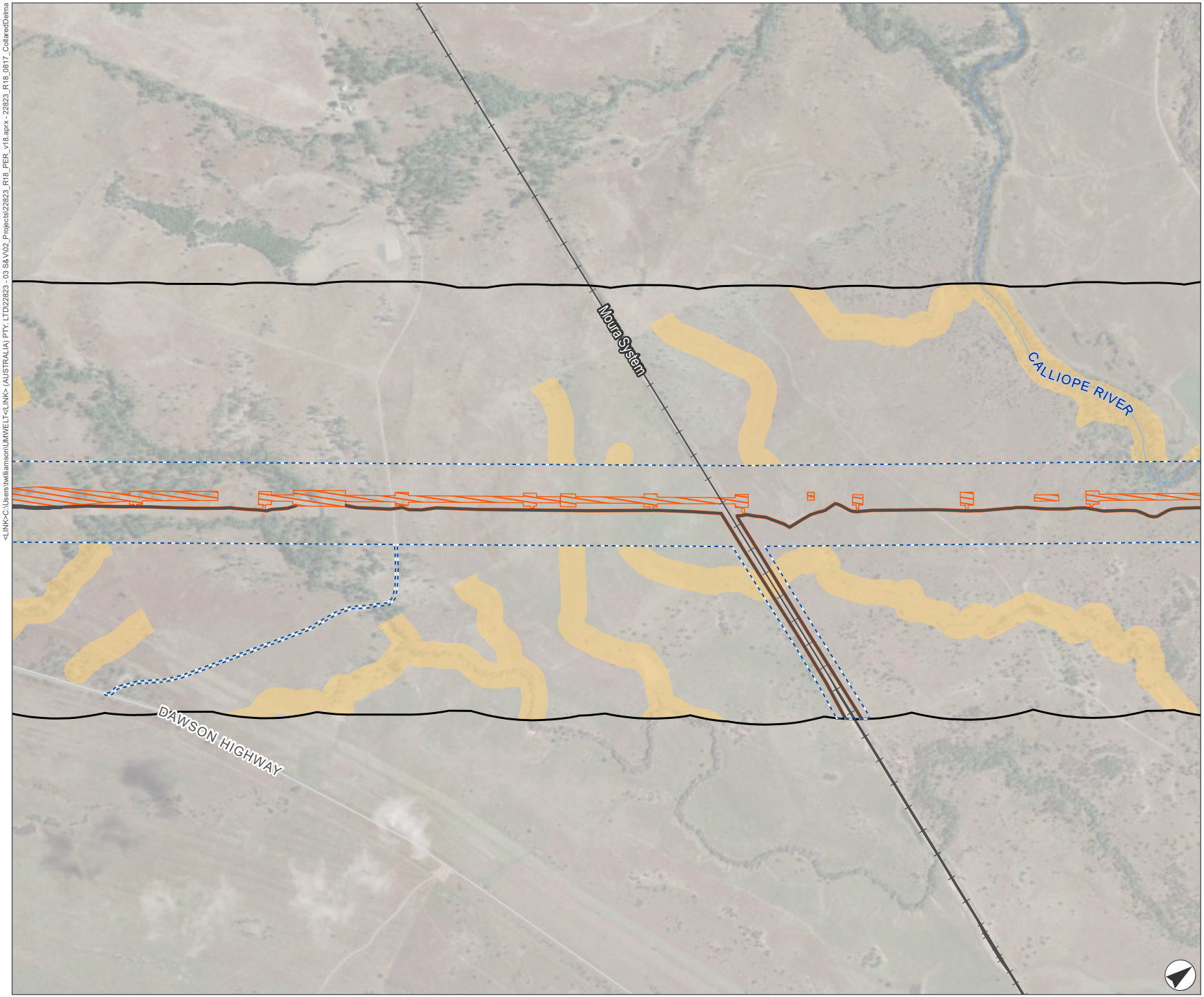


FIGURE 8.17-9

Collared Delma Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

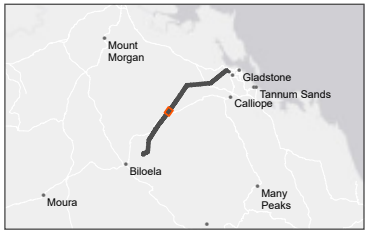
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Collared Delma Habitat

- Suitable habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

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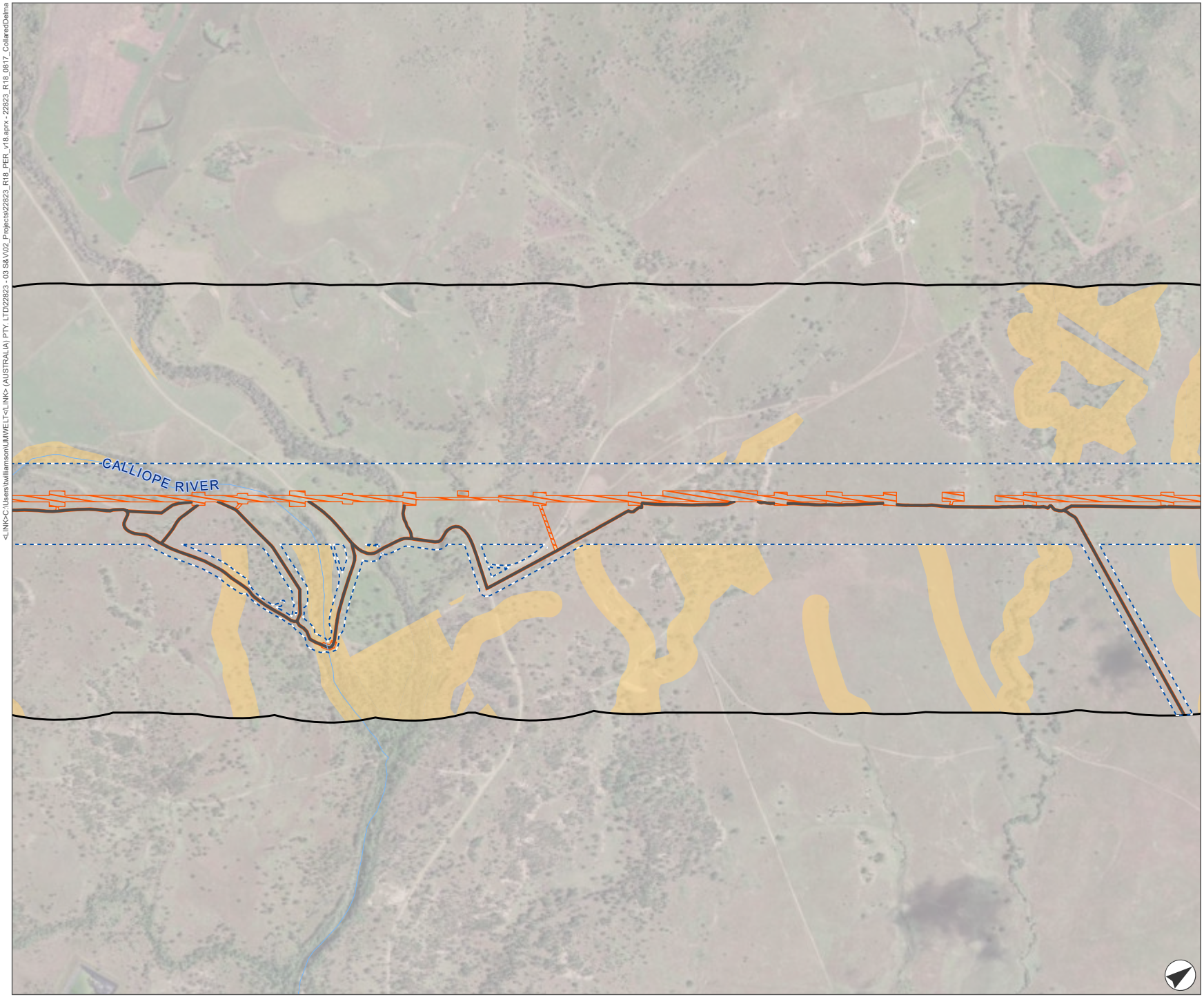


FIGURE 8.17-10

Collared Delma Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

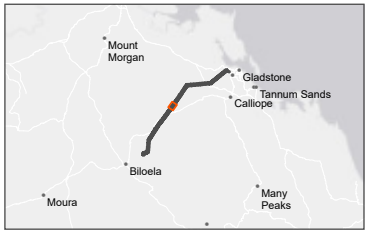
- Watercourse
- Field Survey Extent
- Project Area

Collared Delma Habitat

- Suitable habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



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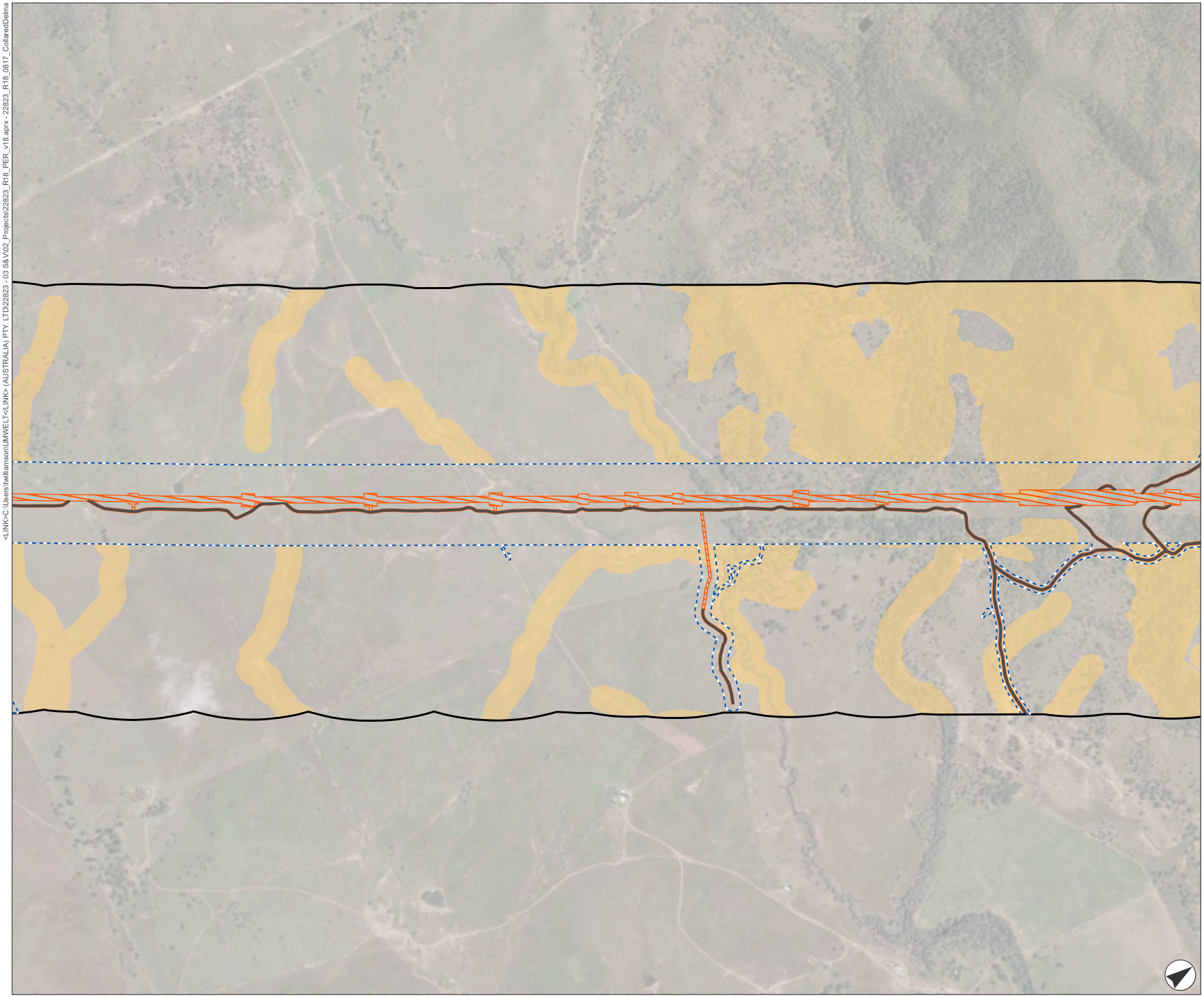


FIGURE 8.17-11

Collared Delma Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

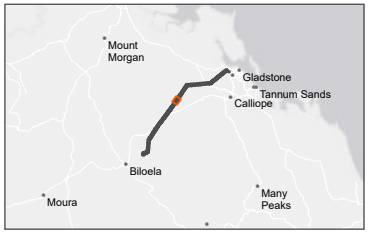
- Field Survey Extent
- Project Area

Collared Delma Habitat

- Suitable habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



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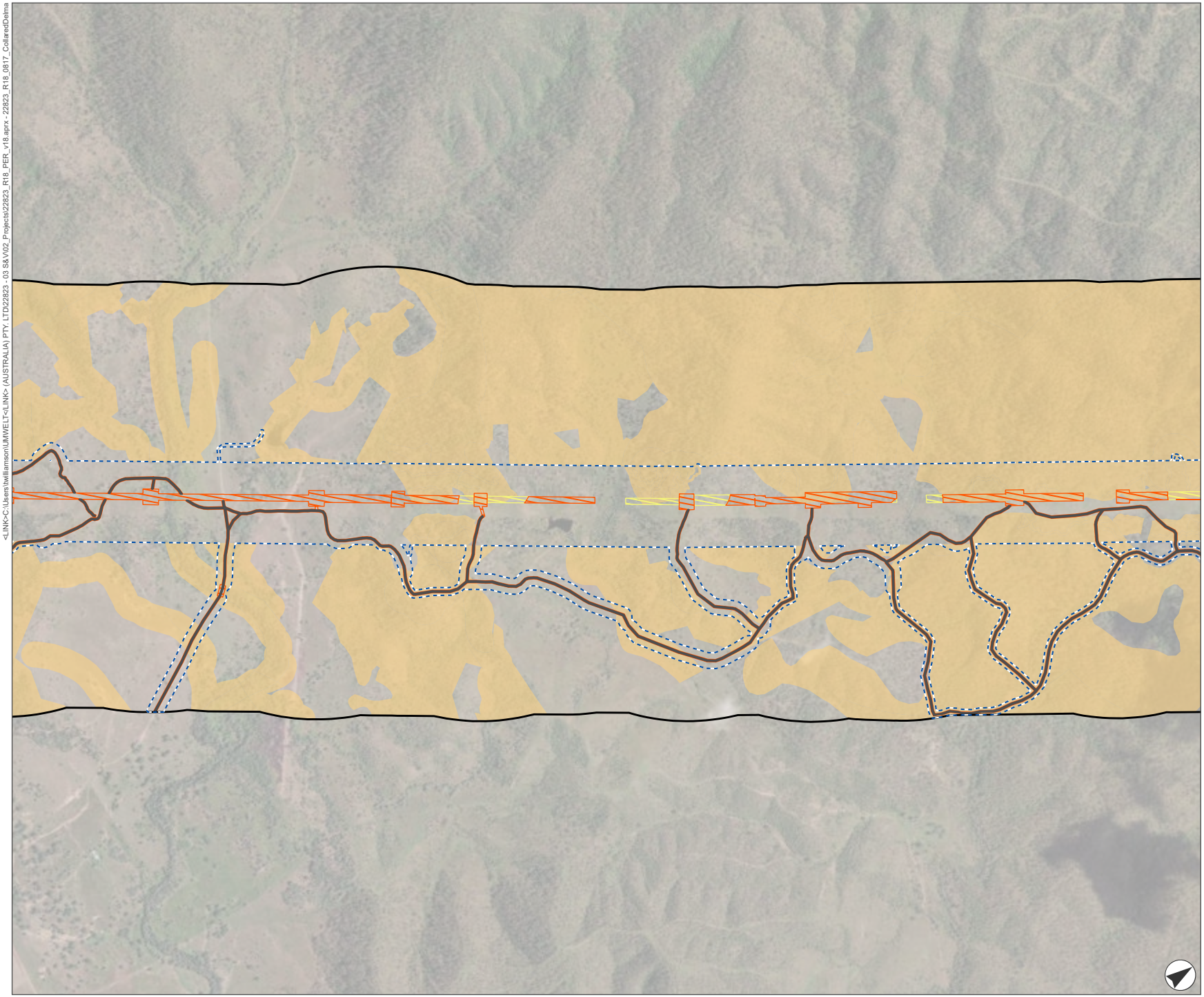


FIGURE 8.17-12

Collared Delma Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

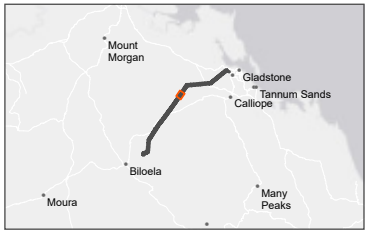
- Field Survey Extent
- Project Area

Collared Delma Habitat

- Suitable habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

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FIGURE 8.17-13

Collared Delma Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

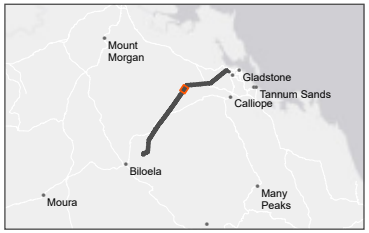
- Field Survey Extent
- Project Area

Collared Delma Habitat

- Suitable habitat

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

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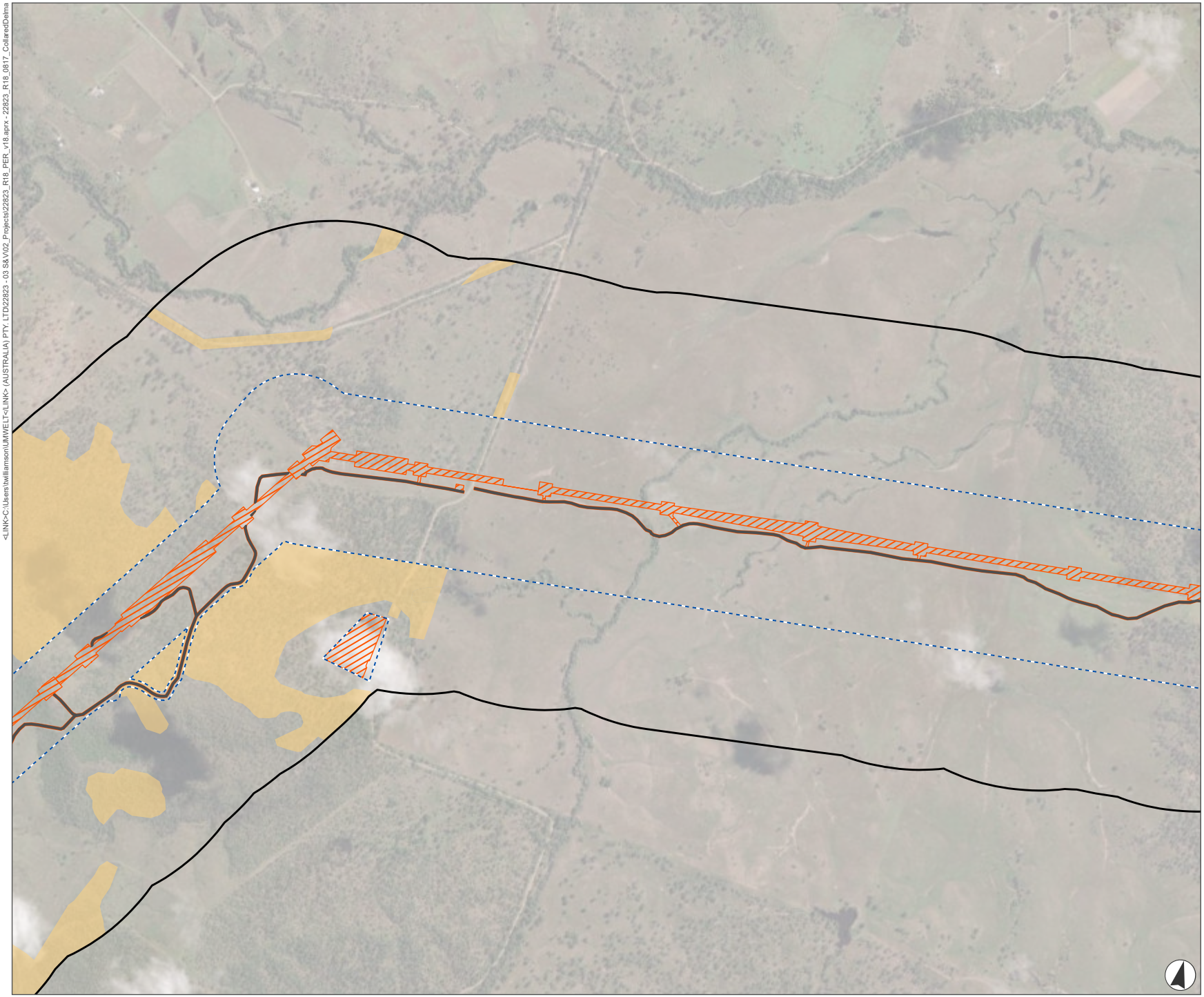


FIGURE 8.17-14

Collared Delma Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

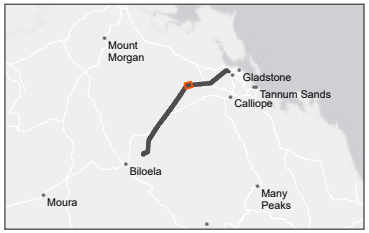
- Field Survey Extent
- Project Area

Collared Delma Habitat

- Suitable habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



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Kilometres

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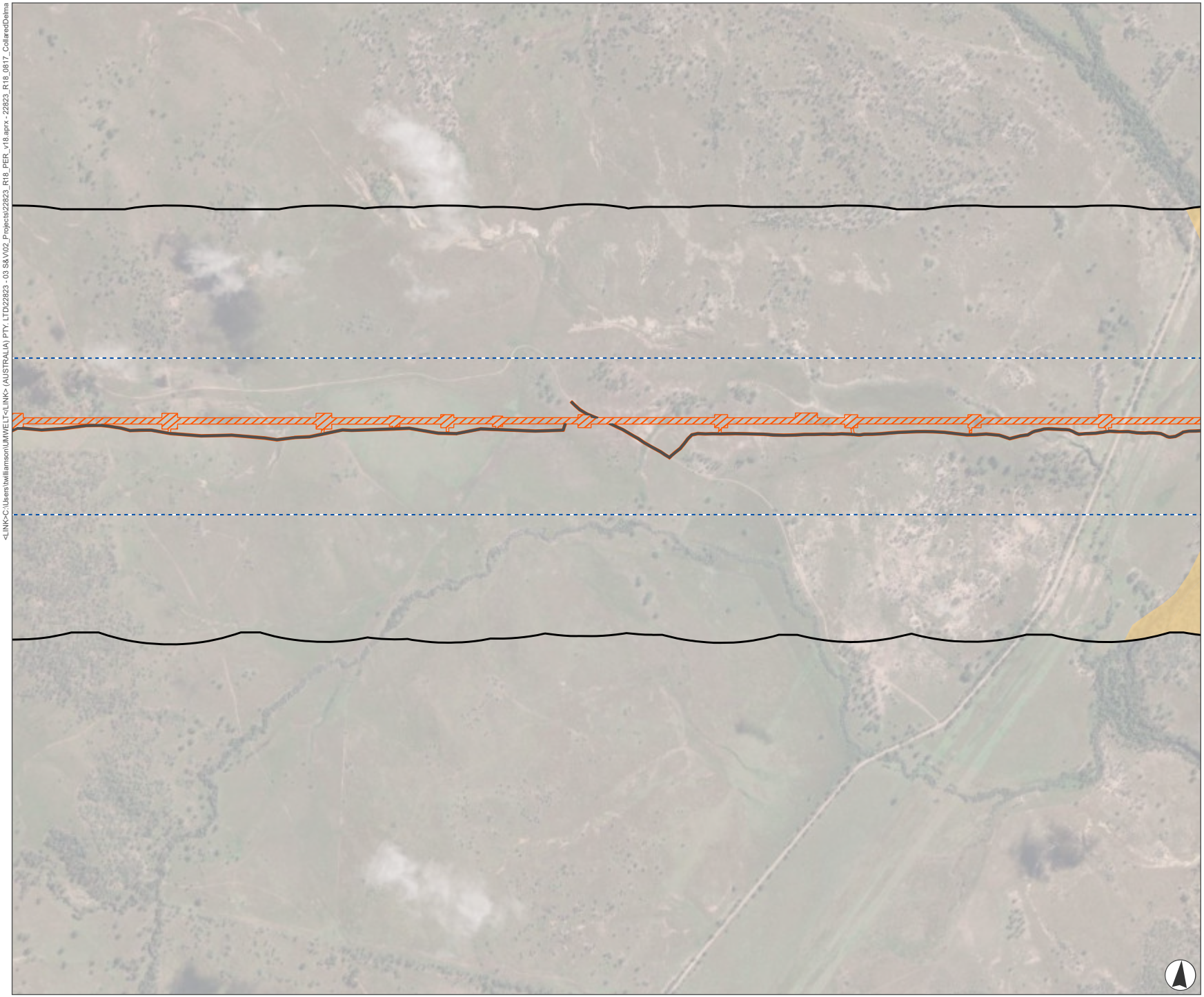


FIGURE 8.17-15

Collared Delma Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

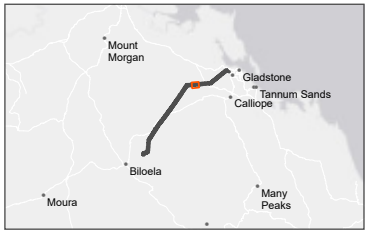
- Field Survey Extent
- Project Area

Collared Delma Habitat

- Suitable habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

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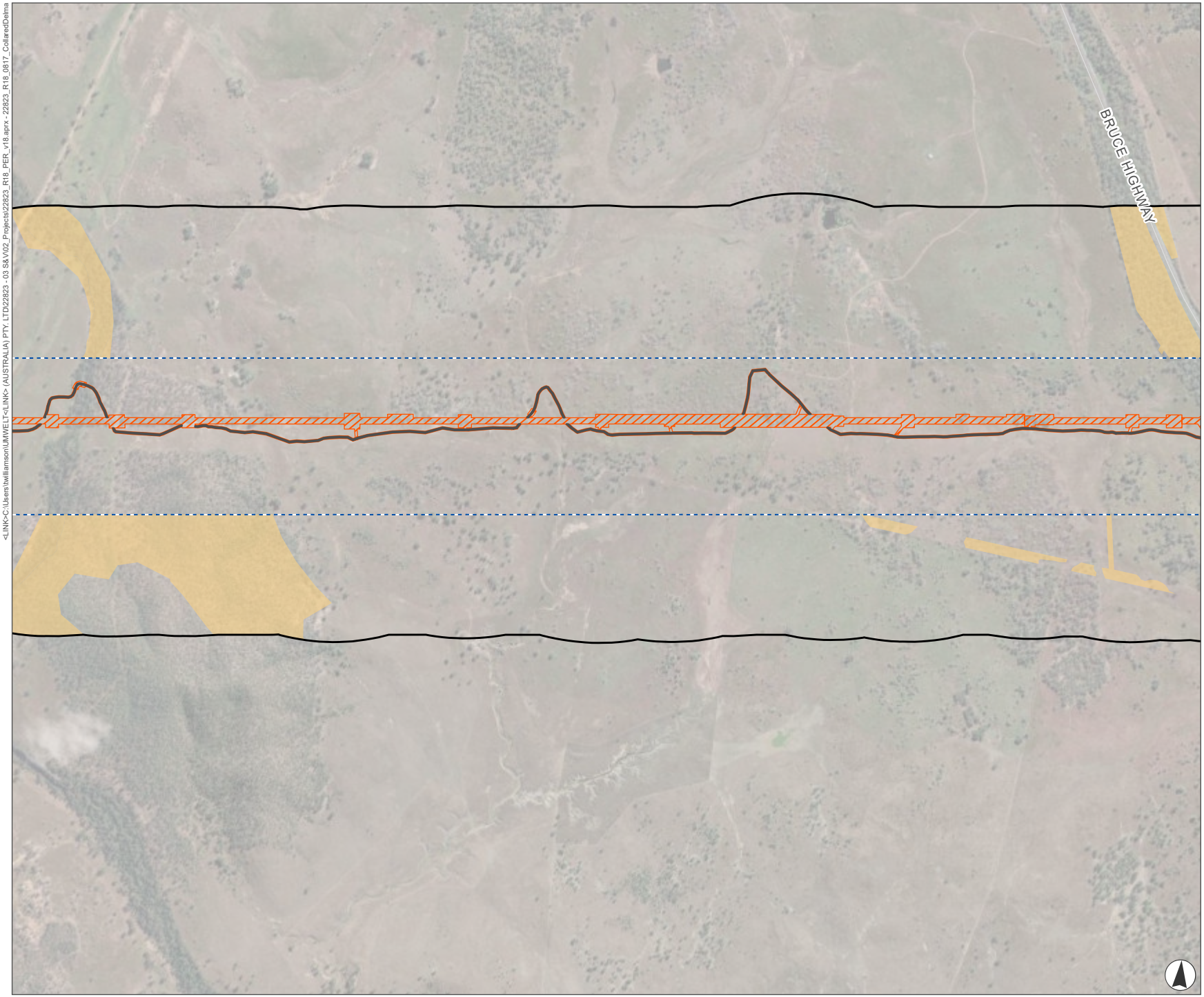


FIGURE 8.17-16

Collared Delma Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

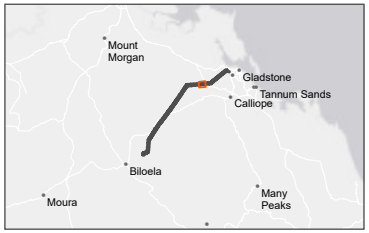
- Roads
- Field Survey Extent
- Project Area

Collared Delma Habitat

- Suitable habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



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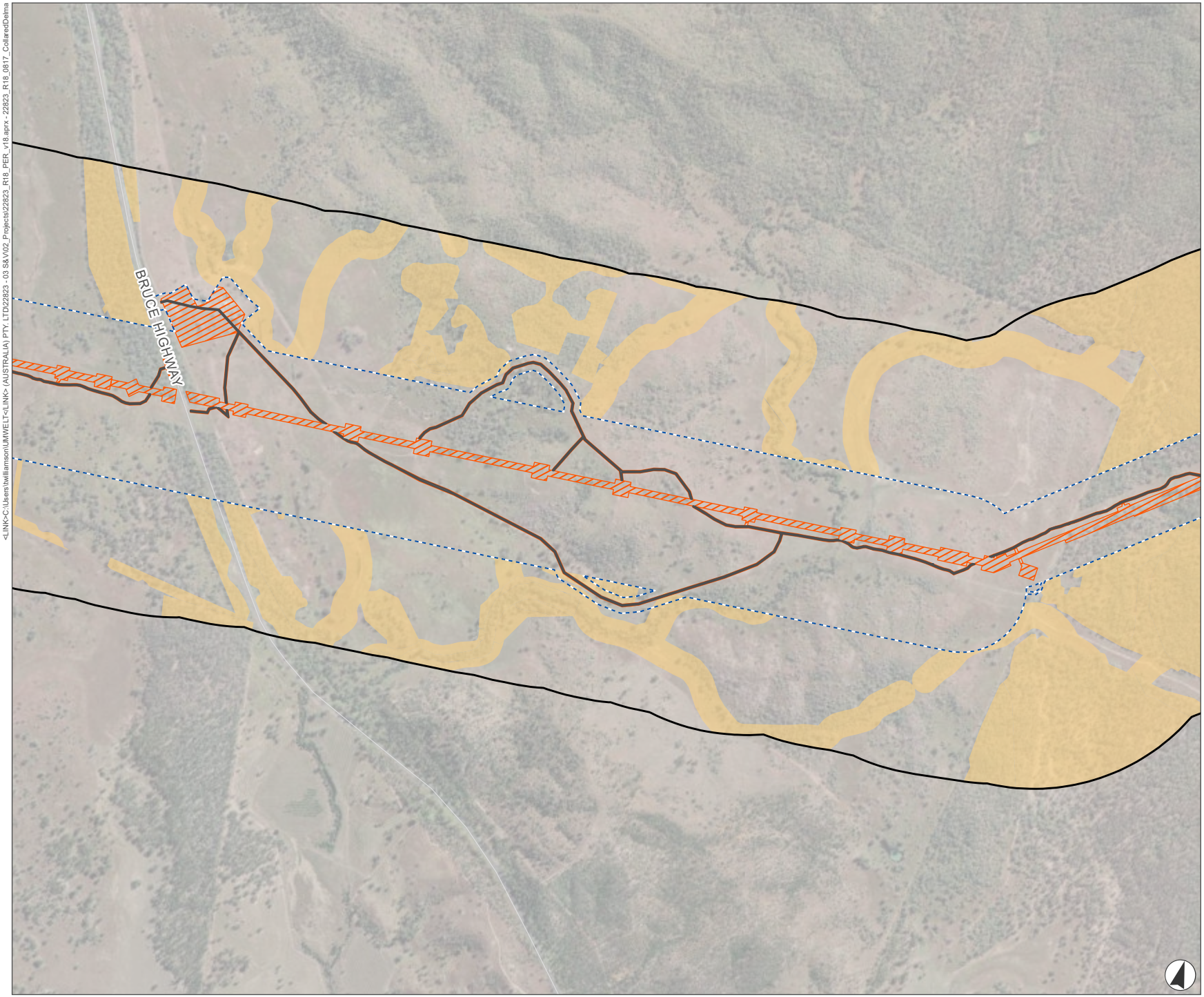


FIGURE 8.17-17

Collared Delma Records and Habitat within the Field Survey Extent and Disturbance Footprint

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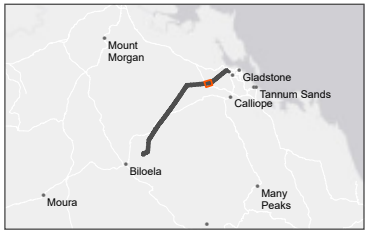
- Roads
- Field Survey Extent
- Project Area

Collared Delma Habitat

- Suitable habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



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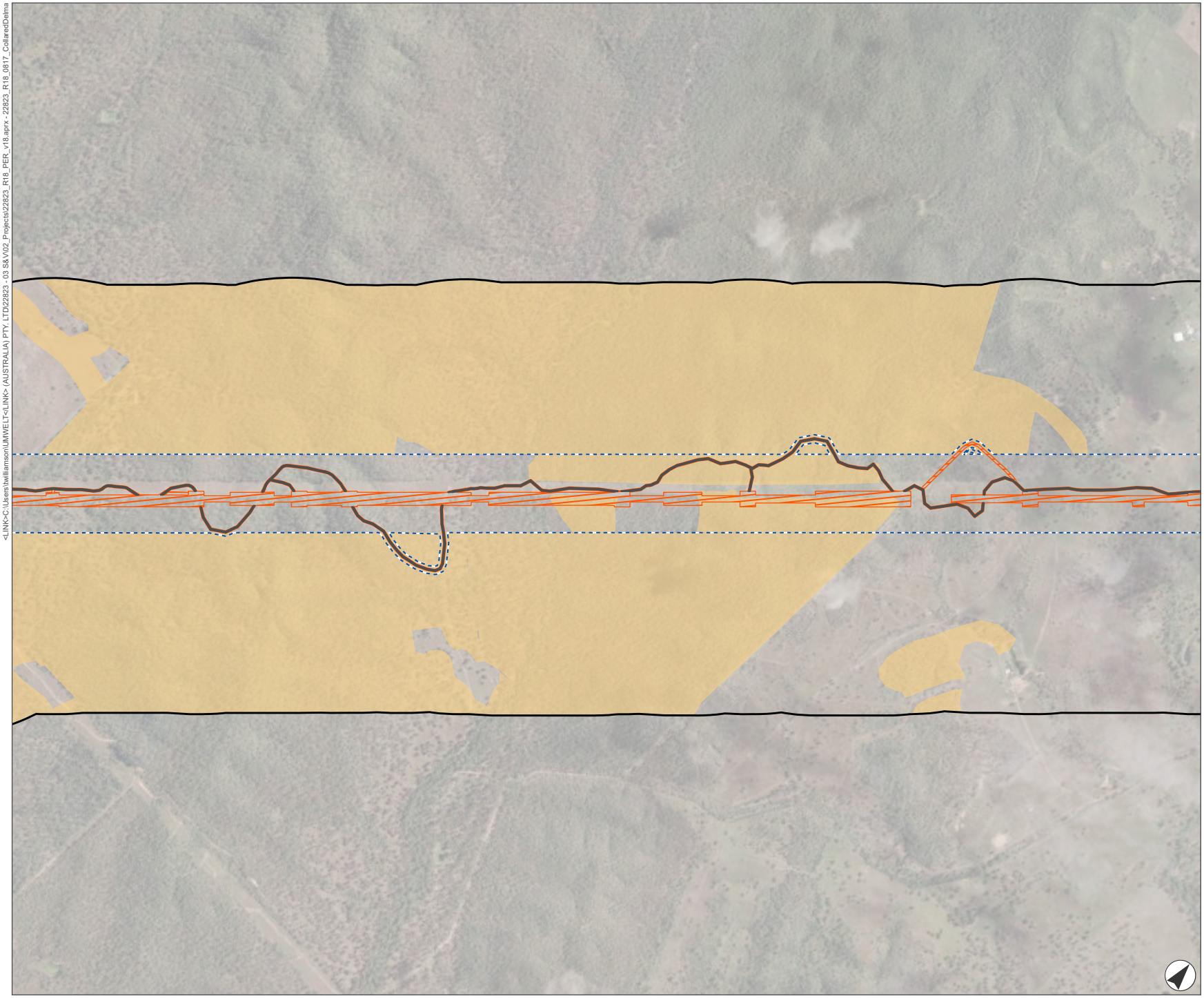


FIGURE 8.17-18

Collared Delma Records and Habitat within the Field Survey Extent and Disturbance Footprint

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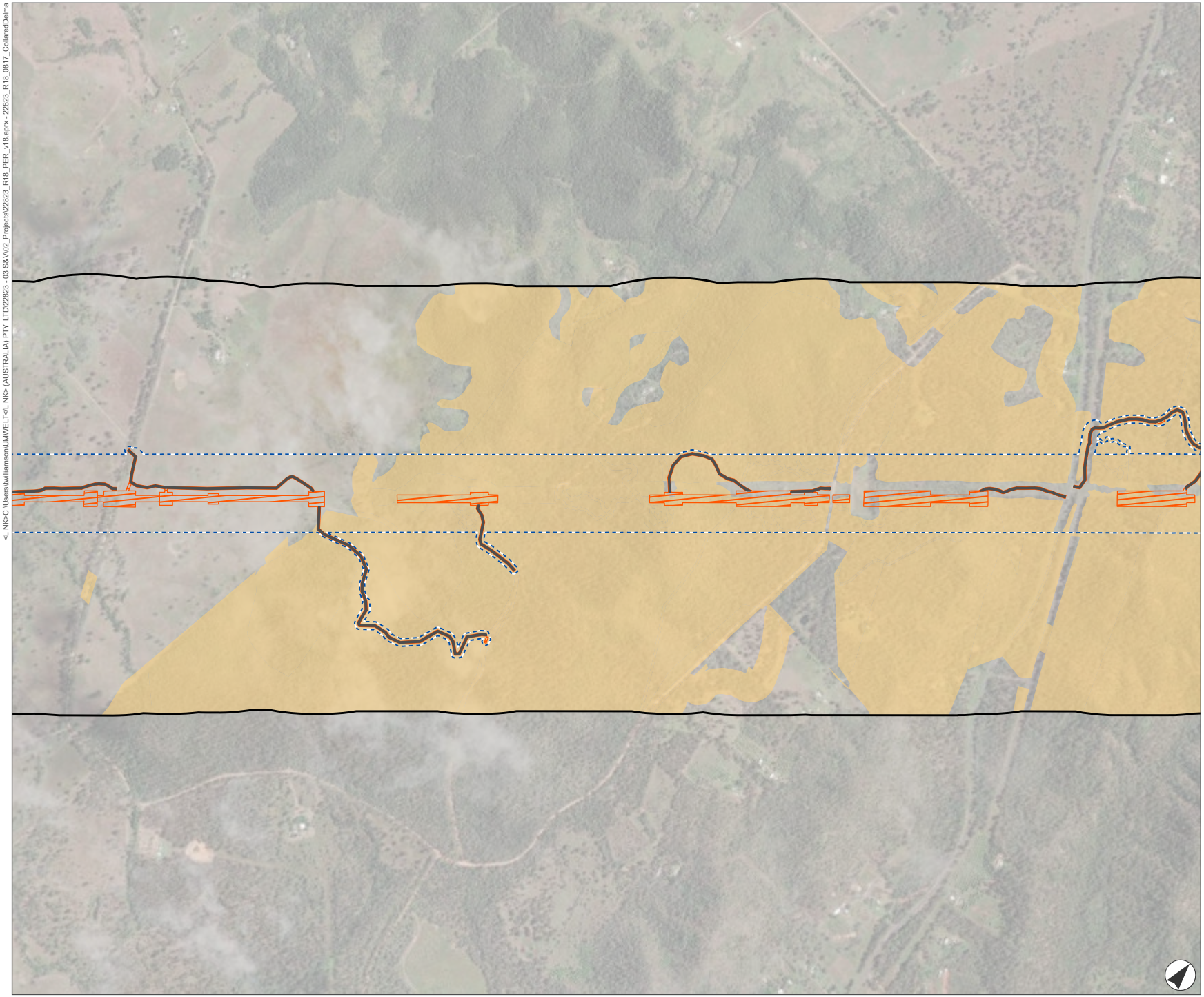


FIGURE 8.17-19

Collared Delma Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

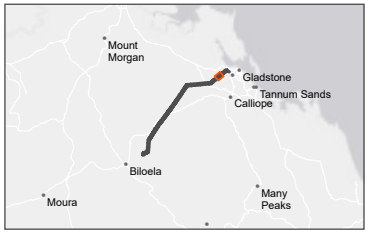
- Field Survey Extent
- Project Area

Collared Delma Habitat

- Suitable habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



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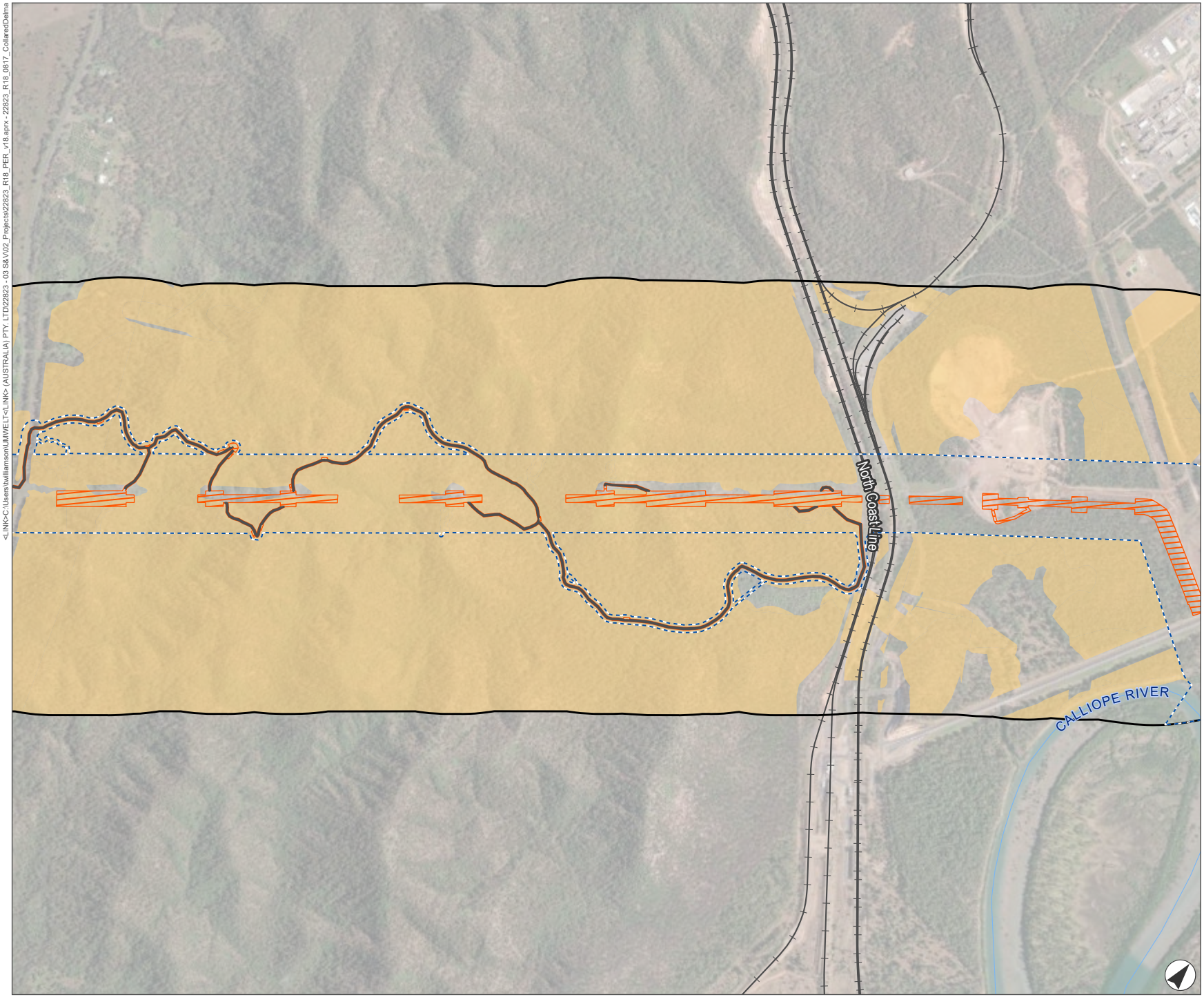


FIGURE 8.17-20

Collared Delma Records and Habitat within the Field Survey Extent and Disturbance Footprint

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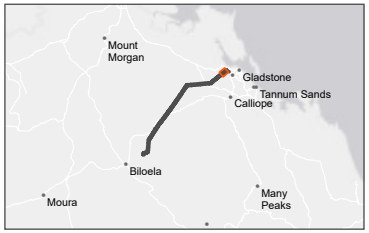
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Collared Delma Habitat

- Suitable habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



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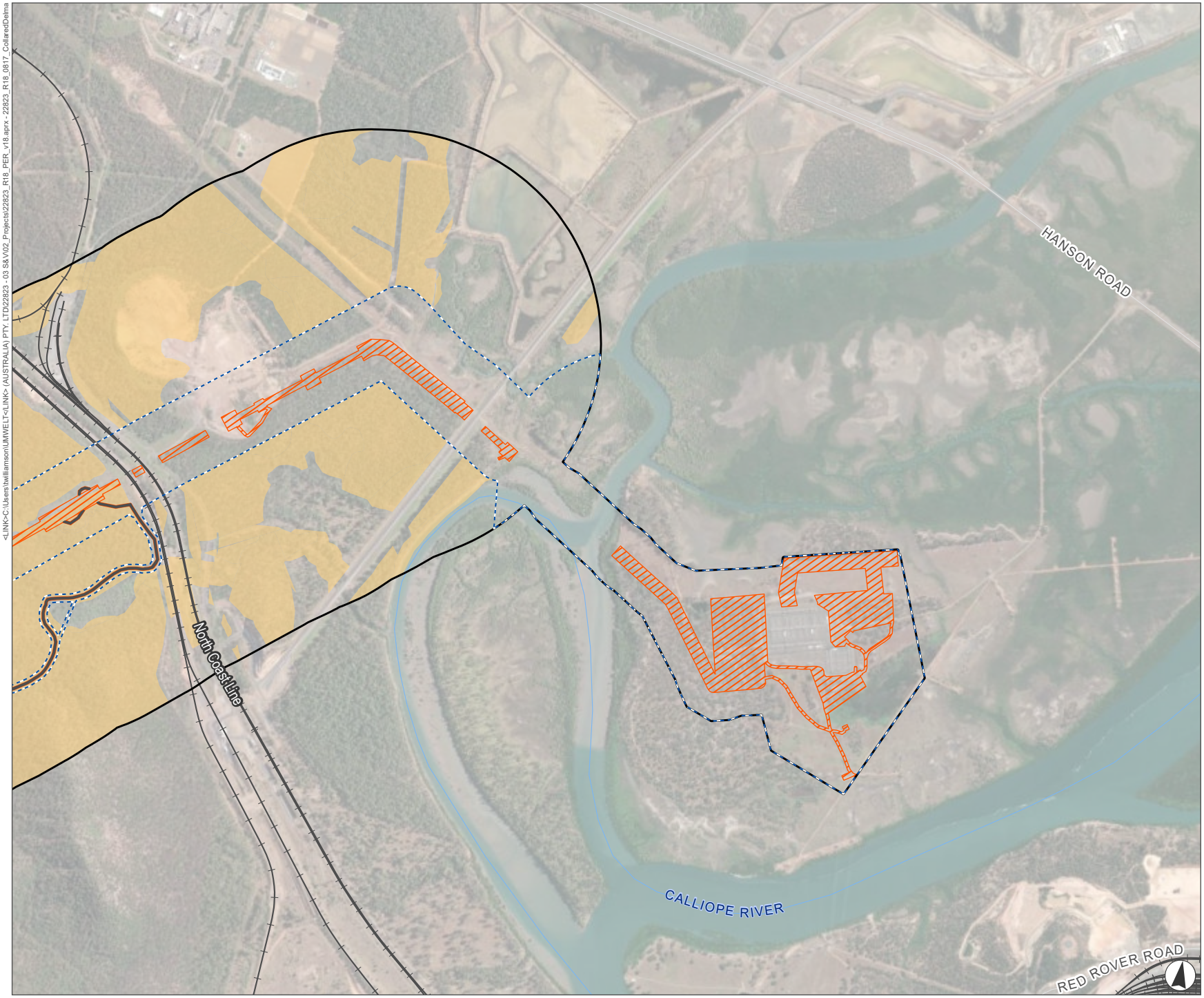


FIGURE 8.17-21

Collared Delma Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

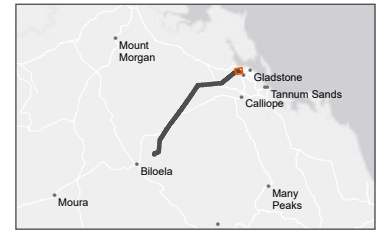
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Collared Delma Habitat

- Suitable habitat

Disturbance Footprint

- Full Clearing
- Existing Clearance



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8.2.7.3 Flatback Turtle (*Natator depressus*)

Table 8.53 Flatback Turtle: Ecology and Relevance to the Project Area

Flatback Turtle	
Profile	**Conservation status** Vulnerable and Migratory. **Distribution** Flatback turtle occurs in tropical waters of northern Australia, Papua New Guinea and Irian Jaya. All recorded rookeries occur in Australia. Flatback turtle nests on inshore islands and the mainland from Mon Repos in southern Queensland to Exmouth in northern Western Australia. **Important population** Important population has not been defined for the species and therefore, the definition provided in *Significant Impact Guidelines 1.1–Matters of National Environmental Significance* (Department of the Environment, 2013a) has been utilised for this assessment. Marine turtles return to the region where they hatched to breed, resulting in discrete genetic stocks within each species. Based on this, each population is considered necessary for maintaining genetic diversity, as each genetic stock cannot be replaced (Department of the Environment and Energy, 2017b). Therefore, if a population is present within the Project Area, it is considered an important population. **Historical records within the desktop search extent** One WildNet record is known from the desktop search extent near Gladstone from 1972, approximately 10 km east of Section E. **Habitat** Flatback turtles have a preference for shallow, soft-bottomed seabed habitats away from reefs. Flatback turtles' nest on inshore islands and the mainland from Mon Repos in southern Queensland to Exmouth in northern Western Australia. Nesting habitat includes sandy beaches in the tropics and subtropics with sand temperatures between 25 °C and 33 °C at nest depth. Hatchlings do not have the wide dispersal phase in the oceanic environment like other sea turtles do. **Habitat critical to the survival of the species** Table 6 in the *Recovery Plan for Marine Turtles in Australia* (Department of the Environment and Energy, 2017c) identifies habitat critical to the survival of each marine turtle species which has been identified by a consensus of experts. For flatback turtle, the following criteria was established: • Nesting habitat includes at least 70% of the nesting for the stock. • Nesting habitat critical to the survival of marine turtles is of a geographically relevant scale. • Where relevant, nesting habitat determined to be critical to the survival of marine turtles includes areas that are geographically dispersed, major and minor rookeries, mainland and island beaches and winter or summer nesting. • All index beaches. • A 60 km buffer on interesting habitat.

Flatback Turtle

Habitat within the Project Area is not listed as a critical habitat to the survival for flatback turtle.

Current threats to the species

A number of threats have been identified for the species. Major threats to the species include:

- Flatback turtle eggs being eaten by a range of predators, including foxes, dogs and pigs.
- Flatback turtles can be killed or injured when caught as 'bycatch' in commercial fishing operations, through getting tangled in discarded 'ghost' fishing nets and drowning and ingestion of marine debris. Flatback turtles from Queensland have also been affected by boat strikes.
- Flatback turtles from the Gulf of Carpentaria and North West Shelf are affected by indigenous harvest for meat.
- Increasing coastal development, particularly large oil and gas facilities, are likely to place increased pressure on important flatback habitat in the north-west of Australia. Light pollution is also a threat as it causes hatchlings to become disorientated and sometimes trapped.
- Increasing sand temperatures due to climate change are skewing the ratio between male and female hatchlings. The sex of a turtle hatchling is temperature dependant with warmer sands producing females and cooler sand producing males. In extreme temperatures baby turtles die.

Recovery plan

- *Recovery Plan for Marine Turtles* (Department of the Environment and Energy, 2017b).

In the Project Area

Surveys

Targeted surveys for marine turtles were not undertaken as suitable habitat for these species occurs outside of the Disturbance Footprint. Surveys relevant to marine turtles were limited to intertidal systems to confirm the presence of suitable nesting habitat however suitable habitat was not identified.

Species occurrence

Flatback turtle is considered to have a moderate likelihood of occurrence within the Project Area due to the presence of some foraging habitat within Section E.

Habitat with the Project Area

Habitat type	Habitat modelling criteria	Area (ha)	
		Project Area	Disturbance Footprint
Nesting	Not present within the Project Area	-	-
Foraging	Calliope River. Foraging occurs within both inshore and offshore waters.	12.8	-

Table 8.54 Assessment of Potential Project Impacts and Mitigation and Management Commitments for Flatback Turtle

Potential Impact	Assessment	Mitigation Commitments
Indirect		
Introduction or proliferation of pest and weed species resulting in degradation of habitat	Majority of works for the Project are confined to already disturbed areas with minimal connectivity to marine habitats. The risk of weed or pest introduction in marine turtle habitat near the Project Area is negligeable, and any potential effects would be short-term and highly manageable.	• Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • All waste to be secured • Biosecurity Instrument Permit to be obtained for moving materials out of or within different biosecurity zones • Educate workforce in the identification of pest fauna species • Avoid inclusion of any water retaining voids or pits • Refer to Table 5.5 and Table 5.6 of the MNES Management Plan for further details on mitigation measures.
Soil exposure resulting in an increased risk of erosion and sedimentation of water bodies, reducing water quality and degrading aquatic habitats	While soil disturbance has the potential to increase sedimentation and reduce water quality in nearby aquatic habitats, the scale of works is limited and the application of established management practices	• Soil sampling and testing to inform both erosion and sediment control (ESC) and rehabilitation • Develop Erosion and Sediment Control Plan (ESCP) in accordance with the IECA Best Practice Erosion and Sediment Control Guidelines 2008 • Extent and duration of soil exposure will be minimised • Disturbed areas will be promptly stabilised. • Site is monitored and controls adjusted to maintain required performance standard • Minimum personnel requirements will apply for ESCP development and verification • A Water Quality Monitoring Plan must be developed by an appropriately qualified person

Potential Impact	Assessment	Mitigation Commitments
	will minimise risk. Any potential effects are expected to be temporary, localised, and manageable.	• Dewatering Management Plan will be developed • Acid Sulphate Soil Management Plan will be developed • Awareness training for identification and management of ASS will be undertaken • Water extraction activities will be strictly controlled and monitored to ensure no waterbodies are completed drained • Erosion and sediment control measures in accordance with IECA 2008 • Refer to Table 5.4 and Table 5.12 of the MNES Management Plan for further details on mitigation measures.
Increased risk of contamination associated with activities such as refuelling or storage of chemicals	Although fuel, oil, or chemical spills have the potential to reduce water quality and degrade aquatic habitats, the likelihood of such events is low given the limited scale of works and strict management measures in place. Any risk is expected to be minimal and effectively managed through established controls.	• Hazardous materials must be stored and handled appropriately • An Emergency Response Plan will be developed • Spill kits will be available during construction • Hazardous materials locations will be bunded • All waste disposed of in accordance with legislative requirements • No refuelling within 50 m of a watercourse • Application of herbicides in accordance with legislative requirements • Refer to Table 5.4 of the MNES Management Plan for further details on mitigation measures.
Temporary changes in hydrology from installation of infrastructure creating a barrier to surface flow and increasing stormwater run-off	While temporary changes to surface water flow and stormwater run-off may occur during installation of infrastructure, these are expected to be minor, localised, and reversible once works	• A Water Quality Monitoring Plan must be developed by an appropriately qualified person • Dewatering Management Plan will be developed • Acid Sulphate Soil Management Plan will be developed • Awareness training for identification and management of ASS will be undertaken • Water extraction activities will be strictly controlled and monitored to ensure no waterbodies are completed drained • Erosion and sediment control measures in accordance with IECA 2008 • Soil sampling and testing to inform both erosion and sediment control (ESC) and rehabilitation

Potential Impact	Assessment	Mitigation Commitments
	are complete. With appropriate siting and management, the risk of impacts to aquatic habitats is minimal.	• Develop Erosion and Sediment Control Plan (ESCP) in accordance with the IECA Best Practice Erosion and Sediment Control Guidelines 2008 • Extent and duration of soil exposure will be minimised • Disturbed areas will be promptly stabilised • Site is monitored and controls adjusted to maintain required performance standard • Minimum personnel requirements will apply for ESCP development and verification • Refer to Table 5.4 and Table 5.12 of the MNES Management Plan for further details on mitigation measures.

Table 8.55 Significant Impact Assessment: Flatback Turtle

Impact Criteria	Assessment
Lead to a long-term decrease in the size of an important population of a species	**Unlikely.** Project infrastructure will not be located within suitable foraging habitat for flatback turtles in the Calliope River. The Project has been specifically designed to avoid placing any infrastructure within the river itself, including intertidal zones and fringing mangrove areas that may support turtle activity. While indirect impacts such as pollution and habitat degradation from coastal development can pose risks to nesting and foraging areas of flatback turtles, the Project includes comprehensive mitigation measures to prevent such outcomes. Flatback turtles may be affected by suspended plastic debris, which can be mistaken for food, and by entanglement in fishing gear and crab pots. Additionally, chemical and terrestrial runoff from agriculture, industry, and urban development can degrade nearshore habitats, including seagrass beds that support foraging. Construction activities also have the potential to disturb acid sulfate soils, which, if exposed, can trigger chemical reactions that release sulfuric acid and mobilise heavy metals, potentially impacting water quality and turtle habitat. To address these risks, the Project will implement measures outlined in the MNES Management Plan. The elevated tower pad near the northern bank of the Calliope River, which has the potential to disturb acid sulfate soils, will be constructed using soil sourced from outside the area. This soil will be free from contaminants and weed seeds, reducing the likelihood of chemical disturbance. Any acid sulfate soils encountered will be managed via a Project ASS Management Plan, consistent with mitigation measures outlined in Table 5.12 of the MNES Management Plan. Water and sediment run off will be controlled through an ESCP, which includes the installation of silt fences and sediment traps, particularly around tower locations closest to the Calliope River in Section E, adjacent to potential foraging habitat. These measures will prevent pollutants from entering the river and affecting water quality. A Water Quality Monitoring Plan will also be

Impact Criteria	Assessment
	implemented to assess conditions before, during, construction. This program will monitor for chemicals, turbidity, metals and nutrient levels during construction and identify suitable corrective actions where exceedances are recorded. Through these targeted and proactive measures, the project will avoid modifying, destroying, removing, isolating, or degrading habitat to the extent that the flatback turtle is likely to decline.
Reduce the area of occupancy of an important population	**Unlikely.** Project infrastructure will not be located within suitable foraging habitat for flatback turtles in the Project Area or Disturbance Footprint. The Project has been designed to avoid placing any infrastructure within the river itself, including intertidal zones and fringing mangrove areas. The method of spanning the Calliope River will not involve the use of marine vessels; instead, transmission lines will be strung using helicopters or drones. As a result, there will be no risk of boat strike or propeller-related injury and construction-related noise within the river environment will be minimal. Furthermore, no lines, bunding, or other physical structures will be placed in the river, eliminating the potential for entanglement. Flatback turtles are vulnerable to suspended plastic debris, which can be mistaken for food, and to entanglement in fishing gear and crab pots. Additionally, chemical and terrestrial runoff from agriculture, industry, and urban development can degrade nearshore habitats, including seagrass beds that support foraging. Construction activities also carry the potential to disturb acid sulfate soils, which, if exposed to oxygen, can initiate chemical reactions that release sulfuric acid and mobilise heavy metals, thereby affecting water quality. To address these risks, the Project will implement measures outlined in the MNES Management Plan. The elevated tower pad near the northern bank of the Calliope River, which has the potential to disturb acid sulfate soils, will be constructed using soil sourced from outside the area. This soil will be free from contaminants and weed seeds. Any acid sulfate soils encountered will be managed in accordance with a Project ASS Management Plan, consistent with mitigations outlined within Table 5.12 of the MNES Management Plan. Runoff and sediment will be controlled through an ESCP, which includes the installation of silt fences and sediment traps, particularly around tower locations closest to the Calliope River in Section E, adjacent to potential foraging habitat. In addition, a Water Quality Monitoring Plan will be implemented to assess pre- and post-construction water quality in the Calliope River. This plan will monitor for chemicals, metals, pH, turbidity, and nutrient levels throughout the construction phase to detect any changes that could affect seagrass beds and nearshore foraging areas. The plan will also identify suitable corrective actions where exceedances are recorded. Through these carefully designed mitigation measures, the Project will maintain the ecological integrity of the Calliope River and ensure that habitat availability and quality for flatback turtles is not compromised in a way that would contribute to population decline.

Impact Criteria	Assessment
Fragment an existing important population into two or more populations	**Unlikely.** Project infrastructure will not be located within suitable foraging habitat in the Calliope River. The Project has been designed to avoid any infrastructure in the Calliope River including the intertidal areas and fringing mangroves. Aa a consequence, no fragmentation impacts are expected to occur.
Adversely affect habitat critical to the survival of a species	**Unlikely.** As discussed above, the Project Area does not occur within or adjacent to any area identified as habitat critical to the survival of the species. No nesting habitat occurs, and no Project infrastructure is proposed within the Calliope River.
Disrupt the breeding cycle of an important population	**Unlikely.** No nesting habitat for these species is present within or adjacent to the Project Area.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely.** Project infrastructure will not be located within suitable foraging habitat in the Calliope River. The Project has been designed to avoid any infrastructure in the Calliope River including the intertidal areas and fringing mangroves. Although green turtles are sensitive to indirect threats such as pollution, habitat degradation, and chemical runoff, the proposed transmission line adjacent to the Calliope River has been designed to limit these impacts. Flatback turtles forage in seagrass beds and may be affected by suspended plastic debris, entanglement in fishing gear, and chemical discharge from surrounding land uses. Additionally, construction activities have the potential to disturb acid sulfate soils, which can release harmful substances into aquatic environments if not properly managed. To ensure that these risks do not result in habitat degradation or loss, the Project incorporates a suite of mitigation measures. The elevated tower pad near the northern bank of the Calliope River will be constructed using soil sourced from outside the area, which will be free from contaminants and weed seeds. This approach avoids triggering acid sulfate soil reactions at the site. Any acid sulfate soils encountered will be managed under a Project ASSMP, which outlines procedures for neutralisation and containment. Runoff and sediment control will be addressed through an ESCP, which includes the installation of silt fences and sediment traps, particularly around tower locations closest to the river in Section E. These measures will prevent sediment and pollutants from entering the river and affecting any nearby seagrass beds. In addition, a Water Quality Monitoring Plan will be implemented to assess the condition of the Calliope River before, during, and after construction. This plan will monitor key indicators such as pH, turbidity, nutrient levels, and metal concentrations whilst also identifying suitable corrective actions where exceedances are recorded.

Impact Criteria	Assessment
	Through these carefully planned and site-specific mitigation strategies, the Project will maintain the ecological integrity of the Calliope River and ensure that the Project is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that a marine turtle species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**Unlikely.** Invasive plants and predatory animals are both considered threats to marine turtles when on land. Nesting beaches situated within or directly adjacent to the Project Area are absent. The Project will employ best practice control methods for weeds and pests and is unlikely to introduce or exacerbate weeds or pests beyond existing levels.
Introduce disease that may cause the species to decline	**Unlikely.** Disease has not been identified as a threat to marine turtle species. Nevertheless, the Project will follow appropriate biosecurity protocols; therefore, introduction of a disease is unlikely.
Interfere substantially with the recovery of the species	**Unlikely.** The Recovery Plan for Marine Turtles in Australia (Department of the Environment and Energy, 2017b) identifies recovery actions for all marine turtle species in Australia. These include: • Maintain and improve efficacy of legal and management protection • Adaptively manage turtle stocks to reduce risk and build resilience to climate change and variability • Reduce the impacts from marine debris • Minimise chemical and terrestrial discharge • Address international take within and outside Australia's jurisdiction • Reduce impacts from terrestrial predation • Minimise light pollution • Address the impacts of coastal development/infrastructure and dredging and trawling • Maintain and improve sustainable Indigenous management of marine turtles • Determine trends at index beaches

Impact Criteria	Assessment
	• Understand population demographics at key foraging grounds • Address information gaps to better facilitate the recovery of marine turtle stocks. Project infrastructure will not be located within the Calliope River. Based on the implementation of measures consistent with the key objectives outlined in the MNES Management Plan, indirect impacts are likely to be negligible. The Project is unlikely to interfere with any of the abovementioned recovery objectives and is therefore unlikely to interfere substantially with the recovery of a marine turtle species.
Significant Residual Impact	**Unlikely to have a significant impact**

8.2.7.4 Green Turtle (*Chelonia mydas*)

Table 8.56 Green Turtle: Ecology and Relevance to the Project Area

Green Turtle	
Profile	**Conservation status** Vulnerable and Migratory. **Distribution** This species has a global distribution that occurs in tropical and subtropical waters throughout the world. In Australia, the green turtle nests, forages and migrates across tropical northern Australia, but occasionally strays into temperate waters. They are highly migratory and travel thousands of kilometres throughout their life (Department of Climate Change. Energy, Environment and Water, 2025). **Important population** Important population has not been defined for the species and therefore, the definition provided in the *Significant Impact Guidelines 1.1– Matters of National Environmental Significance* (Department of the Environment, 2013a) has been utilised for this assessment. Marine turtles return to the region where they hatched to breed, resulting in discrete genetic stocks within each species. Based on this, each population is considered necessary for maintaining genetic diversity, as each genetic stock cannot be replaced (Department of the Environment and Energy, 2017b). Therefore, if a population is present within the Project Area, it is considered an important population. **Historical records within the desktop search extent** WildNet records occur within the desktop search extent, with the most recent occurring in 1989, 1.3 km north-east of Section E at the mouth of the Calliope River. Numerous ALA records occur within 6 km of the Project Area from Calliope River and Gladstone Harbour with the nearest recorded from 2016 occurring 450 m from the Project Area (Atlas of Living Australia, 2025). **Habitat**

Green Turtle

Green turtles are pelagic for the first 5-10 years of life, where they often occur in association with drift lines and rafts of *Sargassum* (Department of Climate Change Energy, Environment and Water 2025).

Green turtles occur in seaweed-rich coral reefs and inshore seagrass pastures in tropical and subtropical areas of the Indo-Pacific region. The southern Great Barrier Reef population has major rookeries on the Islands of the Capricorn Bunker Group and minor breeding aggregations on mainland beaches from Bustard Head to Bundaberg.

Habitat critical to the survival of the species

Table 6 in The Recovery Plan for Marine Turtles in Australia (Department of the Environment and Energy, 2017c) identifies habitat critical to the survival of each marine turtle species which has been identified by a consensus of experts. For green turtle, the following criteria was established:

- Nesting habitat includes at least 70% of the nesting for the stock
- Nesting habitat critical to the survival of marine turtles is of a geographically relevant scale
- Where relevant, nesting habitat determined to be critical to the survival of marine turtles includes areas that are geographically dispersed, major and minor rookeries, mainland and island beaches and winter or summer nesting
- All index beaches
- Nesting habitat which is located within a 20 km buffer immediately seaward of a designated nesting habitat critical to the survival of the species.

Based on the criteria outlined above, habitat within the Project Area does not meet the requirements of habitat critical to the survival of the species as habitat present occurs in an estuary environment (no beaches) and is unlikely to support the species nesting requirements.

Current threats to the species

In Australia, the main current threats to green turtles are disturbance and habitat damage due to coastal development, particularly from light pollution, by-catch from fisheries and shark control measures, predation on nests, boat strikes, entanglement and ingestion of marine debris and in some areas, indigenous harvesting. Potential threats include changes to the sea surface temperature, particularly changes to the Southern Oscillation Index, which determines breeding intervals, chance disasters (e.g. oil spills) and feral predator invasions.

Recovery plan

Recovery Plan for Marine Turtles (Department of the Environment and Energy, 2017b).

In the Project Area	**Surveys:** Targeted surveys for marine turtles were not undertaken as suitable habitat for these species occurs outside of the Disturbance Footprint and therefore no direct impacts are anticipated. **Species occurrence:** Flatback turtle is considered to have a moderate likelihood of occurrence within the Project Area due to the presence of some foraging habitat within Section E.
	Habitat with the Project Area

Green Turtle

Habitat type	Habitat modelling criteria	Area (ha)	
		Project Area	Disturbance Footprint
Nesting	Not present within the Project Area	-	-
Foraging	Calliope River. Foraging occurs within both inshore and offshore waters.	12.8	-

Table 8.57 Assessment of Potential Project Impacts and Mitigation and Management Commitments for Green Turtle

Potential Impact	Assessment	Mitigation Commitments
Indirect		
Introduction or proliferation of pest and weed species resulting in degradation of habitat	Majority of works for the Project are confined to already disturbed areas with minimal connectivity to marine habitats. The risk of weed or pest introduction in marine turtle habitat near the Project Area is negligeable, and any potential effects would be short-term and highly manageable.	• Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • All waste to be secured • Biosecurity Instrument Permit to be obtained for moving materials out of or within different biosecurity zones • Educate workforce in the identification of pest fauna species • Avoid inclusion of any water retaining voids or pits • Refer to Table 5.5 and Table 5.6 of the MNES Management Plan for further details on mitigation measures.
Soil exposure resulting in an increased risk of	While soil disturbance has the potential to increase sedimentation	• Soil sampling and testing to inform both erosion and sediment control (ESC) and rehabilitation

Potential Impact	Assessment	Mitigation Commitments
erosion and sedimentation of water bodies, reducing water quality and degrading aquatic habitats	and reduce water quality in nearby aquatic habitats, the scale of works is limited and the application of established management practices will minimise risk. Any potential effects are expected to be temporary, localised, and manageable.	• Develop Erosion and Sediment Control Plan (ESCP) in accordance with the IECA Best Practice Erosion and Sediment Control Guidelines 2008 • Extent and duration of soil exposure will be minimised • Disturbed areas will be promptly stabilised. • Site is monitored and controls adjusted to maintain required performance standard • Minimum personnel requirements will apply for ESCP development and verification • A Water Quality Monitoring Plan must be developed by an appropriately qualified person • Dewatering Management Plan will be developed • Acid Sulphate Soil Management Plan will be developed • Awareness training for identification and management of ASS will be undertaken • Water extraction activities will be strictly controlled and monitored to ensure no waterbodies are completed drained • Erosion and sediment control measures in accordance with IECA 2008 • Refer to Table 5.4 and Table 5.12 of the MNES Management Plan for further details on mitigation measures.
Increased risk of contamination associated with activities such as refuelling or storage of chemicals	Although fuel, oil, or chemical spills have the potential to reduce water quality and degrade aquatic habitats, the likelihood of such events is low given the limited scale of works and strict management measures in place. Any risk is expected to be minimal and effectively managed through established controls.	• Hazardous materials must be stored and handled appropriately • An Emergency Response Plan will be developed • Spill kits will be available during construction • Hazardous materials locations will be bunded • All waste disposed of in accordance with legislative requirements • No refuelling within 50 m of a watercourse • Application of herbicides in accordance with legislative requirements • Refer to Table 5.4 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Temporary changes in hydrology from installation of infrastructure creating a barrier to surface flow and increasing stormwater run-off	While temporary changes to surface water flow and stormwater run-off may occur during installation of infrastructure, these are expected to be minor, localised, and reversible once works are complete. With appropriate siting and management, the risk of impacts to aquatic habitats is minimal.	• A Water Quality Monitoring Plan must be developed by an appropriately qualified person • Dewatering Management Plan will be developed • Acid Sulphate Soil Management Plan will be developed • Awareness training for identification and management of ASS will be undertaken • Water extraction activities will be strictly controlled and monitored to ensure no waterbodies are completed drained • Erosion and sediment control measures in accordance with IECA 2008 • Soil sampling and testing to inform both erosion and sediment control (ESC) and rehabilitation • Develop Erosion and Sediment Control Plan (ESCP) in accordance with the IECA Best Practice Erosion and Sediment Control Guidelines 2008 • Extent and duration of soil exposure will be minimised • Disturbed areas will be promptly stabilised. • Site is monitored and controls adjusted to maintain required performance standard • Minimum personnel requirements will apply for ESCP development and verification • Refer to Table 5.4 and Table 5.12 of the MNES Management Plan for further details on mitigation measures.

Table 8.58 Significant Impact Assessment: Green Turtle

Impact Criteria	Assessment
Lead to a long-term decrease in the size of an important population of a species	**Unlikely.** Project infrastructure will not be located within suitable foraging habitat in the Calliope River. The Project has been designed to avoid any infrastructure in the Calliope River including the intertidal areas and fringing mangroves. Indirect impacts such as pollution, habitat degradation from coastal development may threaten nesting and foraging areas of this species. Pollution in the form of plastic debris suspended in the water column can be mistaken for food and green turtles can become trapped or tangled in fishing gear and crab pots. Chemical and terrestrial discharge in the form of runoff from agriculture, industry and urban development can damage seagrass bed on which this species forages. Construction activities may initiate acid sulphate soil reactions as part of earth works. Construction of the elevated tower pad near the northern bank of the Calliope River has the potential to initiate the chemical reaction process associated with acid sulphate soils. Soil for this tower pad will be sourced outside of this location but be free from other contaminants including chemicals and weed seeds. Acid sulphate soils will be managed with the Project ASSMP. Runoff of water and sediments will be managed within an ESCP and will focus on the installation of silt fences and

Impact Criteria	Assessment
	sediment traps, particularly surrounding the tower locations closest to the Calliope River in Section E directly adjacent to potential foraging habitat. This will be coupled with a Water Quality Monitoring Plan at the Calliope River, to compare pre and post construction water quality and determine extent of Project related impacts. This plan will monitor for chemicals, turbidity, metals and nutrient levels during construction and identify suitable corrective actions where exceedances are recorded. Given the Project is unlikely to directly impact the species via direct mortality or habitat clearance and considering that indirect impacts will be managed accordingly, the Project is unlikely to lead to a long-term decrease in the size of an important population.
Reduce the area of occupancy of an important population	**Unlikely.** Project infrastructure will not be located within suitable foraging habitat in the Calliope River. The Project has been designed to avoid any infrastructure in the Calliope River including the intertidal areas and fringing mangroves. The construction process for spanning the Calliope River will not involve the use of marine craft and the transmission lines at this location will be strung with the use of helicopter or drone. As a consequence, boat strike (including propeller) and noise will not be present. Similarly, no lines or bunding will be placed in the Calliope River avoiding the potential for entanglement. Green turtles are known to be vulnerable to plastic debris suspended in the water column, which can be mistaken for food, and to entanglement in fishing gear and crab pots. Additionally, chemical and terrestrial discharge from agriculture, industry, and urban development can degrade seagrass beds, which are critical foraging habitats. Construction activities also carry the potential to disturb acid sulfate soils, which, if exposed to oxygen, can initiate chemical reactions that release sulfuric acid and mobilise heavy metals, thereby affecting water quality. To address these risks, the Project has developed specific mitigation measures outlined in the MNES Management Plan that will effectively mitigate indirect impacts. The elevated tower pad near the northern bank of the Calliope River, which has the potential to initiate acid sulfate soil reactions, will be constructed using soil sourced from outside the area. This soil will be free from contaminants and weed seeds, reducing the risk of chemical disturbance. Any acid sulfate soils encountered will be managed in accordance with a site-specific ASSMP. Runoff and sediment will be controlled through an ESCP, which includes the installation of silt fences and sediment traps, particularly around tower locations closest to the Calliope River in Section E, adjacent to potential foraging habitat. In addition, a Water Quality Monitoring Plan will be implemented to assess pre- and post-construction water quality in the Calliope River. This plan will monitor for chemicals, turbidity, metals and nutrient levels during construction and identify suitable corrective actions where exceedances are recorded. Through these carefully designed mitigation measures, the project will maintain the ecological integrity of the Calliope River and ensure that the area of occupancy for green turtles is not reduced.

Impact Criteria	Assessment
Fragment an existing important population into two or more populations	**Unlikely.** Project infrastructure will not be located within suitable foraging habitat in the Calliope River. The Project has been designed to avoid any infrastructure in the Calliope River including the intertidal areas and fringing mangroves. Aa a consequence, no fragmentation impacts are expected to occur.
Adversely affect habitat critical to the survival of a species	**Unlikely.** As discussed above, the Project Area does not occur within or adjacent to any area identified as habitat critical to the survival of the species. No nesting habitat occurs, and no Project infrastructure is proposed within the Calliope River including the intertidal zone.
Disrupt the breeding cycle of an important population	**Unlikely.** No nesting habitat for these species is present within or directly adjacent to the Project Area.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely.** Project infrastructure will not be located within suitable foraging habitat in the Calliope River. The Project has been designed to avoid any infrastructure in the Calliope River including the intertidal areas and fringing mangroves. Although green turtles are sensitive to indirect threats such as pollution, habitat degradation, and chemical runoff, the proposed transmission line adjacent to the Calliope River has been designed to limit these impacts. Green turtles forage in seagrass beds and may be affected by suspended plastic debris, entanglement in fishing gear, and chemical discharge from surrounding land uses. Additionally, construction activities have the potential to disturb acid sulfate soils, which can release harmful substances into aquatic environments if not properly managed. To ensure that these risks do not result in habitat degradation or loss, the project incorporates a suite of mitigation measures. The elevated tower pad near the northern bank of the Calliope River will be constructed using soil sourced from outside the area, which will be free from contaminants and weed seeds. This approach avoids triggering acid sulfate soil reactions at the site. Any acid sulfate soils encountered will be managed under a dedicated ASSMP, which outlines procedures for neutralisation and containment. Runoff and sediment control will be addressed through an ESCP, which includes the installation of silt fences and sediment traps, particularly around tower locations closest to the river in Section E. These measures will prevent sediment and pollutants from entering the river and affecting any nearby seagrass beds. In addition, a Water Quality Monitoring Plan will be implemented to assess the condition of the Calliope River before, during, and after construction. This plan will monitor for chemicals, turbidity, metals and nutrient levels during construction and identify suitable corrective actions where exceedances are recorded. Through these carefully planned and site-specific mitigation strategies, the project will maintain the ecological integrity of the Calliope River and ensure that the Project is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that a marine turtle species is likely to decline.

Impact Criteria	Assessment
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**Unlikely.** Invasive plants and predatory animals are both considered threats to marine turtles when on land. There are no nesting beaches situated within or adjacent to the Project Area. The Project will employ best practice control methods for weeds and pests and is unlikely to introduce or exacerbate weeds or pests beyond existing levels.
Introduce disease that may cause the species to decline	**Unlikely.** Disease has not been identified as a threat to marine turtle species. Nevertheless, the Project will follow appropriate biosecurity protocols; therefore, introduction of a disease is unlikely.
Interfere substantially with the recovery of the species	**Unlikely.** The Recovery Plan for Marine Turtles in Australia identifies recovery actions for all marine turtle species in Australia. These include: • Maintain and improve efficacy of legal and management protection • Adaptively manage turtle stocks to reduce risk and build resilience to climate change and variability • Reduce the impacts from marine debris • Minimise chemical and terrestrial discharge • Address international take within and outside Australia's jurisdiction • Reduce impacts from terrestrial predation • Minimise light pollution • Address the impacts of coastal development/infrastructure and dredging and trawling • Maintain and improve sustainable Indigenous management of marine turtles • Determine trends at index beaches • Understand population demographics at key foraging grounds • Address information gaps to better facilitate the recovery of marine turtle stocks. Project infrastructure will not be located within suitable foraging habitat in the Calliope River and there are no known nesting sites within or in close proximity to the Project Area. Based on the implementation of Project EMPs, indirect impacts are likely to be negligible. The Project is unlikely to interfere with any of the abovementioned recovery objectives and is therefore unlikely to interfere substantially with the recovery of a marine turtle species.
Significant Residual Impact	**Unlikely to have a significant impact**

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FIGURE 8.18-21

Green Turtle Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

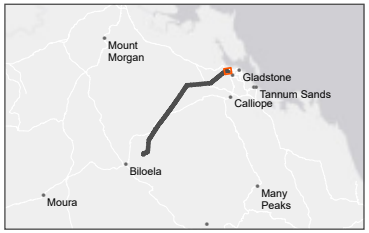
- Roads
- Watercourse
- Railway
- Field Survey Extent
- Project Area

Loggerhead Turtle Habitat

- Foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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Image Source: ESRI Basemap (2025) | **Data Source:** Queensland D of Resources (2025)

8.2.7.5 Grey-headed Flying Fox (*Pteropus poliocephalus*)

Table 8.59 Grey-headed Flying Fox: Ecology and Relevance to the Project Area

Grey-headed Flying Fox	
Profile	**Conservation status** Vulnerable **Distribution** Grey-headed flying-fox is endemic to Australia and occurs from Ingham in Queensland to Adelaide in South Australia. They are usually found on the coastal lowlands and slopes of eastern Australia below altitudes of 200 m (Department of Environment and Water 2021). The species is widespread throughout their range in summer, whilst in autumn it occupies coastal lowlands and is uncommon inland. Grey-headed flying-fox is highly mobile and considered 'highly adaptable' given its proclivity to occupy urbanised environments. Important population: Important populations are not identified in the *National Recovery Plan for the Grey-headed Flying-fox Pteropus poliocephalus* (Department of Environment and Water 2021). As such the generic definition for important populations in the Significant Impact Guidelines 1.1 – Matters of National Environmental Significance (Department of the Environment, 2013a) has been applied. Nationally Important Camps have been identified on the DCCEEW interactive flying fox web viewer. Nationally Important Camps are flying fox camps that have contained ≥ 10,000 grey-headed flying-foxes in more than one year in the last 10 years or have been occupied by more than 2,500 grey-headed flying-foxes permanently or seasonally every year for the last 10 years (Department of Environment and Water, 2021b). No Nationally Important Camps are located within proximity to the Project Area, including within nightly foraging distances (maximum 40 km). The nearest is in Hervey Bay, approximately 230 km to the south-east. Further, only one camp has hosted this species on more than one occasion since the monitoring program began (Calliope camp, located 15 km south of section D, which has only recorded grey-headed flying-fox in 2015, 2019 and 2021). The low number of individuals which sporadically use camps in the region would not be sufficient to constitute a key source population for breeding or dispersal. Although the species is spatially structured into colonies, there is constant genetic exchange and movement between camps throughout the species' entire geographic range. Given this ongoing movement between camps and the species high mobility capacity, no population or sub-population within the Project Area would be necessary for maintaining genetic diversity. Furthermore, the species is known to occur from Geelong in Victoria to Ingham in Far North Queensland and therefore the population is not near the limit of the species range. Given the context above, any population which may utilise the Project Area is unlikely to represent an important population. **Important population** The grey-headed flying-fox is considered to be a single, mobile population with individuals distributed across Queensland, New South Wales, Victoria, South Australia, Tasmania and the ACT (Department of Environment and Water, 2021). Although the species is spatially structured into colonies, there is constant genetic exchange and movement between camps throughout the species' entire geographic range. Given this ongoing movement between camps and the species high mobility capacity, no population or subpopulation within the Project Area would be necessary for maintaining genetic diversity. Furthermore, the species is known to occur from Geelong in Victoria to Ingham in Far North

Grey-headed Flying Fox

Queensland and therefore any population utilising the Project Area is not located near the limit of the species range. As such, the population within the Project Area is not considered to be an important population.

Historical records within the desktop search extent

The most recent WildNet record within the desktop search extent dates from 2007 and occurs approximately 2.5 km east of Section E, in Gladstone. ALA records are known from the coastal areas near Gladstone (ALA, 2025).

Habitat

Grey-headed flying-fox requires foraging resources and roosting sites. It is a canopy-feeding frugivore and nectarivore, which utilises vegetation communities including rainforests, open forests, closed and open woodlands, Melaleuca swamps and Banksia woodlands. It also feeds on commercial fruit crops and on introduced tree species in urban areas. The primary food source is blossom from Eucalyptus and related genera but in some areas, it also utilises a wide range of rainforest fruits. None of the vegetation communities used by grey-headed flying-fox produce continuous foraging resources throughout the year. As a result, the species has adopted complex migration traits in response to ephemeral and patchy food resources and only a small proportion of its' wide range is used at any one time.

Grey-headed flying-fox roosts in aggregations of various sizes on exposed branches. Roost sites are typically located near water, such as lakes, rivers or the coast. Roost vegetation includes rainforest patches, stands of Melaleuca, mangroves and riparian vegetation.

Grey-headed flying-fox individuals commute daily to foraging areas, usually within 15 km of the day roost site. They are capable of nightly flights of up to 50 km from their roost to different feeding areas as food resources change. At most times of the year there is a complete exodus from the colony site at dusk.

Habitat critical to the survival of the species

Habitat critical to the survival of this species, as described in the *National Recovery Plan for the Grey-headed Flying-fox Pteropus poliocephalus* (Department of Environment and Water, 2021b) includes:

- Important winter and spring vegetation communities that contain the following species:
  - *Eucalyptus tereticornis, Eucalyptus albens, Eucalyptus crebra, Eucalyptus fibrosa, Eucalyptus melliodora, Eucalyptus paniculata, Eucalyptus pilularis, Eucalyptus robusta, Eucalyptus seeana, Eucalyptus sideroxylon, Eucalyptus siderophloia, Banksia integrifolia, Castanospermum australe, Blakella citriodora, Blakella eximia, Blakella maculata, Grevillea robusta, Melaleuca quinquenervia* or *Syncarpia glomulifera*.
  - Vegetation communities that contain native species that are known to be productive as foraging habitat during the final weeks of gestation, and during the weeks of birth, lactation and conception (August to May).
  - Vegetation communities that contain native species used for foraging and occur within 20 km of a nationally important camp as identified on the Department's interactive flying-fox web viewer.
  - Vegetation communities that contain native and or exotic species used for roosting at the site of a nationally important camp as identified on the Department's interactive flying-fox web viewer.

Grey-headed Flying Fox

Within the Project Area, vegetation communities which broadly meet the above definitions includes those which contain *Eucalyptus crebra, Eucalyptus tereticornis* and *Blakella citriodora*. Based on this, all modelled habitat within the Project Area is considered to meet the definition of habitat critical to the survival of the species.

Current threats to the species

The *National recovery plan for the Grey-headed flying-fox Pteropus poliocephalus* (Department of Environment and Water, 2021b) identifies the key threats to the species as:

- Habitat loss, particularly:
  - Clearing of winter foraging resources
  - Loss of rooting habitat.
- Camp disturbance via conflict with humans
- Mortality in commercial fruit crops–animals being killed from crop management practices including shooting by orchardists
- Heat stress
- Entanglement in netting and barbed wire fencing–animals can become entangled in netting over fruit trees and thousands of animals die or face permanent injury from entanglement in barbed wire
- Climate change–has the potential to affect food availability and heat-related mortality
- Bushfires–resulting in the loss of foraging habitat and resources leading to mortalities
- Electrocution on powerlines
- Zoonotic diseases.

Recovery plan

- *National recovery plan for the Grey-headed flying-fox Pteropus poliocephalus* (Department of Environment and Water, 2021b)

In the Project Area

Surveys

422 habitat assessments to map suitable habitat and 51 person hours of spotlight searching on foot and by vehicle to detect individuals were undertaken.

In addition to the above, a roost survey was undertaken at an unmarked roost location along Callide Creek immediately west of the Project and did not detect the species.

Species occurrence

Grey-headed flying-fox was recorded within the Project Area during the field survey program. In March 2023, one deceased individual was recorded on a barb-wire fence at the Calliope River substation, adjacent to a patch of regrowth *Eucalyptus tereticornis* woodland on quaternary alluvium (RE 12.3.3).

Grey-headed Flying Fox

The locations of flying-fox camps are generally stable through time, although pattens of camp occupation vary. Based on the quarterly data from the National Flying-fox Monitoring Program (contained within the National Flying-fox Monitoring Viewer), the nearest regularly occupied camps are in Bundaberg, approximately 160 km south-east of the Project Area. However, grey-headed flying-fox have been observed roosting at the Boyne River camp in 2019 (approximately 15 km south-east of Section E), and the Calliope camp in 2015, 2019 and 2021 (approximately 15 km south of Section D). The most recent observations of grey-headed flying-fox roosting in these camps are from 2021 in Calliope (187 individuals). None of these camps constitute 'Nationally important camps' (Department of Environment and Water, 2021b) as they have not contained ≥ 10,000 individuals in more than one year in the last 10 years or have been occupied by more than 2,500 grey-headed flying-fox permanently or seasonally every year for the last 10 years.

Habitat within the Project Area

Habitat type	Habitat modelling criteria	Area (ha)	
		Project Area	Disturbance Footprint
Roosting	No roost sites were identified within the Project Area during the field survey program, and none are expected to occur.	-	-
Foraging and dispersal	RE 11.3.4, 11.3.25, 11.3.26, 11.8.4,11.10.3, 11.10.4, 11.10.13, 11.11.3, 11.11.3c, 11.11.4, 11.11.10, 11.11.15, 11.12.1, 11.12.3, 11.12.6, 12.3.3, 12.11.6 and 11.12.17 in remnant or regrowth condition. Relevant flying-fox camps in the wider region include the Calliope camp (#853) and the Boyne River camp (#290), as identified in the National Flying-fox monitoring viewer dataset. No other potential camps were identified via public records.	5,539.9	125.3

Table 8.60 Assessment of Potential Project Impacts and Mitigation and Management Commitments for Grey-headed Flying Fox

Potential Impact	Assessment	Mitigation Commitments
Direct		
Vegetation clearing causing habitat loss and fragmentation	Although vegetation clearance is a known threat to the species, it is not anticipated that impacts from the Project would result in isolation of populations of this species due to habitat fragmentation as the species	• Identify MNES fauna habitat and individuals through pre-clearance surveys • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Disturbance activities must be contained to Disturbance Footprint • Habitat features to be relocated to adjacent areas

Potential Impact	Assessment	Mitigation Commitments
	is highly mobile. Connectivity within and to adjacent vegetated areas will be largely maintained and the extent of clearing would not result in a barrier to movement for the species.	• During the pre-clearance survey, the fauna spotter-catcher will locate, record and mark the habitat features (including those to be retained in situ) • Install tree protection to habitat trees immediately adjacent to areas of earthworks • Refer to Table 5.1 and Table 5.8 of the MNES Management Plan for further details on mitigation measures.
Injury or direct mortality	Construction works will involve the modification, disruption or removal of habitat for the species; however, the species is not known to roost in the Project Area and the closest known camps are approximately 15 km away, therefore the species is only likely to occur in the Project Area when it is foraging at night. Construction activities will mostly occur during daylight hours (6.30 am to 6.30 pm), when the species is unlikely to be present.	• Appropriately qualified fauna spotter catcher to undertake pre-clearance habitat assessment and be present during clearing and disturbance to habitat features • Clearing must be staged, with non-habitat trees felled first • Tampering with an animal breeding place to be carried out in accordance with an approved Species Management Program • Clear delineation of habitat features to be retained • Habitat trees must be soft-felled • Restrict vehicles to approved access tracks • Vehicle travelling speed restricted to <40 km/hr • Excavations must be secured (e.g. covered) • Canopy searches prior to clearing in grey-headed flying fox habitat • Exclusion zone around a grey-headed flying fox roost and obtain relevant permit • Any new fencing used for the perimeter or within the Project Area must be constructed entirely of plain (non-barbed) wire where landholder preferences allow and where no security, safety, or insurance requirements apply. ○ The second preference for new fencing will incorporate a top strand of plain (non-barbed) wire with barbed wire only to be used where required to meet Australian safety standards, electrical security requirements, insurance conditions, or specific landholder or security restrictions. • Where new fencing incorporating barbed wire is established within the Project Area, fence visibility must be increased by affixing durable visibility tags or tape at 30 cm intervals along the top strand of the barbed wire fencing. Refer to Table 5.3 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Changes to habitat quality (degradation) and loss of key habitat resources	Loss of important winter and spring vegetation containing *Eucalyptus crebra, Eucalyptus tereticornis* and *Blakella citriodora* is unavoidable for construction, however, the Project is not expected to largely reduce the quality of habitat that will be retained within and adjacent to the Project Area as mitigations have been specifically designed to avoid such impacts. Further, the species is highly mobile and moves throughout its range in response to foraging resources and it is anticipated the large areas of intact vegetation surrounding in the region would provide higher quality resources than are present in the fragmented and disturbed habitat in the Project Area.	• Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Disturbance activities must be contained to Disturbance Footprint subject to minor micro-siting within the Field Survey Extent • Refer to Table 5.1 of the MNES Management Plan for further details on mitigation measures.
Indirect		
Alterations to fire regimes including uncontrolled fires that may result from construction and/or operation	Changes to fire frequency within the Project Area could result in habitat loss and degradation, increased competition for food resources and conflict with humans e.g. foraging in commercial orchards. Although the increased plant and vehicle presence will result in an increased number of potential ignition sources, employment of standard construction protocols will ensure the risk of bushfire is actively managed.	• Bushfire Management Plan will be developed • Burning of vegetation strictly prohibited unless a permit is obtained • Designated parking areas for vehicles and machinery • During operation, vegetation within the Disturbance Footprint will be managed in accordance with Powerlink's vegetation specification • Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken

Potential Impact	Assessment	Mitigation Commitments
		• A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • Refer to Table 5.5 and Table 5.9 of the MNES Management Plan for further details on mitigation measures.
Entanglement or electrocution	Entanglement in barbed-wire fences is a major hazard for flying-foxes, often resulting in mortality. One deceased grey-headed flying-fox was recorded on a barb-wire fence at the Calliope River substation (Section E) in March 2023. Grey-headed flying-foxes are also prone to mortality from electrocution on powerlines from wing contact when flying or resting and/or from arc flash.	• The top strand on any new fencing must be non-barbed wire, unless required to meet safety standards • Visibility tags on barbed wire (new fencing) • Refer to Table 5.3 of the MNES Management Plan for further details on mitigation measures.
Noise, activity, artificial lighting and vibration generated during construction and operation interrupting foraging, breeding or dispersal behaviours	Construction activities will mostly occur during daylight hours (6.30 am to 6.30 pm), when the species is unlikely to be present. The species may forage in the Project Area nightly, however, during this time noise and activity and vibration are unlikely to occur at a level that would impact individuals. Grey-headed flying-fox may be resilient to the effects of artificial lighting as they move around in response to food resources rather	• Plant and equipment to be fitted with appropriate noise attenuation and maintained • Deliveries and removal of material and equipment to and from site within approved hours for construction • Plant to be turned off when not in use • No unnecessary use of horns or other audible signals on mobile plant or equipment • Machinery and equipment will be maintained in good working condition • Refer to Table 5.10 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
	than following a particular movement pathway and are well known to occupy urban environments where artificial light is constant. Noise, activity, artificial lighting and vibration in relation to operation is negligible.	
Dust generated during construction activities disturbing behaviours or health/palatability of foraging resources	Dust emissions may result following construction activities and affect adjacent habitat, including palatability of food resources. Dust can settle on adjacent vegetation, coating leaves and reducing photosynthesis, respiration, and growth. Dust clouds may also pose a respiratory risk to fauna and cause temporary disorientation; however, construction works will mostly occur during daylight hours (6.30 am to 6.30 pm) when the species is unlikely to be present.	• Dust suppression measures including vehicles restricted to approved tracks, cover all loose loads and set speed limits (<40 km/hr) • Application of dust suppressants as required • Dust generating activities will be limited on days with strong winds blowing towards sensitive receptors or dust sensitive locations • Regular monitoring and visual surveillance to trigger management actions will be undertaken • Refer to Table 5.4 of the MNES Management Plan for further details on mitigation measures.

Table 8.61 Significant Impact Assessment: Grey-headed Flying Fox

Impact Criteria	Assessment
Lead to a long-term decrease in the size of an important population of a species	**Unlikely.** One deceased individual was recorded within the Project Area during a 2023 survey, entangled in barbed-wire fence. There are no known roosts in the Project Area. As per the *National Flying Fox Monitoring program* there are known roosts in the wider region, including two nearby camps where grey-headed flying-fox records occur approximately 15 km south of the Project Area, however these camps do not meet the definition of a Nationally Important Camp. As described in **Table 8.59**, an important population is unlikely to occur in the Project Area. Approximately 125.3 ha of foraging and dispersal habitat will be directly impacted via vegetation clearing required for construction of the Project. Given its location in the landscape (away from known roosts), potential habitat is likely to only be utilised occasionally by a small number of individuals under ideal conditions when canopy trees are in flower.

Impact Criteria	Assessment
	Clearing will occur in phases, ensuring only a subset of the Disturbance Footprint is impacted at one time and allowing any individuals present to relocate. Vegetation adjacent to the transmission line may remain in place if it does not violate the exclusion zones. The quantum of habitat that will remain following construction of the Project will be sufficient to maintain any individuals that may temporarily use the site. Furthermore, the State forests and adjacent areas directly north and south are likely to contain large areas of suitable and higher quality habitat. During the operational phase, the transmission line may cause mortality to the species. Grey-headed flying-fox mortality rates as a result of electrocution are not well known but it is not considered to be a 'key threat' to the species (Department of Environment and Water 2021). However, the Project Area does not occur between known camps and is not located along a regular movement corridor as the species moves sporadically throughout its range in response to resource availability. Since the proposed Project is co-located next to an existing transmission line, this threat is currently present in the Project Area. Given that an important population does not occur and impacted habitat is unlikely to be necessary for supporting any part of the species' life cycle long-term, it is unlikely that the Project will lead to a long-term decrease in the size of an important population of this species.
Reduce the area of occupancy of an important population	**Unlikely.** The grey-headed flying-fox has a large distribution across eastern Australia. Patterns of occupancy and relative abundance within its distribution vary widely seasonally and temporally. The Project Area is not located at the limit of the species range. Large areas of higher quality habitat are likely to occur in the wider area, including in the state forests north and south of the Project Area. Furthermore, the Project Area does not occur between known camps, therefore, does not fragment populations of this highly mobile species. No known roosts in the region comprise a Nationally Important Camp, therefore an important population is unlikely to occur. Given the above, the Project is unlikely to reduce the area of occupancy of an important population.
Fragment an existing important population into two or more populations	**Unlikely.** As described above, the Project Area does not support an important population of grey-headed flying-fox. This species is highly mobile, travelling large distances across cleared and developed landscapes at night in search of suitable foraging habitat. It is adaptable and known to occur in high human use and urban areas. The removal of habitat within the Disturbance Footprint is unlikely to limit this species' capacity to travel between known roosts or other areas of foraging habitat, as clearing will be linear in shape and the species has extremely high mobility capacity. Construction activity is unlikely to disturb any individuals that may occur temporarily, noting that no construction is to occur at night. The proposed linear clearing will not create a barrier to the State forests and adjacent areas directly north and south of the Project Area which are likely to contain large areas of suitable and higher quality habitat.

Impact Criteria	Assessment
	Given this, and the absence of an important population present, the proposed impact is unlikely to fragment an existing important population into two or more populations.
Adversely affect habitat critical to the survival of a species	**Unlikely.** As described above, modelled habitat broadly meets the definition of habitat critical to the species as it includes vegetation communities which contain important winter and spring foraging species (*Eucalyptus crebra*, *Eucalyptus tereticornis* and *Blakella citriodora*). However, tree canopy these species are common in the wider region and their loss in the Project Area would not be a limiting factor for the grey-headed flying-fox presence. Flowering does not occur on a reliable schedule, therefore the Project Area potentially does not represent a reliable annual foraging resource. Flowering plants that are important for the species and do flower reliably in winter are located on coastal lowlands in northern New South Wales and southern Queensland (Department of Environment and Water, 2021). Vegetation clearing required for the Project will result in the removal of up to of 125.3 ha of foraging and dispersal habitat. The majority of the habitat is already subject to degradation from edge effects and agricultural activities. As the clearing will be linear in nature and minimised where possible, the quantum of potential habitat that will remain should be sufficient to maintain any individuals that may occur transiently when foraging resources are available. Suitable, similar habitat occurs extensively within the wider region, including in areas much closer to known camps. Large areas of intact suitable habitat are present in the wider region and will not be impacted by the Project. The Project is unlikely to lead to indirect impacts on the species or the species habitat. In the unlikely event that a flying-fox congregation is identified within the Disturbance Footprint, an exclusion zone will be established. A suitably qualified person will refer to the *Interim Policy for Determining When a Flying-fox Congregation is Regarding as flying-fox Roost* under Section 88C of the NC Act to determine if the congregation could be considered a roost. If determined that the congregation constitutes a roost, impacts to the flying-fox congregation will be managed in accordance with the *Code of practice–Ecologically Sustainable Management of Flying-fox Roosts*, including an application to Department of Environment, Technology, Science and Innovation (DETSI) for a flying-fox roost management permit if required. Based on the above, it is considered unlikely the Project will adversely affect habitat critical to the survival of the species.
Disrupt the breeding cycle of an important population	**Unlikely.** This species breeds annually in camps with births occurring from October to December when foraging resources are generally most abundant. As per the National Flying-fox monitoring viewer, the closest known roosts are 15 km south of the western extent of the Project Area, with species last recorded in 2019 and 2021. Given the distance to the nearest known camp, clearing works required for construction of the Project are highly unlikely to disturb breeding individuals. In the unlikely event that a flying-fox congregation is identified within the Disturbance Footprint, an exclusion zone will be established and no disturbance to that area permissible until the potential presence of a roost is determined in

Impact Criteria	Assessment
	consultation with DETSI. Furthermore, as foraging resources during this period are likely to be abundant in the wider area, the maximum loss of 125.3 ha of habitat is unlikely to materially reduce the availability of suitable foraging and dispersal habitat required by any breeding individuals that may be temporarily utilising the area. The Project will implement mitigation measures such a pre-clearance surveys to ensure there are no direct impacts to individuals during construction, so the Project would not result in removal of breeding aged individuals from the population and would not affect generation length. As described above the Project Area is not considered to support an important population. The Project is therefore unlikely to disrupt the breeding cycle of an important population.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely.** The loss of up to 125.3 ha of foraging and dispersal habitat spread along a linear corridor is considered to have a low to negligible impact on the species given the landscape context which offers large, continuous patches of remnant vegetation in protected areas to the north and south. This species is unlikely to rely on the potential habitat contained within the Project Area given the comparatively low habitat quality across much of the Project Area. Further, this species is highly mobile and known to fly over cleared or modified environments and as such clearing associated with the Project would not result in isolation of habitat or cause the species to alter its movement pattern to avoid the Project Area. The removal of habitat contained within the Disturbance Footprint is therefore unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**Unlikely.** Both weed and pest species were recorded throughout the field survey program. However, invasive species are not a known threat to the grey-headed flying-fox in any capacity. Nonetheless, the Project will employ best practice control methods for weeds and is unlikely to introduce or exacerbate weeds or pests beyond existing levels. Therefore, the Project is unlikely to result in the establishment of invasive species in grey-headed flying-fox habitat.
Introduce disease that may cause the species to decline	**Unlikely.** There is very little information available on the impact of disease on Australian flying-fox populations, including grey-headed flying-foxes. Australian flying-foxes including the grey-headed flying-fox are natural reservoirs for at least three zoonotic diseases including Australian Bat Lyssavirus, Hendra virus and Menangle virus. The incidence of Lyssavirus in the species is low (<1 %). Any sick or injured grey-headed flying-fox encountered in the Project Area would be captured (if safe to do so) and transported to a vet or wildlife carer for appropriate treatment. Only personnel who are trained, experienced and vaccinated against Australian Bat Lyssavirus would be authorised to handle bats. No individual would be released back into the wild if it was showing signs of illness to prevent potential spread of disease.

Impact Criteria	Assessment
Interfere substantially with the recovery of the species	**Unlikely.** As defined in the *National Recovery Plan for Grey-headed Flying-fox Pteropus poliocephalus*, recovery objectives for this species include: • development of a robust estimate of an increasing population trend • an improved understanding of habitat critical to the survival of the species • an increase in protection of habitat critical to the survival of the species and nationally important camp sites • implementation of effective habitat restoration projects • a reduction of conflict between people and flying-foxes in residential areas through investment in household mitigation measures • greater uptake of crop netting under subsidy schemes • decrease in the number of licences issued to harm the species • an improved understanding of threats with as yet unquantified impacts on flying foxes, such as electrocution, entanglements and climate change. The Project is unlikely to impede on any of the above recovery objectives. Habitat loss and degradation, possibly the greatest threat to the species, is unavoidable to allow for construction of the Project. However, the habitat proposed to be impacted is highly unlikely to necessary for the survival of the species given the transient nature of the species and the availability of higher quality, intact habitat in the region. Furthermore, large areas will be retained within the Project Area that are of sufficient size to maintain any individuals that may occur. Noting that higher quality habitat exists in closer proximity to known roosts to the south, the nature and scale of the impact is unlikely to have a material effect on the species persistence within the region or as a whole.
Significant Residual Impact	**Unlikely to have a significant impact**

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FIGURE 8.19-1

Grey-headed Flying Fox Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

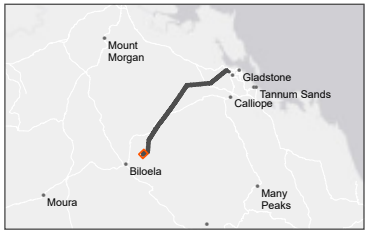
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Grey-headed Flying Fox Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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Kilometres

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FIGURE 8.19-2

Grey-headed Flying Fox Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

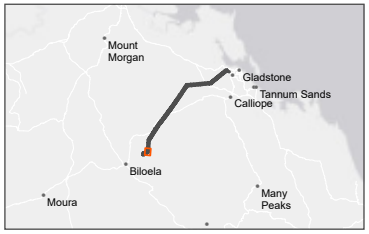
- Watercourse
- Field Survey Extent
- Project Area

Grey-headed Flying Fox Habitat

- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.19-3

Grey-headed Flying Fox Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

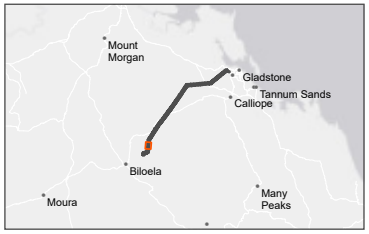
- Field Survey Extent
- Project Area

Grey-headed Flying Fox Habitat

- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.19-4

Grey-headed Flying Fox Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

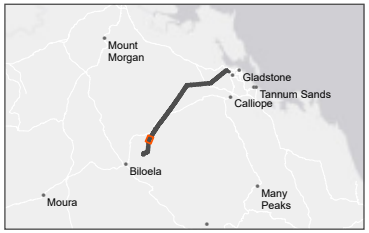
- Field Survey Extent
- Project Area

Grey-headed Flying Fox Habitat

- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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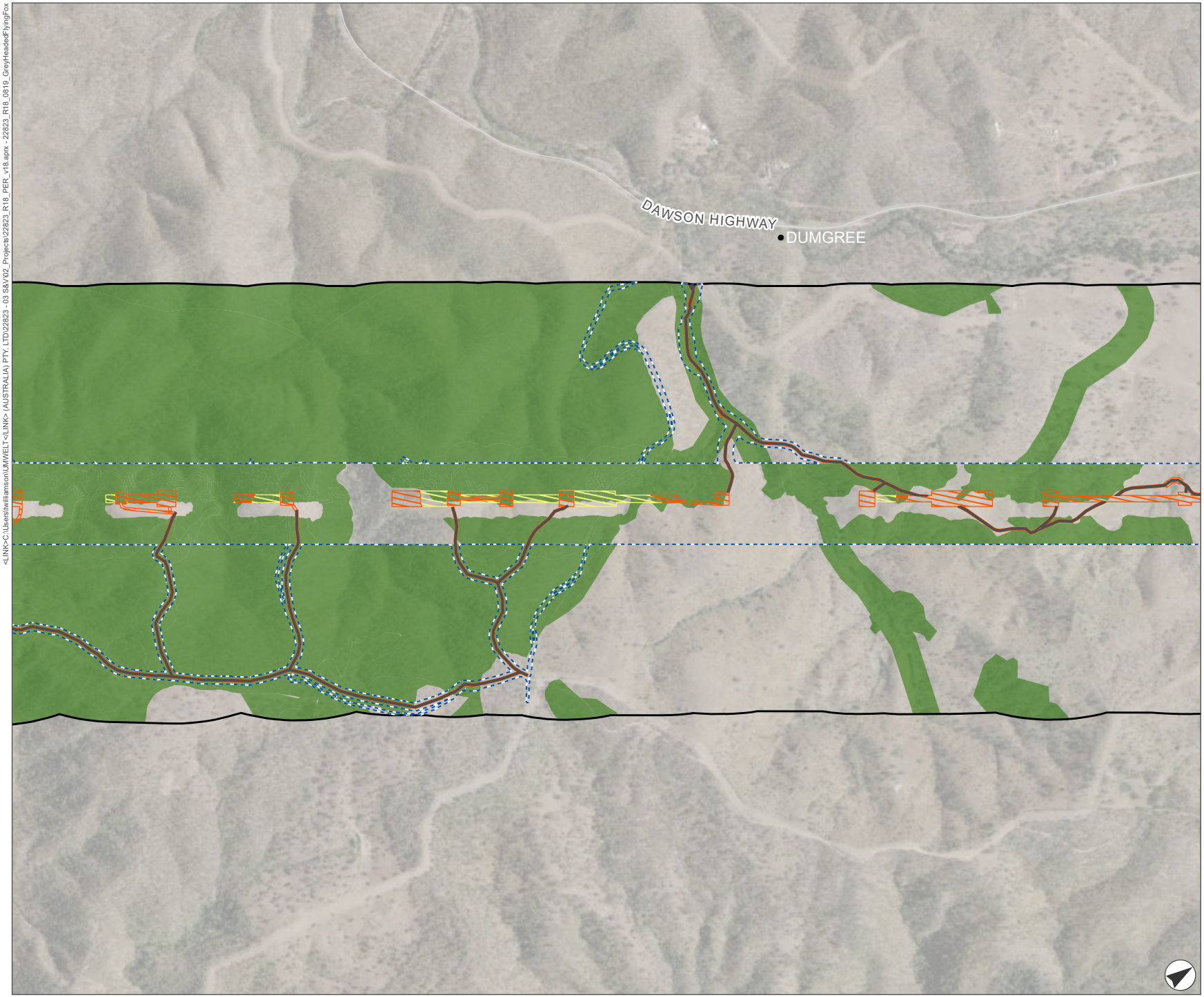


FIGURE 8.19-5

Grey-headed Flying Fox Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

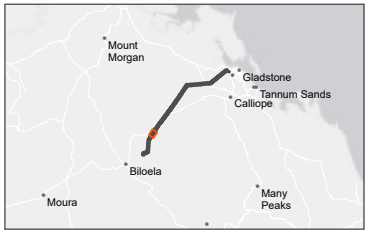
- Roads
- Field Survey Extent
- Project Area

Grey-headed Flying Fox Habitat

- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.19-6

Grey-headed Flying Fox Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

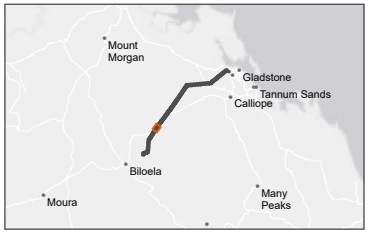
- Roads
- Watercourse
- Field Survey Extent
- Project Area

Grey-headed Flying Fox Habitat

- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.19-7

Grey-headed Flying Fox Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

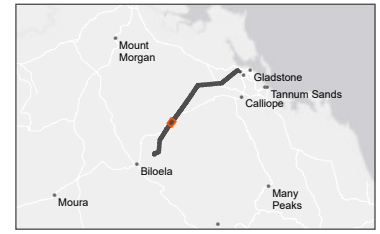
- Roads
- Watercourse
- Field Survey Extent
- Project Area

Grey-headed Flying Fox Habitat

- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.19-8

Grey-headed Flying Fox Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

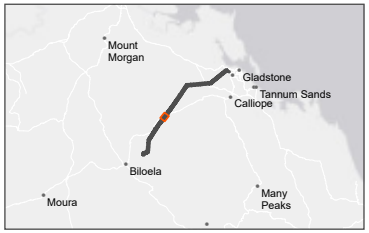
- Roads
- Field Survey Extent
- Project Area

Grey-headed Flying Fox Habitat

- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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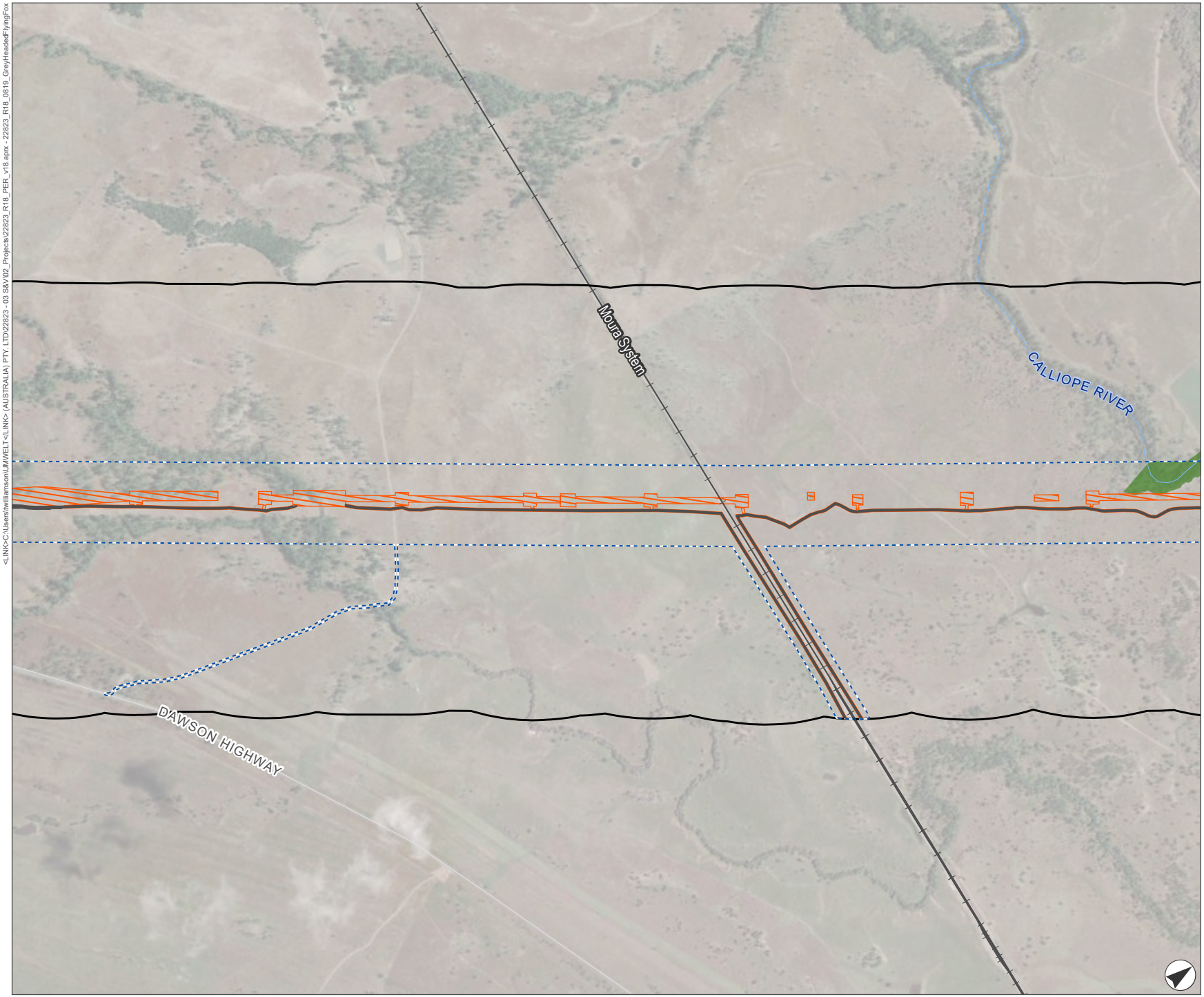


FIGURE 8.19-9

Grey-headed Flying Fox Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

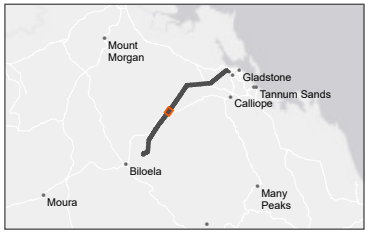
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Grey-headed Flying Fox Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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Kilometres

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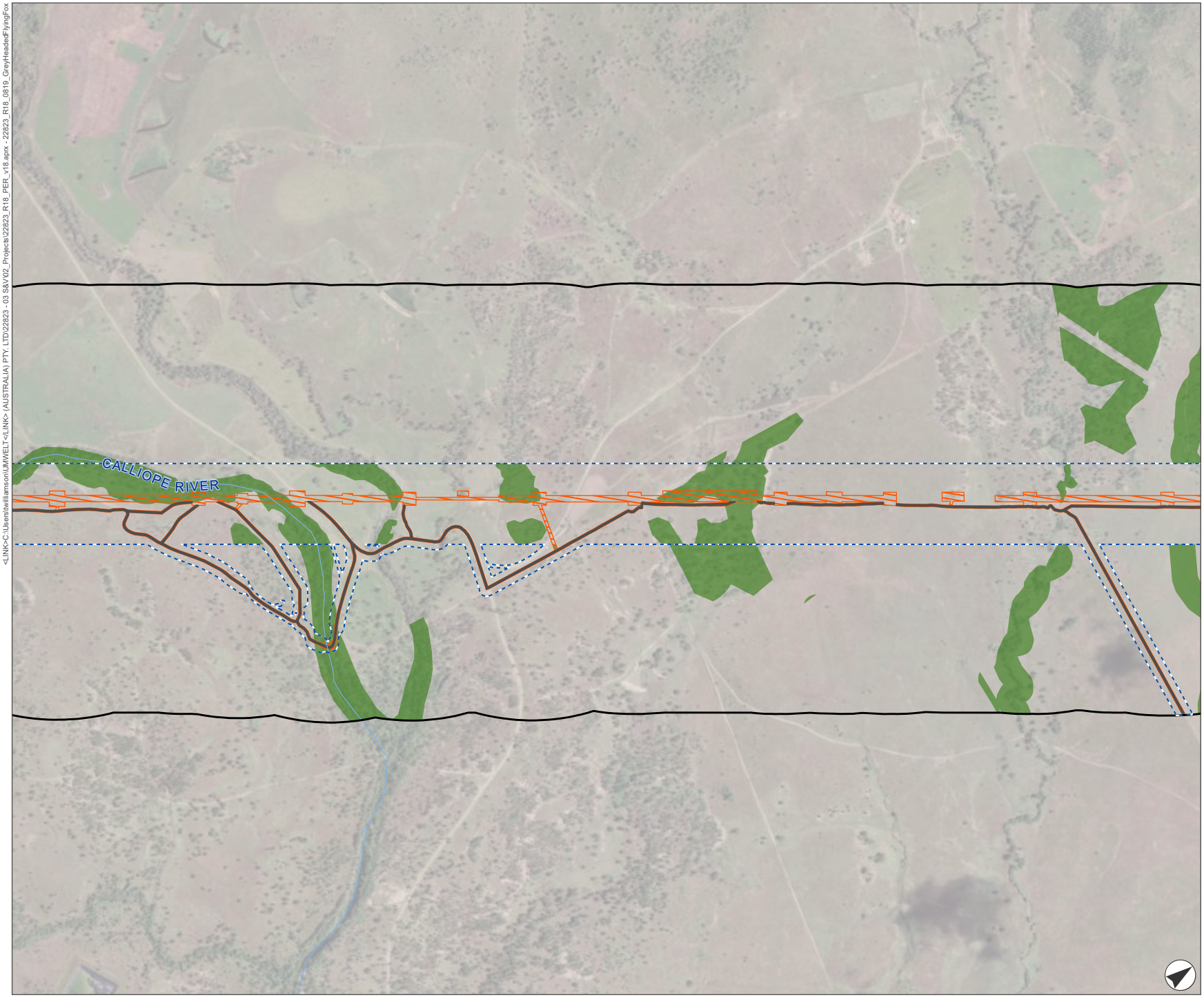


FIGURE 8.19-10

Grey-headed Flying Fox Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

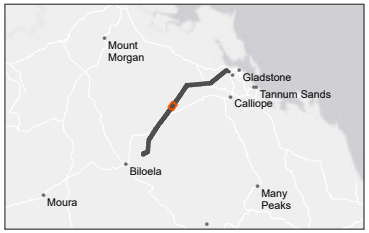
- Watercourse
- Field Survey Extent
- Project Area

Grey-headed Flying Fox Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

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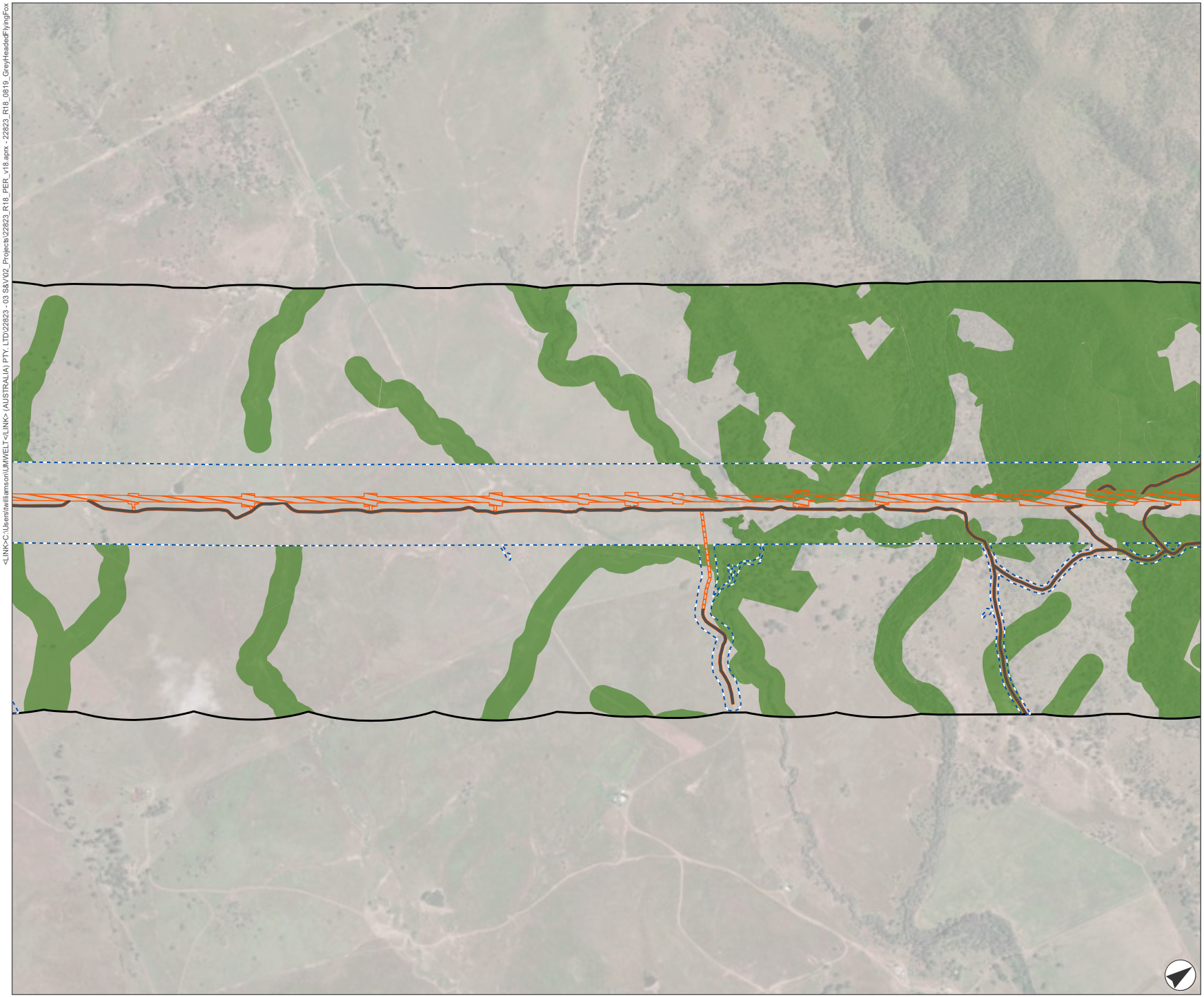


FIGURE 8.19-11

Grey-headed Flying Fox Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

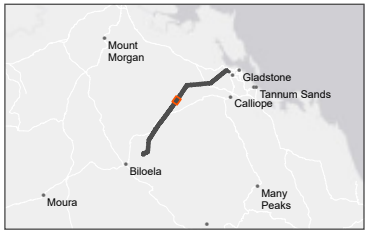
- Field Survey Extent
- Project Area

Grey-headed Flying Fox Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.19-12

Grey-headed Flying Fox Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

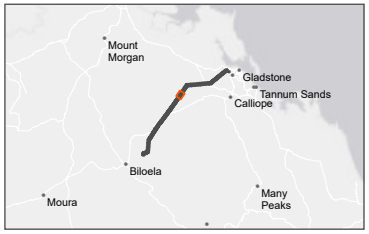
- Field Survey Extent
- Project Area

Grey-headed Flying Fox Habitat

- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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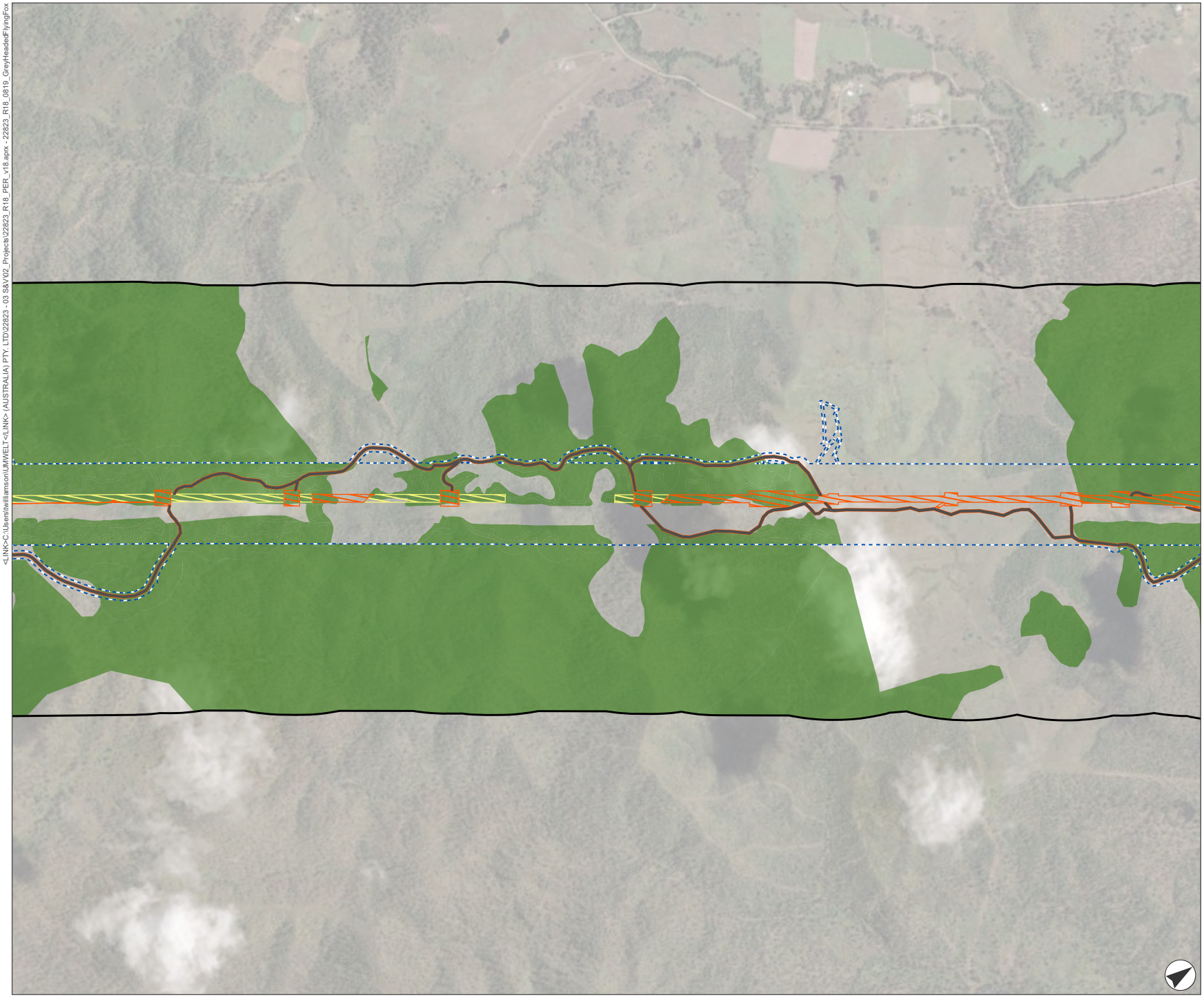


FIGURE 8.19-13

Grey-headed Flying Fox Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

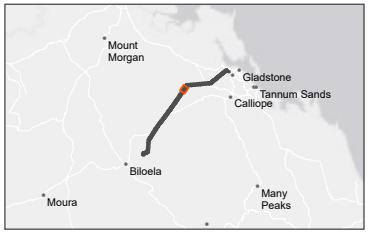
- Field Survey Extent
- Project Area

Grey-headed Flying Fox Habitat

- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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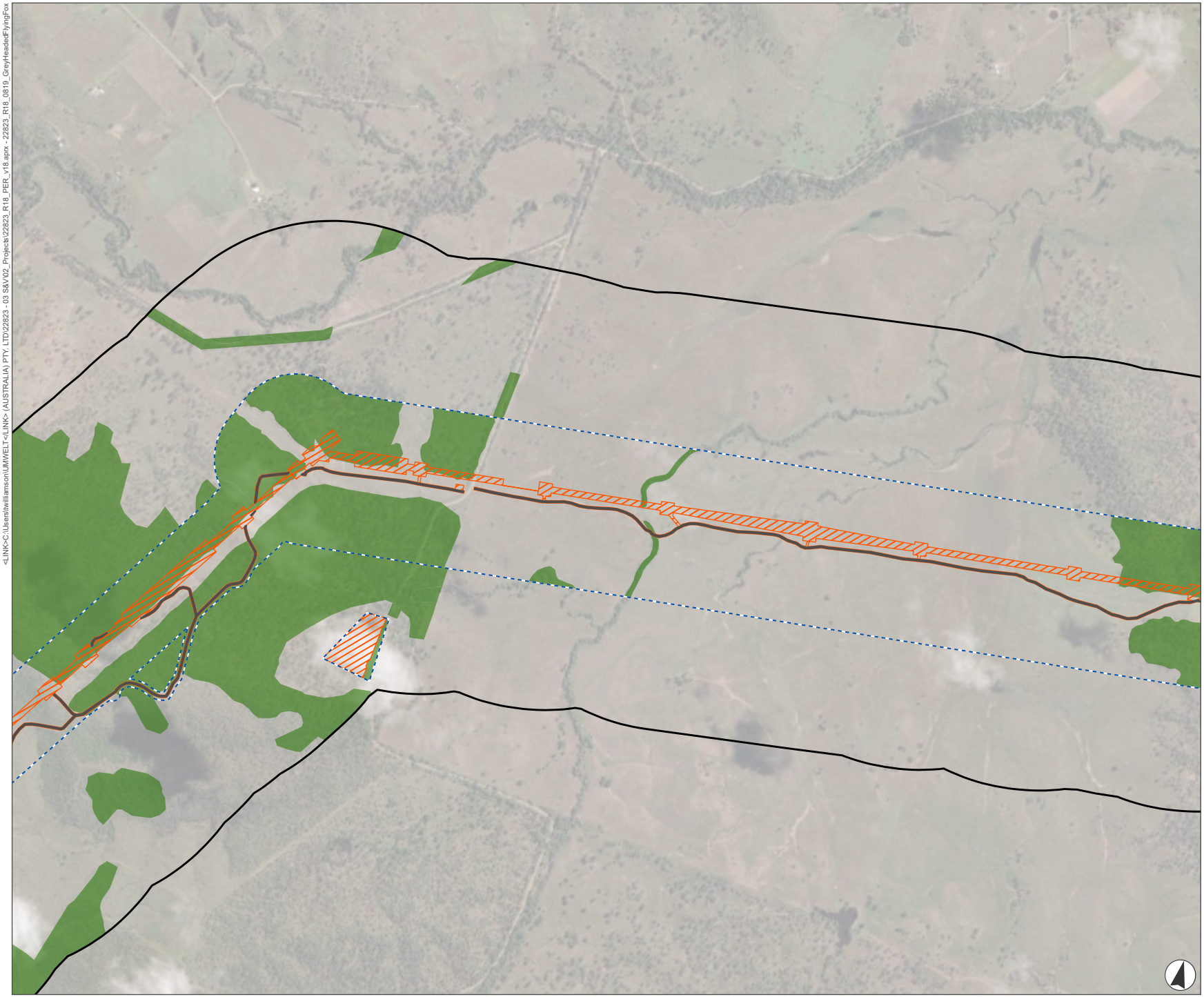


FIGURE 8.19-14

Grey-headed Flying Fox Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

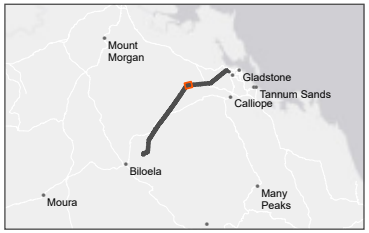
- Field Survey Extent
- Project Area

Grey-headed Flying Fox Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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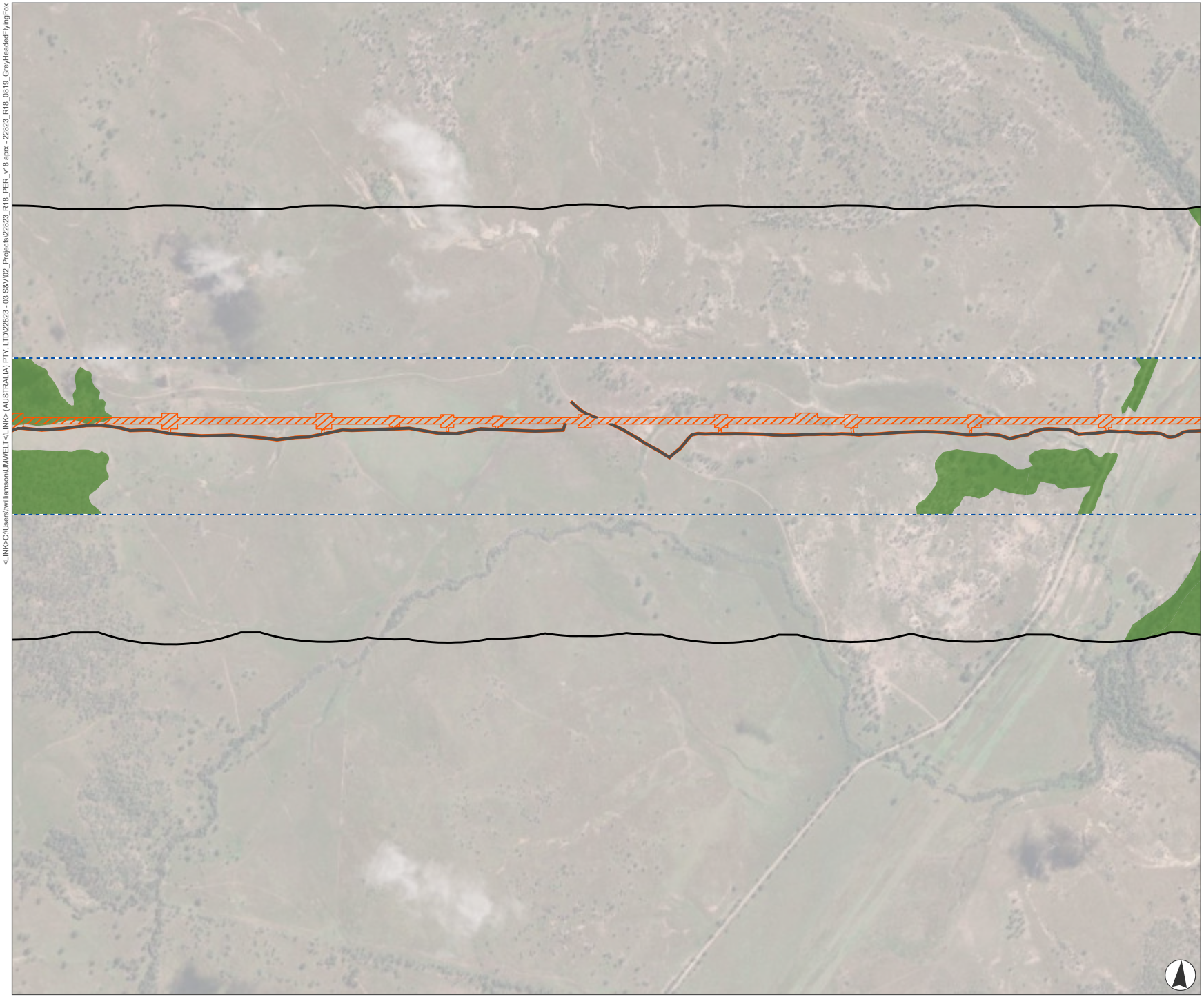


FIGURE 8.19-15

Grey-headed Flying Fox Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

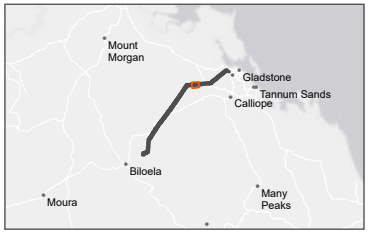
- Field Survey Extent
- Project Area

Grey-headed Flying Fox Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



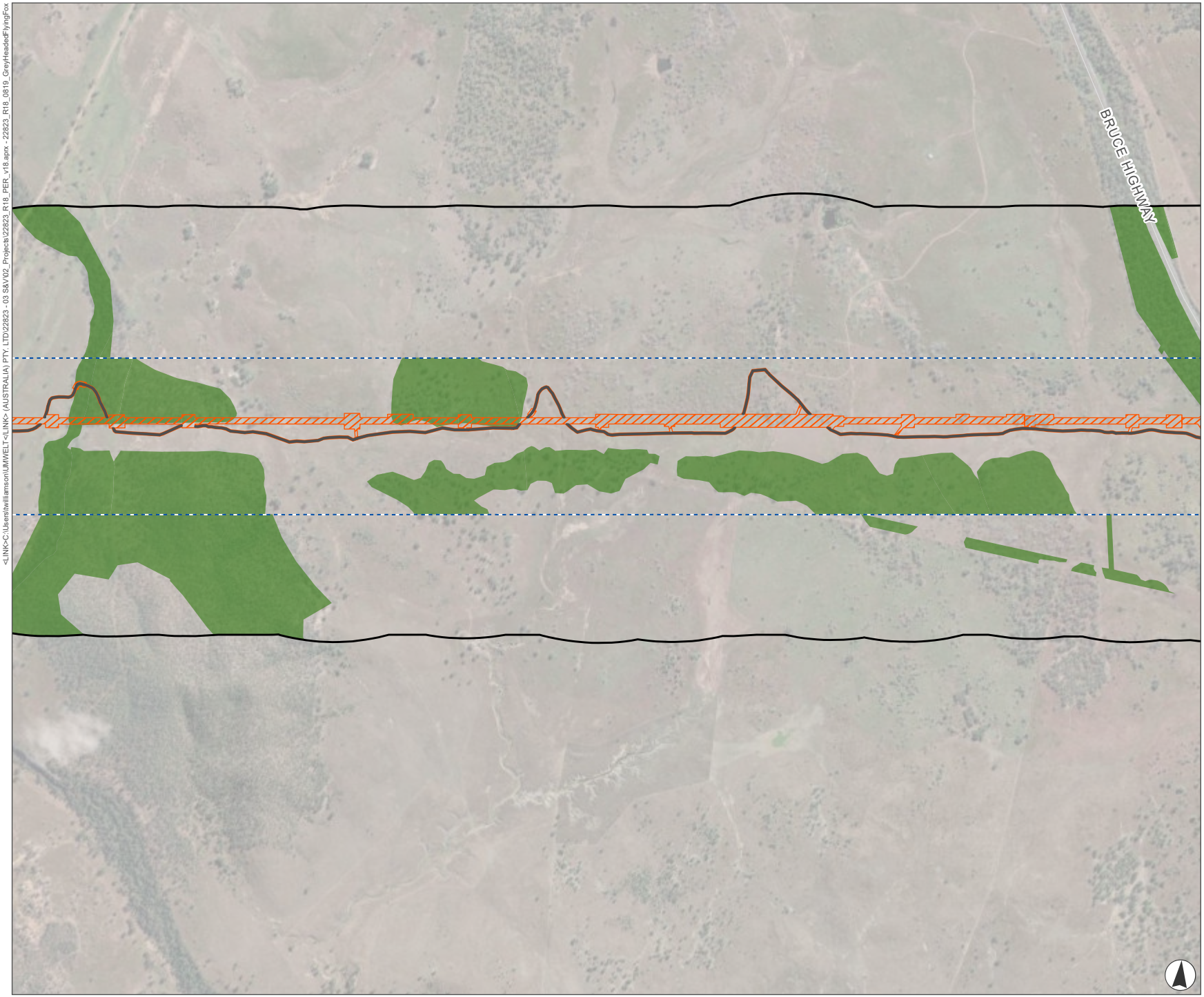
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FIGURE 8.19-16

Grey-headed Flying Fox Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

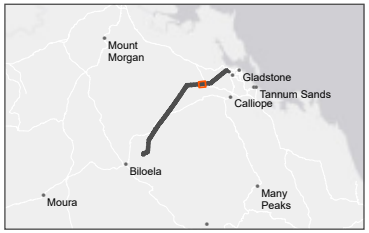
- Roads
- Field Survey Extent
- Project Area

Grey-headed Flying Fox Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.19-17

Grey-headed Flying Fox Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

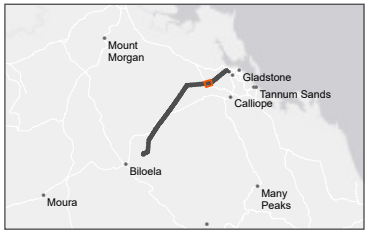
- Roads
- Field Survey Extent
- Project Area

Grey-headed Flying Fox Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.19-18

Grey-headed Flying Fox Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

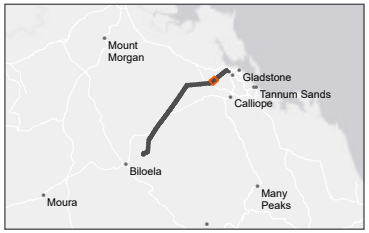
- Field Survey Extent
- Project Area

Grey-headed Flying Fox Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.19-19

Grey-headed Flying Fox Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

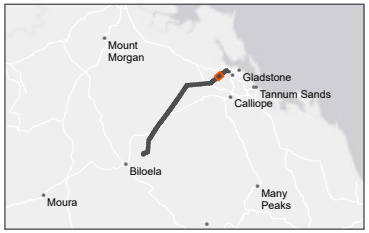
- Field Survey Extent
- Project Area

Grey-headed Flying Fox Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.19-20

Grey-headed Flying Fox Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

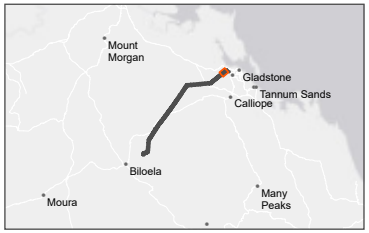
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Grey-headed Flying Fox Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.19-21

Grey-headed Flying Fox Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

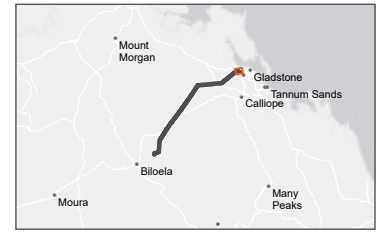
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area
- Grey-headed Flying-fox Records (Umwelt)

Grey-headed Flying Fox Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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8.2.7.6 Latham's Snipe (*Gallinago hardwickii*)

Table 8.62 Latham's Snipe: Ecology and Relevance to the Project Area

Latham's snipe	
Profile	**Conservation status** Vulnerable and Migratory **Distribution** Latham's snipe migrates from its breeding locations in Japan and far eastern Russia. It migrates south, through Papua New Guinea to winter in eastern Australia. Within Australia, it is recorded from Cape York Peninsula in the north, down the east coast through Queensland, New South Wales, Victoria, including Tasmania, and as far as south-eastern South Australia. It is occasionally sighted in inland and western areas, though infrequently (Department of Climate Change, Energy, the Environment and Water 2024a). **Important population** Important populations of the Latham's snipe are not defined in the Conservation Advice (DCCEEW, 2024a) and no recovery plan exists at this time. As such the generic definition for important populations in the *Significant Impact Guidelines 1.1–Matters of National Environmental Significance* (Department of the Environment, 2013b) has been applied. This document defines an 'important population' as 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 • Populations that are near the limit of the species range. Latham's snipe was not recorded within the Project Area. While the Project Area supports some roosting and foraging habitat, the extent of this habitat is unlikely to be of the size and condition to support a key-source population. As such, any population that may exist is likely to include transient individuals that may use mapped habitat as intermittent stopping points or short-term sites. The Project Area is not located at the edge of the species distribution. Given the above, an important population of this species is not considered to occur within the Project Area. **Ecologically significant portion of a population** For Latham's snipe, an ecologically important portion of the population is defined using specific thresholds, as the species does not typically occur in large flocks like other migratory shorebirds. A site is considered nationally or internationally important if it regularly supports at least 18 individuals, or if it has previously been identified as internationally important by supporting more than 1% of the global population (around 300 individuals). Habitat meeting or exceeding these thresholds is regarded as critical to the survival of the species, and its degradation or loss would have disproportionately negative impacts on the population (Department of Climate Change, Energy, the Environment and Water 2024a).

Latham's snipe

Historical records within the desktop search extent

The closest and most recent WildNet record dates from 2016 and occurs approximately 4.8 km north of Section C of the Project Area, in Aldoga. Scattered ALA records occur amongst the various waterbodies within the Project region that provide suitable habitat along the Project Area, with records from 2001 at Lake Callide at Section A and numerous records from the Gladstone Area (Atlas of Living Australia, 2025). Areas that these records occur are generally large waterbodies including lakes, weirs and dams which support abundances of low bank vegetation.

Habitat

Latham's snipe occurs in permanent and ephemeral wetlands up to 2,000 m ASL. They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies). However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity (Department of Climate Change, Energy, the Environment and Water 2024a).

The foraging habitats of Latham's snipe are characterised by areas of mud (either exposed or beneath a very shallow covering of water) and some form of cover (e.g. low, dense vegetation). It roosts on the ground near (or sometimes in) their foraging areas, usually in sites that provide some degree of shelter, e.g. beside or under clumps of vegetation, among dense tea-tree, in forests, in drainage ditches or plough marks, among boulders, or in shallow water if cover is unavailable. Breeding habitat does not occur in Australia.

Habitat critical to the survival of the species

Habitat critical to the survival of the species is defined in the *Conservation Advice for Gallinago hardwickii (Latham's snipe)* (Department of Climate Change, Energy, the Environment and Water 2024). This includes habitat which is necessary:

- For activities such as foraging, breeding, roosting, or dispersal
- For the long-term maintenance of the species (including the maintenance of species essential to the survival of the Latham's snipe, such as macrobenthos)
- To maintain genetic diversity and long-term evolutionary development
- For the re-introduction of populations or recovery of the species.

Habitat has been mapped within the Project Area is considered marginal and would only be relied on by the species intermittently, or during times of severe drought when regional, more suitable low-lying wetlands are dry and fail to provide a foraging resource to the species. In addition, habitat mapped within the Project Area occurs at the edges of waterbodies that are used primarily for stock watering and therefore support a moderate level of degradation by stock which feed on and trample low, fringing vegetation that are required by the species for refuge. Due to the moderate disturbance of the habitats and the typical lack of low vegetation cover around the waterbodies, the mapped habitat is not considered to be critical to the survival of the species.

Important habitat

Latham's snipe typically disperse in small numbers across larger habitat areas (DCCEEW, 2024a). Important habitat for Latham's snipe occurs at sites that have previously been identified as internationally important for the species, or sites that:

Latham's snipe

- Support at least 18 individuals of the species (ecologically significant proportion of the population).
- Are naturally occurring open freshwater wetland with vegetation cover nearby (for example, tussock grasslands, sedges, lignum or reeds within 100 m of the wetland).

The conservation advice notes that it is difficult to determine which sites are most important for Latham's snipe in Australia due to difficulties associated with surveying for the species (DCCEEW, 2024a). However, six important sites (i.e. those with major populations) have been identified based on surveys in Victoria, Tasmania and South Australia. No important habitat sites have been identified in Queensland.

Latham's snipe was not recorded within the Project Area. While the Project Area supports roosting and foraging habitat, it is unlikely to support up to 18 individuals due to the high disturbance of the habitats (from livestock watering and vegetation clearing) and the typical poor condition of low vegetation cover around the wetlands. As such, the mapped habitat is not considered to be important habitat for the species.

Current threats to the species

Current threats to the species include habitat loss and degradation as a result of drainage and conversion of wetlands, diversion of water, mowing of habitat, vegetation replacement and grazing. Hunting, while now illegal, has had a historic impact on the species. Other threats include climate change and predation by invasive species.

Recovery plan

A recovery plan has not been adopted for the species as the conservation advice is considered effective (*Conservation Advice for Gallinago hardwickii (Latham's snipe)* (Department of Climate Change, Energy, the Environment and Water 2024)).

In the Project Area

Surveys

During the field surveys, 28 habitat assessments in areas of suitable habitat were completed, diurnal bird surveys were undertaken throughout all field surveys and opportunistic surveys of wetlands were conducted.

Species occurrence

Latham's snipe is considered to have a moderate likelihood of occurrence within the Project Area due to the presence of seasonal breeding, foraging and dispersal habitat within wetland areas and the presence of records within the Project region.

Habitat within the Project Area

Habitat type	Habitat modelling criteria	Area (ha)	
		Project Area	Disturbance Footprint
Seasonal breeding, foraging and dispersal	All freshwater wetlands and farm dams, as well as intertidal areas, near-coastal wetlands and dams, tidal flats dominated by mangroves, sedges and grasses. Adjacent to and including RE 12.1.2 and 12.1.3.	32.2	0.6

Latham's snipe	
	Where field data is not available, habitat conservatively includes all farm dams and waterbodies mapped as lacustrine or palustrine wetlands based on waterbody data in the Queensland wetland area mapping. It also includes areas mapped as intertidal wetlands on Queensland Globe.

Table 8.63 Assessment of Potential Project Impacts and Mitigation and Management Commitments for Latham's Snipe

Potential Impact	Assessment	Mitigation Commitments
Direct		
Vegetation clearing causing habitat loss and fragmentation	Vegetation clearing is unlikely to directly impact this species, as much of the Project sits within already disturbed areas or alongside the existing transmission line. However, farm dams which are considered suitable habitat do occur within the Disturbance Footprint and may be directly impacted by disturbance works.	• Identify MNES fauna habitat and individuals through pre-clearance surveys • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Disturbance activities must be contained to Disturbance Footprint subject to minor micro-siting within the Field Survey Extent • Refer to Table 5.1, MNES Management Plan for further details on mitigation measures.
Direct injury or mortality	The risk of direct injury or mortality is low due to the species occurrence being restricted to wetland habitat. However, direct mortality is possible during earthworks in and around wetlands if the species is not flushed by construction machinery.	• Appropriately qualified fauna spotter catcher to undertake pre-clearance habitat assessment and be present during clearing and disturbance to habitat features • Flushing surveys • Clearing must be staged, with non-habitat trees felled first • Tampering with an animal breeding place to be carried out in accordance with an approved Species Management Program • Clear delineation of habitat features to be retained • Restrict vehicles to approved access tracks • Vehicle travelling speed restricted to <40 km/hr • Excavations must be secured (e.g. covered) • Refer to Table 5.3 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Disturbance to foraging behaviours due to increased noise and activity during construction	Construction related noise and activity may disturb any individuals of the species present, causing them to flush from foraging areas, though these will be temporary and localised.	• Plant and equipment to be fitted with appropriate noise attenuation and maintained • Deliveries and removal of material and equipment to and from site within approved hours for construction • Plant to be turned off when not in use • No unnecessary use of horns or other audible signals on mobile plant or equipment • Machinery and equipment will be maintained in good working condition • Refer to Table 5.10 of the MNES Management Plan for further details on mitigation measures.
Indirect		
Soil exposure resulting in an increased risk of erosion and sedimentation of water bodies, reducing water quality and degrading aquatic habitats	Construction of the transmission line will involve ground disturbance that may expose soils, increasing the risk of erosion and sedimentation of nearby water bodies. This could reduce water quality and degrade aquatic habitats. With appropriate erosion and sediment control measures in place, the impact is expected to be minor, localised, and temporary.	• Soil sampling and testing to inform both erosion and sediment control (ESC) and rehabilitation • Develop Erosion and Sediment Control Plan (ESCP) in accordance with the IECA Best Practice Erosion and Sediment Control Guidelines 2008 • Extent and duration of soil exposure will be minimised • Disturbed areas will be promptly stabilised. • Site is monitored and controls adjusted to maintain required performance standard • Minimum personnel requirements will apply for ESCP development and verification • A Water Quality Monitoring Plan must be developed by an appropriately qualified person • Dewatering Management Plan will be developed • Acid Sulphate Soil Management Plan will be developed • Awareness training for identification and management of ASS will be undertaken • Water extraction activities will be strictly controlled and monitored to ensure no waterbodies are completed drained • Erosion and sediment control measures in accordance with IECA 2008 • Refer to Table 5.4 and Table 5.12 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Increased risk of contamination associated with activities such as refuelling or storage of chemicals	Construction activities, including refuelling and chemical storage, present a risk of soil and water contamination. With appropriate handling, storage, and spill management procedures implemented, the impact is expected to be low and readily manageable.	• Hazardous materials must be stored and handled appropriately • An Emergency Response Plan will be developed • Spill kits will be available during construction • Hazardous materials locations will be bunded • All waste disposed of in accordance with legislative requirements • No refuelling within 50 m of a watercourse • Application of herbicides in accordance with legislative requirements • Refer to Table 5.4 of the MNES Management Plan for further details on mitigation measures.
Removal of water from existing farm dams leading to changes in hydrology / habitat extent and water quality. Increased activity at these locations resulting in avoidance and potentially altered foraging and breeding behaviour	Removal of water from constructed wetlands and farm dams may alter hydrology, habitat extent, and water quality. Increased activity around these sites could cause temporary disturbance, with potential avoidance and altered foraging or breeding behaviour. With disturbance and extraction activities minimised through mitigations, this is expected to have little impact.	• A Water Quality Monitoring Plan must be developed by an appropriately qualified person • Dewatering Management Plan will be developed • Acid Sulphate Soil Management Plan will be developed • Awareness training for identification and management of ASS will be undertaken • Water extraction activities will be strictly controlled and monitored to ensure no waterbodies are completed drained • Erosion and sediment control measures in accordance with IECA 2008 • Refer to Table 5.12 of the MNES Management Plan for further details on mitigation measures.
Periodic bursts of elevated noise levels may startle and disorientate individuals within proximity to the noise source	Periodic bursts of elevated noise may temporarily startle or disorient individuals nearby, though impacts are expected to be minor and short-term.	• Plant and equipment to be fitted with appropriate noise attenuation and maintained • Deliveries and removal of material and equipment to and from site within approved hours for construction • Plant to be turned off when not in use • No unnecessary use of horns or other audible signals on mobile plant or equipment • Machinery and equipment will be maintained in good working condition

Potential Impact	Assessment	Mitigation Commitments
		• Refer to Table 5.10 of the MNES Management Plan for further details on mitigation measures.
Increased pest levels, notably those which may predate upon individuals	The Project is not expected to increase pest levels within the Project Area beyond existing levels.	• All waste to be secured • Biosecurity Instrument Permit to be obtained for moving materials out of or within different biosecurity zones • Educate workforce in the identification of pest fauna species • Avoid inclusion of any water retaining voids or pits • Refer to Table 5.6 of the MNES Management Plan for further details on mitigation measures.

Table 8.64 Significant Impact Assessment: Latham's Snipe

Impact Criteria	Assessment
Lead to a long-term decrease in the size of an important population of a species	**Unlikely.** Direct impacts to potential habitat for this species is limited to clearing of 0.6 ha of seasonal breeding, foraging and dispersal habitat. This loss of habitat is not likely to significantly reduce the species' ability to persist in the local area given habitat within the adjacent areas is likely to be preferred as it is less disturbed. While suitable foraging habitat is found within and adjacent, this is limited to less than one hectare of farm dams which are already highly degraded by cattle use and weeds. Farm dams were also typically observed as supporting limited fringing vegetation which is required for roosting and steep banks with limited muddy margins for foraging. Further, the Project Area and surrounding waterbodies are not known to support significant numbers of any migratory waders, including the Lathams's snipe. As such, this species is expected to occur as infrequent individuals only. Implementation of the MNES Management Plan will assist in minimising potential indirect impacts of the Project, such as habitat degradation, weeds and temporary altered hydrology. The Project is therefore unlikely to lead to a long-term decrease in the size of a population.
Reduce the area of occupancy of an important population	**Unlikely.** The estimated area of occupancy for this species as provided in the species conservation advice (DCCEEW 2024e) is 13,000 km^2. The species is a migratory visitor to Australia. A maximum of 0.6 ha of suitable habitat will be cleared as a result of the Project, and the site is not known to support large numbers of the species. In addition, no importation population is expected to utilise habitats within the Project Area. Therefore, the Project is unlikely to reduce the area of occupancy of an important population.

Impact Criteria	Assessment
Fragment an existing important population into two or more populations	**Unlikely.** The species migrates between eastern Asia and Australia. Potential habitat within the Project Area is limited to a few artificial dams and mudflats and is considered marginal in quality due to existing disturbances such as prior clearing, grazing, and human activity. Given the species' capacity to readily disperse across the landscape, and the Project's location alongside an existing transmission line corridor, vegetation clearance is unlikely to create barriers to movement or fragment any population within the Project Area.
Adversely affect habitat critical to the survival of a species	**Unlikely.** No areas within the Project Area have been formally listed as Critical Habitat for Latham's snipe under section 207A of the EPBC Act. However, some habitat within the Project Area meets the criteria for important habitat and is therefore being conservatively assessed as habitat critical to the survival of the species. This habitat is limited to a few artificial dams and mudflats and is considered marginal in quality due to existing disturbances, including prior clearing, grazing, and human activity. Clearance of up to 0.5 ha of this habitat is not expected to significantly impact the species, given its migratory behaviour and capacity to disperse across the landscape. Accordingly, the Project is unlikely to adversely affect habitat critical to the survival of the species.
Disrupt the breeding cycle of an important population	**Unlikely.** This species is a non-breeding visitor to Australia. The Project is unlikely to disrupt the breeding cycle of a potential population.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely.** The mapped habitat within the Project Area primarily occurs on artificial dams and mudflats which are already degraded due to grazing and human disturbance. A maximum of 0.6 ha of seasonal breeding, foraging and dispersal habitat will be directly impacted as a result of the Project. The seasonal breeding, foraging and dispersal habitat is not considered highly unique or important for refuge and habitat with similar characteristics, quality and condition occurs widely within the region. Clearing will only be conducted as strictly necessary. It is recognised that potential indirect impacts on habitat that will be retained may occur as a result of the Project including habitat degradation from increased dust, edge effects, weeds and temporary altered hydrology. Indirect impacts will be actively managed in accordance with the MNES Management Plan and include measures such as erosion and sediment control, dust suppression and weed and pest management. While minor increases in the noise levels at the Calliope River substation during the operational phase are expected due to the substation upgrade, these are not expected to be significant in relation to the existing impacts despite the occurrence of habitat within 20 m of the proposed substation. Given the low quality of habitat, likely infrequent use of the Project Area by this species as well as its' high mobility capacity, the Project is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Impact Criteria	Assessment
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**Unlikely.** Historical clearing has occurred in discrete locations across the Project Area primarily for cattle grazing purposes, and ongoing maintenance currently occurs within the existing transmission line. It is considered likely that these areas already act as conduits for pest movement in the landscape and that the additional proposed transmission line will not functionally increase the movement or abundance of pest species. Red fox and feral cats have been recorded within the Project Area during baseline studies. These species may present a predation risk to Latham's snipe while foraging in low, open habitats. Appropriate biosecurity controls and weed washdown procedures will be adhered to, to mitigate the introduction or proliferation of pest and weed species in accordance with Table 5.5 and 5.6 of the MNES Management Plan. Based on this, it is unlikely the Project will result in invasive species that are harmful to shorebird species becoming established.
Introduce disease that may cause the species to decline	**Unlikely.** There are no known diseases affecting this species. The Project will employ best practice biosecurity protocols during construction and operation; therefore, introduction of a disease that may cause a shorebird species to decline is unlikely.
Interfere substantially with the recovery of the species	**Unlikely.** There is currently no recovery plan required or adopted for this species. However, the *Conservation Advice for Gallinago hardwickii (Latham's snipe)* (Department of Climate Change, Energy, the Environment and Water 2024a) outlines key conservation objectives and guidelines. Latham's snipe populations are considered stable within Australia, and key recovery actions focus on maintaining habitat, protecting important feeding and roosting areas, and ensuring functional connectivity across the East Asian–Australasian Flyway. Potential habitat within the Project Area is limited to a few artificial dams and mudflats, which are marginal in quality due to prior clearing, grazing and human activity. Clearance of up to 0.6 ha of this habitat is unlikely to compromise recovery objectives, as the species is migratory, able to disperse across the landscape, and no large or internationally significant aggregations occur within the Project Area. Accordingly, the Project is unlikely to interfere substantially with the recovery of Latham's snipe, given that it does not remove or degrade key habitat at the national or flyway scale and does not disrupt broader conservation and management actions identified in the species' recovery guidance.
Significant Residual Impact	**Unlikely to have a significant impact.**

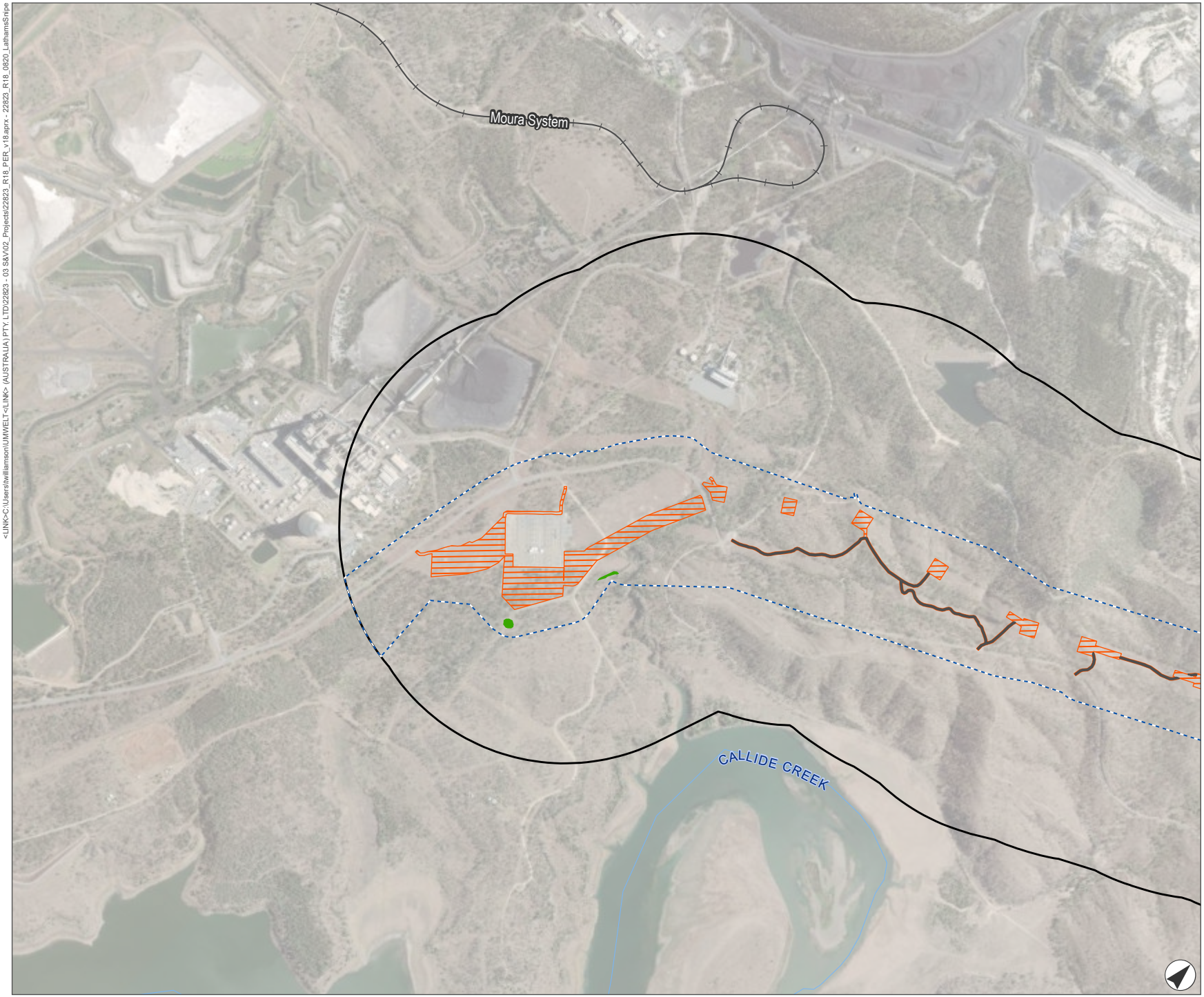


FIGURE 8.20-1

Latham's Snipe Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

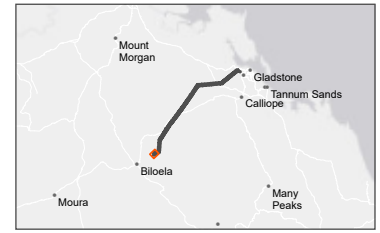
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Latham's Snipe Habitat

- Seasonal breeding, foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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Kilometres

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FIGURE 8.20-14

Latham's Snipe Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

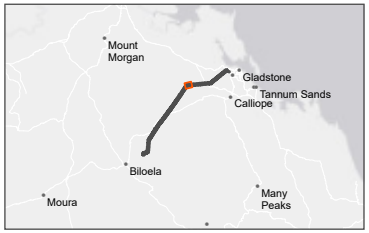
- Field Survey Extent
- Project Area

Latham's Snipe Habitat

- Seasonal breeding, foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



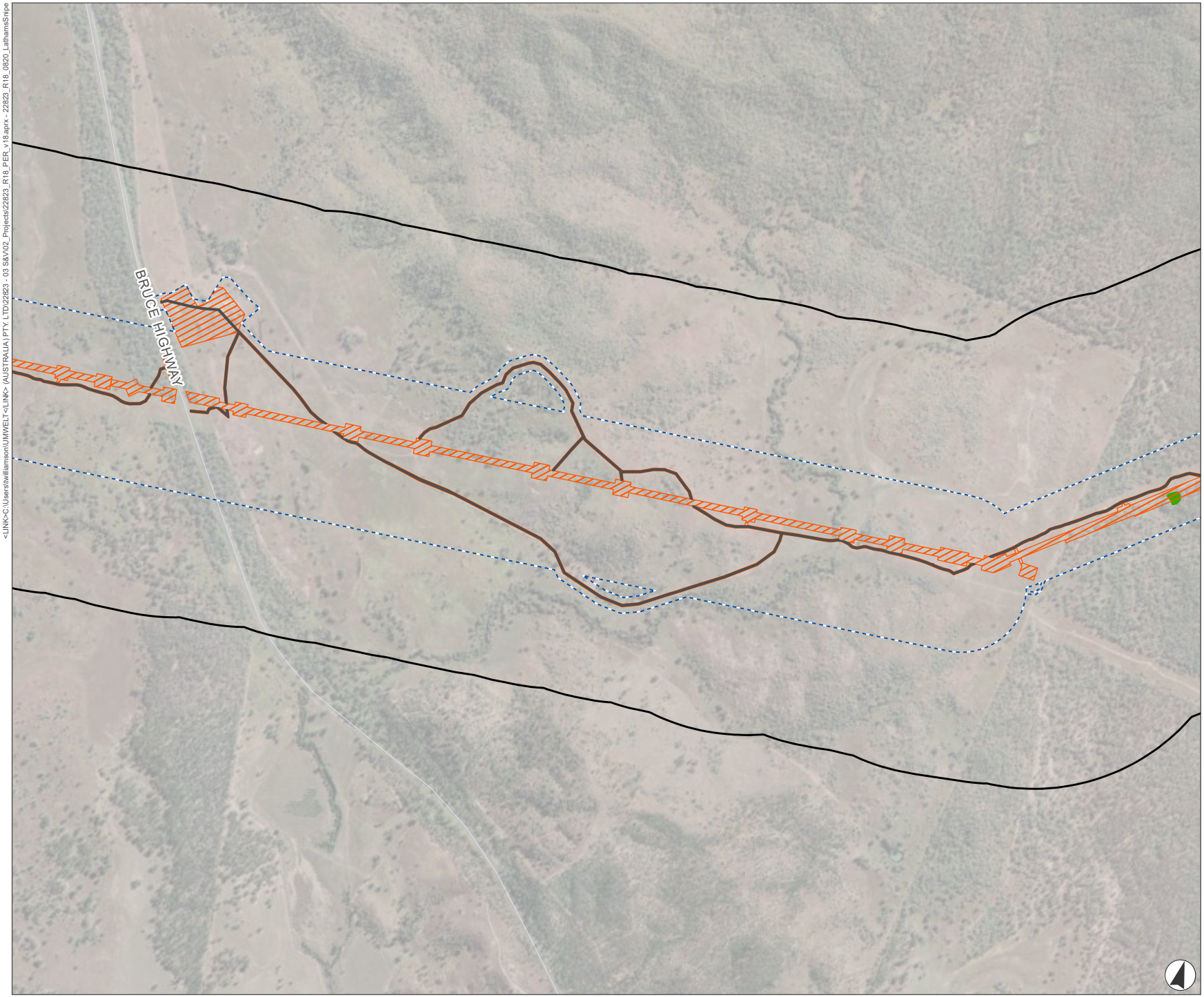
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FIGURE 8.20-17

Latham's Snipe Records and Habitat within the Field Survey Extent and Disturbance Footprint

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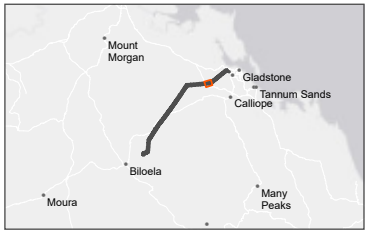
- Roads
- Field Survey Extent
- Project Area

Latham's Snipe Habitat

- Seasonal breeding, foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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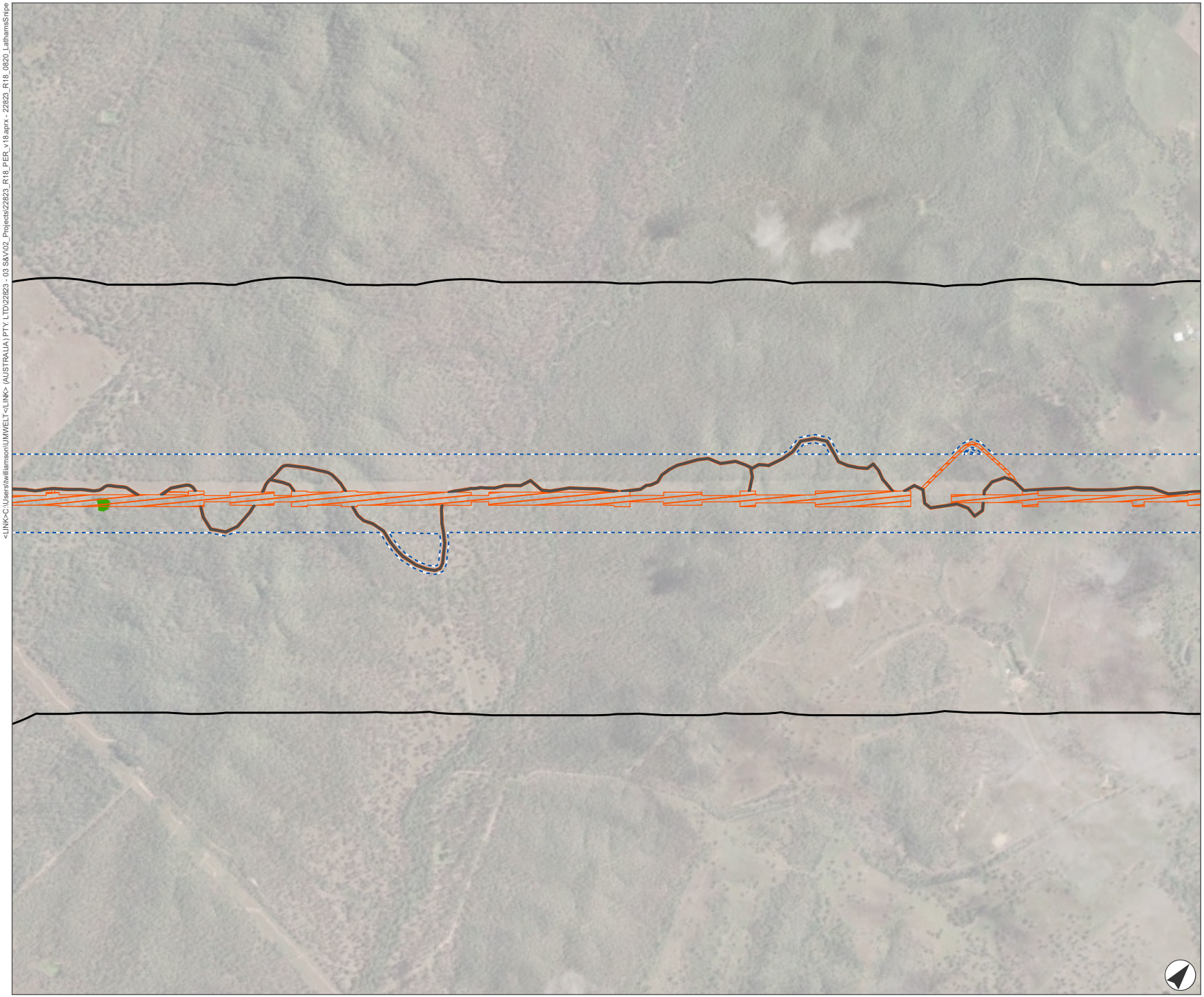


FIGURE 8.20-18

Latham's Snipe Records and Habitat within the Field Survey Extent and Disturbance Footprint

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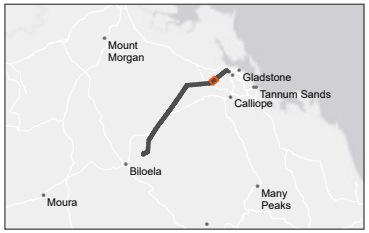
- Field Survey Extent
- Project Area

Latham's Snipe Habitat

- Seasonal breeding, foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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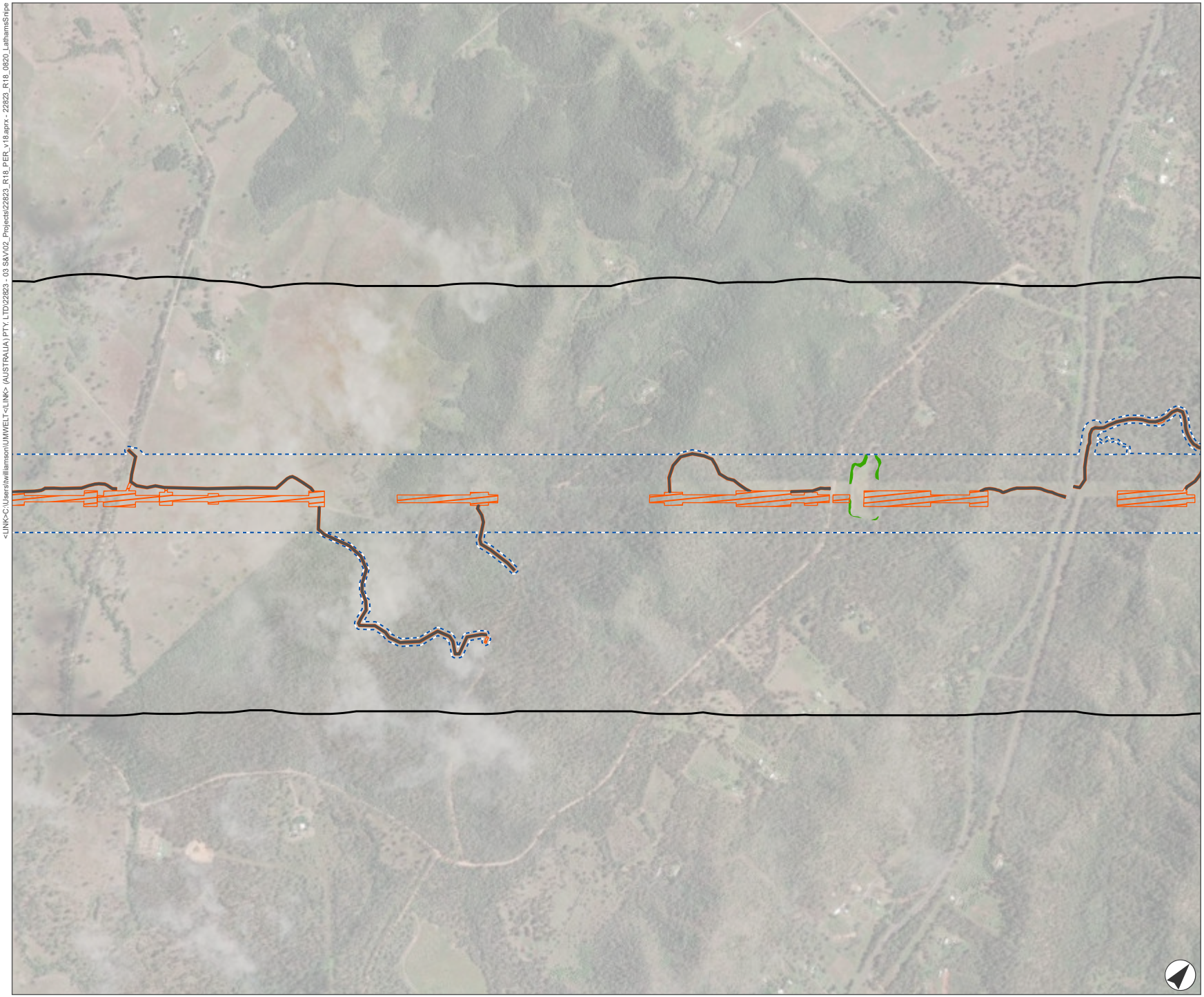


FIGURE 8.20-19

Latham's Snipe Records and Habitat within the Field Survey Extent and Disturbance Footprint

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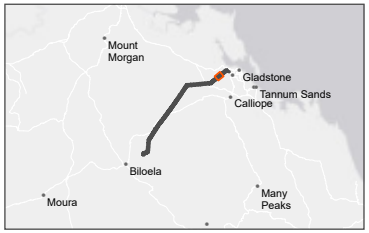
- Field Survey Extent
- Project Area

Latham's Snipe Habitat

- Seasonal breeding, foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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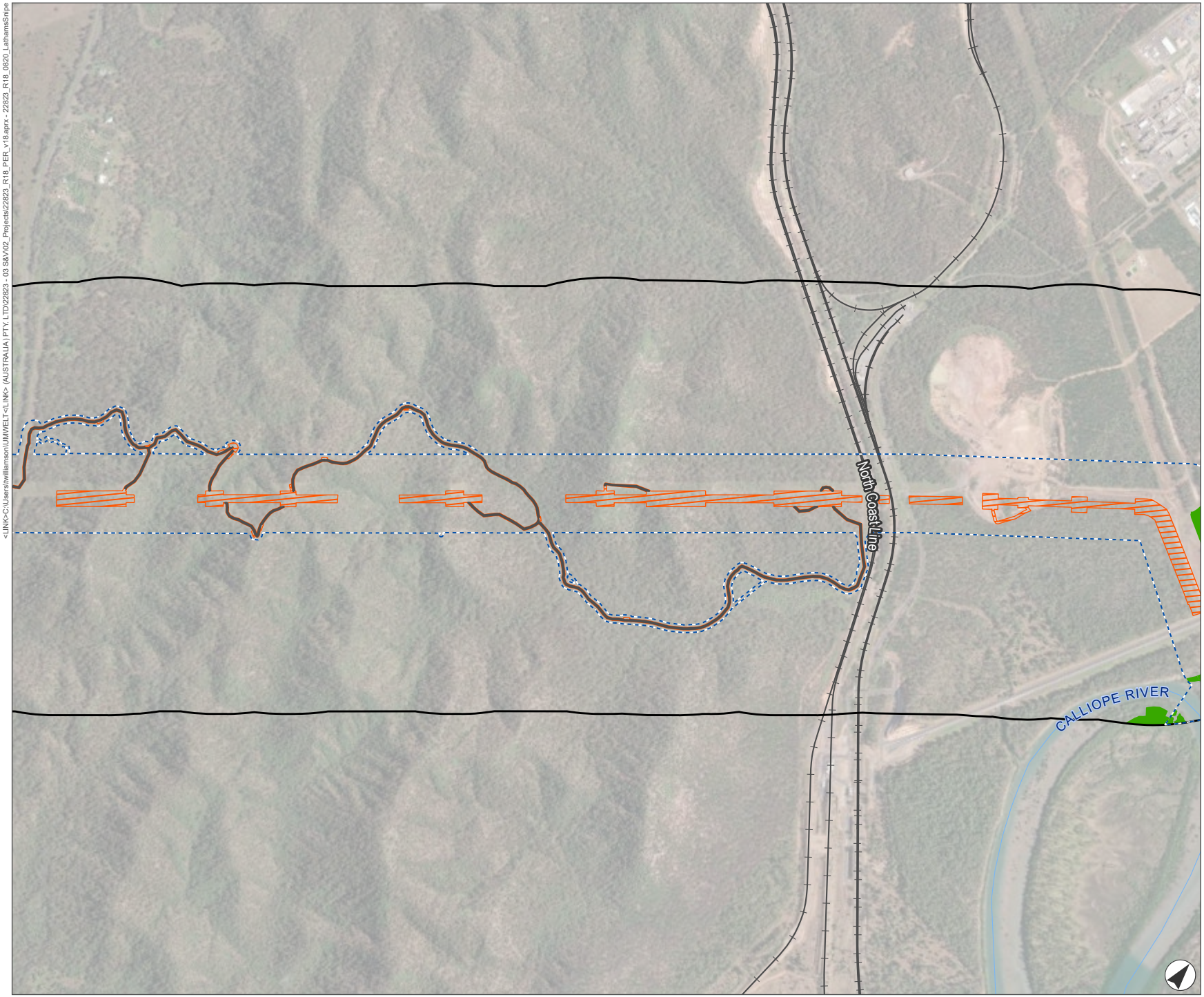


FIGURE 8.20-20

Latham's Snipe Records and Habitat within the Field Survey Extent and Disturbance Footprint

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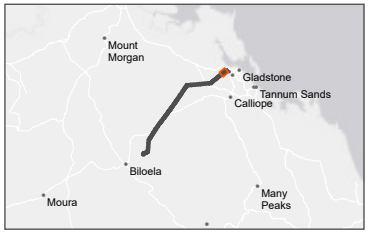
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Latham's Snipe Habitat

- Seasonal breeding, foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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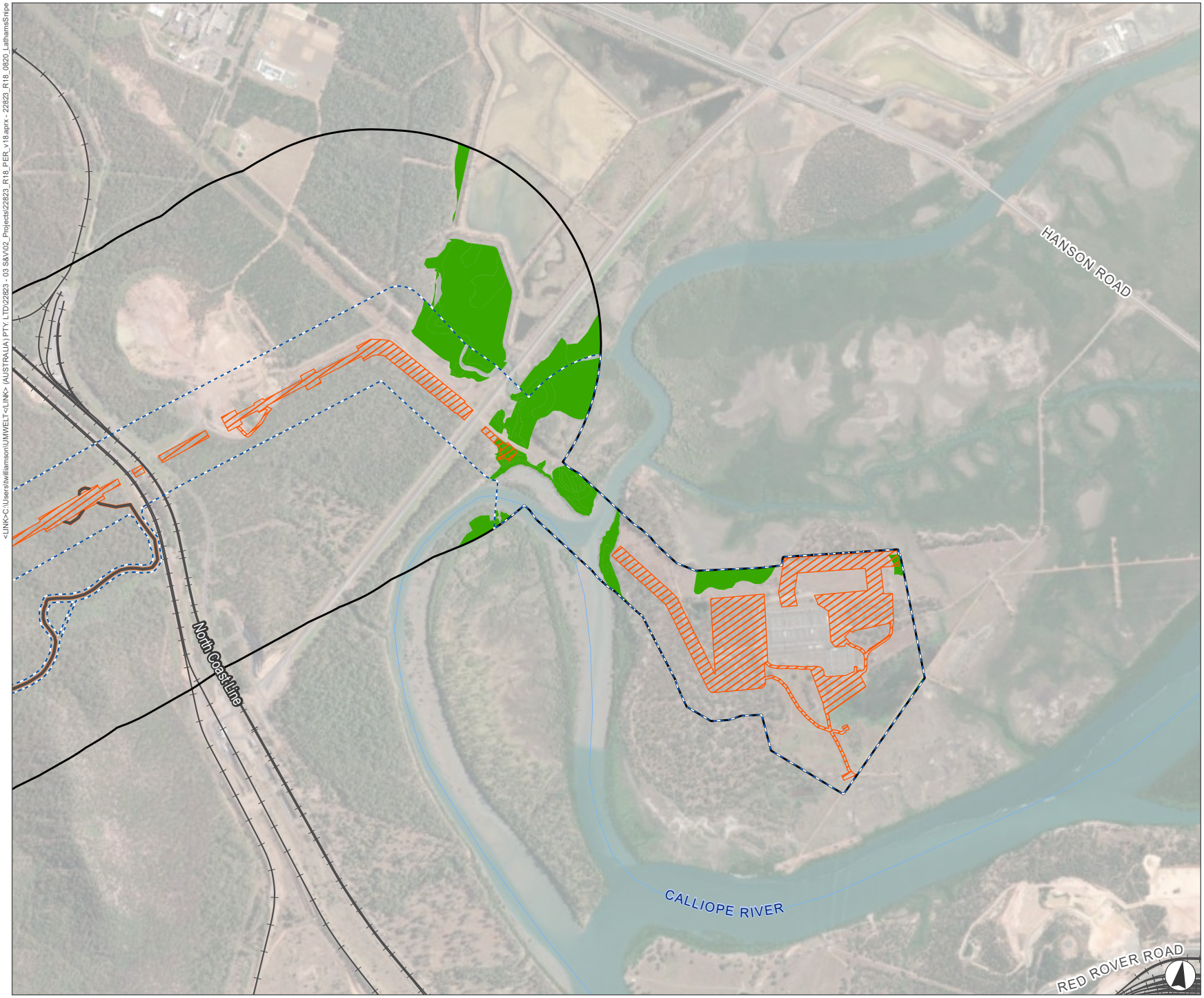


FIGURE 8.20-21

Latham's Snipe Records and Habitat within the Field Survey Extent and Disturbance Footprint

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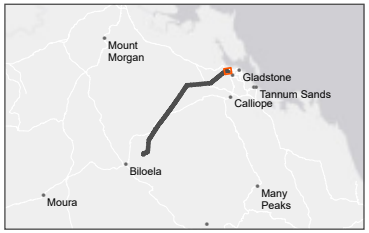
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Latham's Snipe Habitat

- Seasonal breeding, foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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8.2.7.7 Painted Honeyeater (*Grantiella picta*)

Table 8.65 Painted Honeyeater: Ecology and Relevance to the Project Area

Painted honeyeater	
Profile	**Conservation status** Vulnerable **Distribution** This species is highly nomadic, sparsely and widely distributed from south-eastern Australia to north-western Queensland and eastern Northern Territory. The greatest concentrations and almost all records of breeding come from south of 26ºS, on inland slopes of the Great Dividing Range between the Grampians, Victoria and Roma, Queensland (Threatened Species Scientific Committee, 2015a). This species often move after breeding to semi-arid regions such as north-eastern South Australia, central and western Queensland, and central Northern Territory. **Important population** Important populations of painted honeyeater is not defined in any of the literature (Department of Climate Change. Energy, Environment and Water, 2025). Therefore, any population potentially occurring within the Project Area has been assessed against the generic definition in the *Significant Impact Guidelines 1.1–Matters of National Environmental Significance* (Department of the Environment, 2013a). The Project Area is unlikely to support an important population, given that the species is highly nomadic, there is no evidence to suggest that any population potentially present would be a key source population for breeding or dispersal or necessary for maintaining genetic diversity and the Project Area is not near the limit of the species range. **Historical records within the desktop search extent** No WildNet records occur within the desktop search extent and there are limited ALA records in the vicinity. The closest record was located 11 km west of the Project Area at Biloela from 2017. Another record occurs near Rockhampton. **Habitat** Painted honeyeater occurs in dry forests and woodlands, where its primary food is mistletoes in the genus *Amyema*, though it will also take some nectar and insects. Invertebrates are of particular importance as a dietary item provided to nestlings and are also used by adults in the breeding season. The species is also known to occur in riparian woodland communities dominated by species such as *Eucalyptus camaldulensis*, *Casuarina spp*., *Callitris spp*., and in *Acacia spp*. dominated woodlands, *Melaleuca spp*. and trees on farmland and in gardens. The species demonstrates preference for larger patches of remnant woodland and areas with higher numbers of older trees (as mistletoes are largely restricted to these trees) (Department of Agriculture, Water and the Environment, 2021b). This species does exhibit distinct movement patterns which are influenced by the fruiting of mistletoe which also coincides with its breeding season. Breeding occurs in October to March. Two mistletoe species are heavily relied on during breeding: *Amyema quandang (grey mistletoe*) and *A. cambagei* (needle-leaf mistletoe). The painted honeyeater shows preference for wider patches of woodland habitat; however, it is

Painted honeyeater

known to breed in narrow roadside strips of vegetation provided that ample mistletoe is available for foraging (Threatened Species Scientific Committee, 2015a).

Habitat critical to the survival of the species

The *National Recovery Plan for the Painted Honeyeater (Grantiella picta)* (Department of Agriculture, Water and the Environment, 2021b) identifies 'habitat critical to the survival of the species' as:

- Breeding habitat: known or likely breeding habitat in *Acacia pendula*, *Acacia harpophylla* woodlands, box-gum woodlands and box-ironbark forests on the inland slopes of the Great Dividing Range in New South Wales, Victoria and southern Queensland.
- Foraging habitat: all preferred foraging species within known and likely foraging habitat particularly mistletoes of the genus *Amyema* growing in forest and woodlands dominated by eucalypts and acacias.
- Habitat for the long-term persistence of the species: all Key Biodiversity Areas (KBA) with painted honeyeater as a trigger species, and suitable habitat in future climate niches as information becomes available.

Suitable foraging and dispersal habitat is mapped within the Project Area; however, this habitat is considered marginal as mistletoe was sparsely recorded within the Project Area. The Project Area is not located within or near a KBA. The closest is Kroombit Tops National Park, however, painted honeyeater is not a trigger species for this KBA. On this basis, the habitat within the Project Area is not considered necessary for life-cycle requirements, maintaining genetic diversity, the recovery of the species or for the long-term persistence of the species; thus, it is not considered 'habitat critical to the survival of the species'.

Current threats to the species

The primary identified threat to this species is habitat loss (Department of Agriculture, Water and the Environment, 2021b). Both breeding and non-breeding habitat has been subject to extensive clearing in the past or degraded to the point where they no longer provide suitable habitat. Regrowth woodland, which contains similar or higher densities of mistletoe than remnant woodland, is viewed as having little conservation value and is also being cleared at an unsustainable rate.

Other identified threats include:

- Habitat degradation by grazing livestock, native macropods and rabbits leading to a collapse in mistletoe resources
- Deliberate destruction of mistletoe by landholders and in production forests
- Competition with the native noisy miner (*Manorina melanocephala*)
- Predation by invasive species such as the black rat
- Collision with road vehicles
- Nest predation by over-abundant native birds including currawongs, butcherbirds, crows and ravens.

Recovery plans

National Recovery Plan for the Painted Honeyeater (Grantiella picta) (Department of Agriculture, Water and the Environment, 2021b).

Painted honeyeater

In the Project Area

Surveys

422 habitat assessments to determine areas of suitable habitat and record presence/absence of mistletoe were undertaken. Diurnal bird surveys were undertaken throughout all field surveys. The Project Area is outside of the breeding range of the species and can be detected from March to September (i.e. outside the breeding season).

Active searches for feathers and mistletoe were undertaken at each habitat assessment site.

Species occurrence

Painted honeyeater was not recorded during the field surveys. It is considered to have a moderate likelihood of occurring within the Project Area, based on the presence of potential habitat.

Habitat within the Project Area

Habitat type	Habitat modelling criteria	Area (ha)	
		Project Area	Disturbance Footprint
Breeding	No breeding habitat occurs within the Project Area as it occurs outside of the species breeding range.	-	-
Foraging and dispersal	Select patches of remnant and regrowth RE 11.3.4, 11.3.25, 11.3.25b, 11.3.26, 11.8.4, 11.10.3, 11.10.4, 11.10.13, 11.11.3, 11.11.3c, 11.11.4, 11.11.4c, 11.11.10, 11.11.15, 11.12.1, 11.12.6, 11.12.17, 12.3.3 and 12.11.6. Habitat modelled within the Project Area has been restricted to areas that exclusively fall within the species predicted distribution as shown on SPRAT (SNES, 2025) (i.e. Sections A and part of B). Mistletoe presence/absence has been utilised, as determined by field data.	1778.7	9.0

Table 8.66 Assessment of Potential Project Impacts and Mitigation and Management Commitments for Painted Honeyeater

Potential Impact	Assessment	Mitigation Commitments
Direct		
Vegetation clearing causing habitat loss and fragmentation	The Project has been strategically designed to minimise clearing and fragmentation of habitat by collocating alongside and	• Identify MNES fauna habitat and individuals through pre-clearance surveys • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Disturbance activities must be contained to Disturbance Footprint • Habitat features to be relocated to adjacent areas

Potential Impact	Assessment	Mitigation Commitments
	existing transmission line corridor. Despite this, up to 9.0 ha of suitable painted honeyeater habitat may be cleared for the Project, which would result in a loss of habitat for the species, though this habitat is considered of limited importance for the species compared to more suitable higher quality habitat in nearby state forests.	• During the pre-clearance survey, the fauna spotter-catcher will locate, record and mark the habitat features (including those to be retained in situ) • Install tree protection to habitat trees immediately adjacent to areas of earthworks • Within suitable habitat for the painted honeyeater, micro-siting will aim to retain trees with heavy loads of suitable mistletoe (i.e. *Amyema* spp.) • Refer to Table 5.1 and Table 5.8 of the MNES Management Plan for further details on mitigation measures.
Injury or direct mortality	Construction works will involve the modification, disruption or removal of habitat for the species; therefore, injury or mortality is a risk associated with clearing activities.	• Appropriately qualified fauna spotter catcher to undertake pre-clearance habitat assessment and be present during clearing and disturbance to habitat features • Clearing must be staged, with non-habitat trees felled first • Tampering with an animal breeding place to be carried out in accordance with an approved Species Management Program • Clear delineation of habitat features to be retained • Habitat trees must be soft-felled • Refer to Table 5.3 of the MNES Management Plan for further details on mitigation measures.
Changes to habitat quality (degradation) and loss of key habitat resources	The Project is not expected to largely reduce the quality of habitat within the Project Area, given that this habitat is already highly fragmented and lower quality than adjacent habitat within State forests which would be more favourable to the species.	• Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed

Potential Impact	Assessment	Mitigation Commitments
		• Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • Dust suppression measures including vehicles restricted to approved tracks, cover all loose loads and set speed limits (<40 km/hr) • Application of dust suppressants as required • Dust generating activities will be limited on days with strong winds blowing towards sensitive receptors or dust sensitive locations • Regular monitoring and visual surveillance to trigger management actions will be undertaken • Bushfire Management Plan will be developed • Burning of vegetation strictly prohibited unless a permit is obtained • Designated parking areas for vehicles and machinery • During operation, vegetation within the Disturbance Footprint will be managed in accordance with Powerlink's vegetation specification • Refer to Table 5.4, Table 5.5 and Table 5.9 of the MNES Management Plan for further details on mitigation measures.
Vehicle strike	Vehicle collision has potential to cause injury or fatalities. The risk is greatest when high volumes of vehicle activity (including light and heavy vehicles) is occurring during the construction phase. During operation, traffic will be reduced so the risk is also comparatively reduced.	• Restrict vehicles to approved access tracks • Vehicle travelling speed restricted to <40 km/hr • Refer to Table 5.3 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Indirect		
Alterations to fire regimes including uncontrolled fires	Fire is not a listed direct threat to Painted Honeyeater, although is a potential indirect threat related to changs in fire frequency and intensity under climate change. Changes to fire frequency and intensity within the Project Area may lead to habitat degradation and loss of key resources (mistletoe). Although increased plant and vehicle presence during construction will result in an increased number of potential ignition sources, employment of standard construction protocols will ensure the risk of bushfire is actively managed.	• Bushfire Management Plan will be developed • Burning of vegetation strictly prohibited unless a permit is obtained • Designated parking areas for vehicles and machinery • During operation, vegetation within the Disturbance Footprint will be managed in accordance with Powerlink's vegetation specification • Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • Refer to Table 5.5 and Table 5.9 of the MNES Management Plan for further details on mitigation measures.
Increased incidence of predators	Increased competition with other species, particularly the noisy miner (*Manorina melanocephala*), and/or nest predation by other species, such as pied and grey butcherbirds (*Cracticus nigrogularis* and *C. torquatus*) is a possible consequence of clearing and fragmentation of	• All waste to be secured • Biosecurity Instrument Permit to be obtained for moving materials out of or within different biosecurity zones • Educate workforce in the identification of pest fauna species • Avoid inclusion of any water retaining voids or pits • Refer to Table 5.6 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
	habitat as a result of the Project. Populations of black rat have potential to increase as a result of the project, especially in relation to increased rubbish and food scraps. Black rat predates on painted honeyeater and outcompetes the species for resources.	
Noise, activity, artificial light and vibration generated during construction and operation interrupting foraging, breeding or dispersal behaviours	Construction activities will mostly occur during daylight hours (6.30 am to 6.30 pm), so as not to disturb potential roosting. As clearing will be staged, noise and vibration will be limited to discrete locations at the clearing front. Construction noise and vibration will primarily occur around infrastructure (not intact habitat). Artificial light could interfere with roosting and increase visibility of roosting birds to predators. Noise, activity, artificial light and vibration impacts in relation to operation would be negligible.	• Plant and equipment to be fitted with appropriate noise attenuation and maintained • Deliveries and removal of material and equipment to and from site within approved hours for construction • Plant to be turned off when not in use • No unnecessary use of horns or other audible signals on mobile plant or equipment • Machinery and equipment will be maintained in good working condition • Refer to Table 5.10 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Dust generated during construction activities disturbing behaviours or health/palatability of foraging resources	Dust emissions may result following construction activities and affect adjacent habitat. Dust can settle on adjacent vegetation, coating leaves and reducing photosynthesis, respiration, and growth. Dust clouds may also pose a respiratory risk to fauna and cause temporary disorientation.	• Dust suppression measures including vehicles restricted to approved tracks, cover all loose loads and set speed limits (<40 km/hr) • Application of dust suppressants as required • Dust generating activities will be limited on days with strong winds blowing towards sensitive receptors or dust sensitive locations • Regular monitoring and visual surveillance to trigger management actions will be undertaken • Refer to Table 5.4 of the MNES Management Plan for further details on mitigation measures.

Table 8.67 Significant Impact Assessment: Painted Honeyeater

Impact Criteria	Assessment
Lead to a long-term decrease in the size of an important population of a species	**Unlikely.** The painted honeyeater has not been recorded within the Project Area, despite significant survey effort. It is conservatively considered to potentially occur within the Project Area due to the presence of suitable habitat and ALA records within the broader region. During the winter, the painted honeyeater is more likely to be found in the north of its distribution, which may explain the scattered records around the Project Area. Suitable habitat within the Project Area is generally degraded and likely to only be utilised opportunistically when resource availability in the wider region is limited. As this species typically breeds south of Roma, Queensland, no breeding habitat is modelled within the Project Area. Direct impacts to potential habitat are limited to clearing of 9.0 ha of foraging and dispersal habitat. This loss of habitat is considered unlikely to significantly reduce the species' ability to persist in the local area given habitat within the adjacent State forests would likely be preferred habitat. Following the mitigation measures outlined in the MNES Management Plan will assist to minimise potential indirect impacts of the Project, such as habitat degradation from increased dust, edge effects, weeds and temporary altered hydrology. Further, any population utilising habitat within the Project Area is not considered an important population. Therefore, a long-term decrease in the size of an important population of this species is unlikely as a result of the Project.

Impact Criteria	Assessment
Reduce the area of occupancy of an important population	**Unlikely.** The area of occupancy for the species is estimated to be 1,000 km^2 (S. Garnett et al., 2011). Habitat mapping has identified a total of 9.0 ha of foraging and dispersal habitat to be directly impacted by vegetation clearing. This species is highly nomadic and the landscape in which the Project Area occurs is already highly disturbed, with many patches of habitat highly fragmented by pastures and the existing transmission line corridor. Further, any population utilising the Project Area is not considered an important population. Given the extent of habitat in the region and the relatively small amount of habitat being impacted within the Project Area, it is considered unlikely the Project will reduce the area of occupancy of any important population.
Fragment an existing important population into two or more populations	**Unlikely.** The painted honeyeater is a highly mobile species which undertakes large seasonal movements within Australia. Potential habitat within the Project Area is already highly fragmented due to historical clearing and the existing transmission line corridor. Given the ability for this species to readily disperse across the landscape, vegetation clearance required for the Project is unlikely to present barriers to this species local movement, to the extent that it fragments any population of this species within the broader region.
Adversely affect habitat critical to the survival of a species	**Unlikely.** As aforementioned, the potential habitat within the Project Area is not considered critical to the survival of the species as it is unlikely to provide a refuge for the species and is not necessary for life-cycle requirements or maintaining genetic diversity. Mapped potential habitat within the Project Area is highly fragmented and likely to only be utilised temporarily due to its marginal quality. Direct impacts to potential habitat are limited to clearing of 9.0 ha of foraging and dispersal habitat. This loss of habitat is considered unlikely to significantly reduce the species' ability to persist in the local area given habitat within the adjacent State forests is likely to be preferred. Indirect impacts on potential habitat for the species will be actively mitigated in accordance with the MNES Management Plan. Therefore, the Project is unlikely to adversely affect any habitat critical to the survival of the species.
Disrupt the breeding cycle of an important population	**Unlikely.** The Project Area is not situated within the primary known breeding area of the species, which is on the inland slopes of the Great Dividing Range, south of Roma, Queensland. Therefore, the Project is unlikely to disrupt the breeding cycle of a population.

Impact Criteria	Assessment
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely.** Mapped habitat within the Project Area is fragmented and disturbed, with the presence of exotic pasture grasses and grazing. A maximum of 9.0 ha of foraging and dispersal habitat for Painted Honeyeater will be directly impacted by the Project. This habitat is not considered highly unique or critical for refuge, and more suitable habitat of similar characteristics, quality, and condition is prevalent within the broader region. Potential indirect impacts on retained habitat such as degradation from dust, edge effects, weed invasion, and temporary changes to hydrology will be actively managed through targeted measures, including erosion and sediment control, dust suppression, and weed and pest management. Given that the species likely only infrequently utilises areas within the Project Area and is capable of moving across the landscape, the Project is unlikely to modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**Unlikely.** Predation by black rat is considered to be a threat to the species (Threatened Species Scientific Committee, 2015a). This species was observed during the field surveys, and numbers are expected to fluctuate according to seasonal conditions. Rats may pose a threat to the species during plague periods. Appropriate biosecurity controls and weed washdown procedures will be adhered to as outlined within Table 5.5 and 5.6 of the MNES Management Plan.
Introduce disease that may cause the species to decline	**Unlikely.** Disease has not been identified as a threat to the species. The Project will follow best practice construction and operational methods; therefore, introduction of a disease that may cause the species to decline is unlikely.

Impact Criteria	Assessment
Interfere substantially with the recovery of the species	**Unlikely.** A *National Recovery Plan for the Painted* Honeyeater was published in 2021 (Department of Agriculture, Water and the Environment, 2021b). The six main strategies for the recovery of the species are: • Protect, manage and restore painted honeyeater breeding and foraging habitats at the local, regional and landscape scales. • Monitor, reduce and manage threats and sources of mortality. • Develop and apply techniques to measure changes in population trajectory in order to measure the success of recovery actions. • Improve understanding of habitat use at a landscape scale in order to better target protection and restoration measures. • Engage local communities and stakeholders in painted honeyeater conservation. • Coordinate, review and report on recovery progress. The foraging and dispersal habitat which occurs within the Project Area is considered to have negligible importance for the species in the long-term or on a population scale. As the Project Area lacks the large contiguous tracks of vegetation preferred by this species, the painted honeyeater is likely to be an infrequent visitor to the Project Area, potentially only present during the winter when individuals move towards the north of their range. The Project will not result in disruptions to breeding cycles and existing threats to the species are unlikely to be increased. As such, the Project is considered unlikely to interfere substantially with the recovery of the species.
Significant Residual Impact	**Unlikely to have a significant impact**

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FIGURE 8.21-1

Painted Honeyeater Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

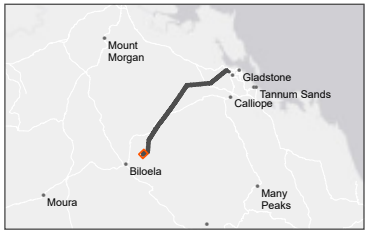
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Painted Honeyeater Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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FIGURE 8.21-2

Painted Honeyeater Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

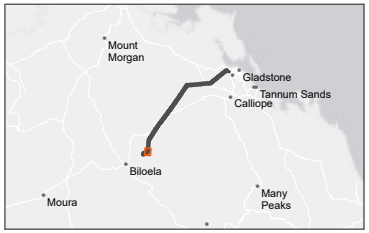
- Watercourse
- Field Survey Extent
- Project Area

Painted Honeyeater Habitat

- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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Kilometres

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FIGURE 8.21-3

Painted Honeyeater Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

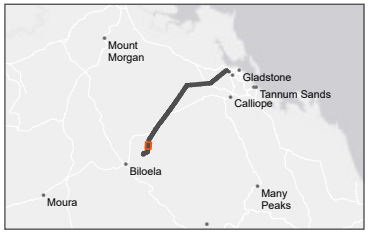
- Field Survey Extent
- Project Area

Painted Honeyeater Habitat

- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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Kilometres

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FIGURE 8.21-4

Painted Honeyeater Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

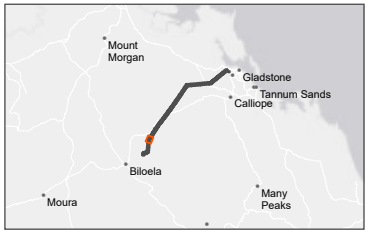
- Field Survey Extent
- Project Area

Painted Honeyeater Habitat

- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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Kilometres

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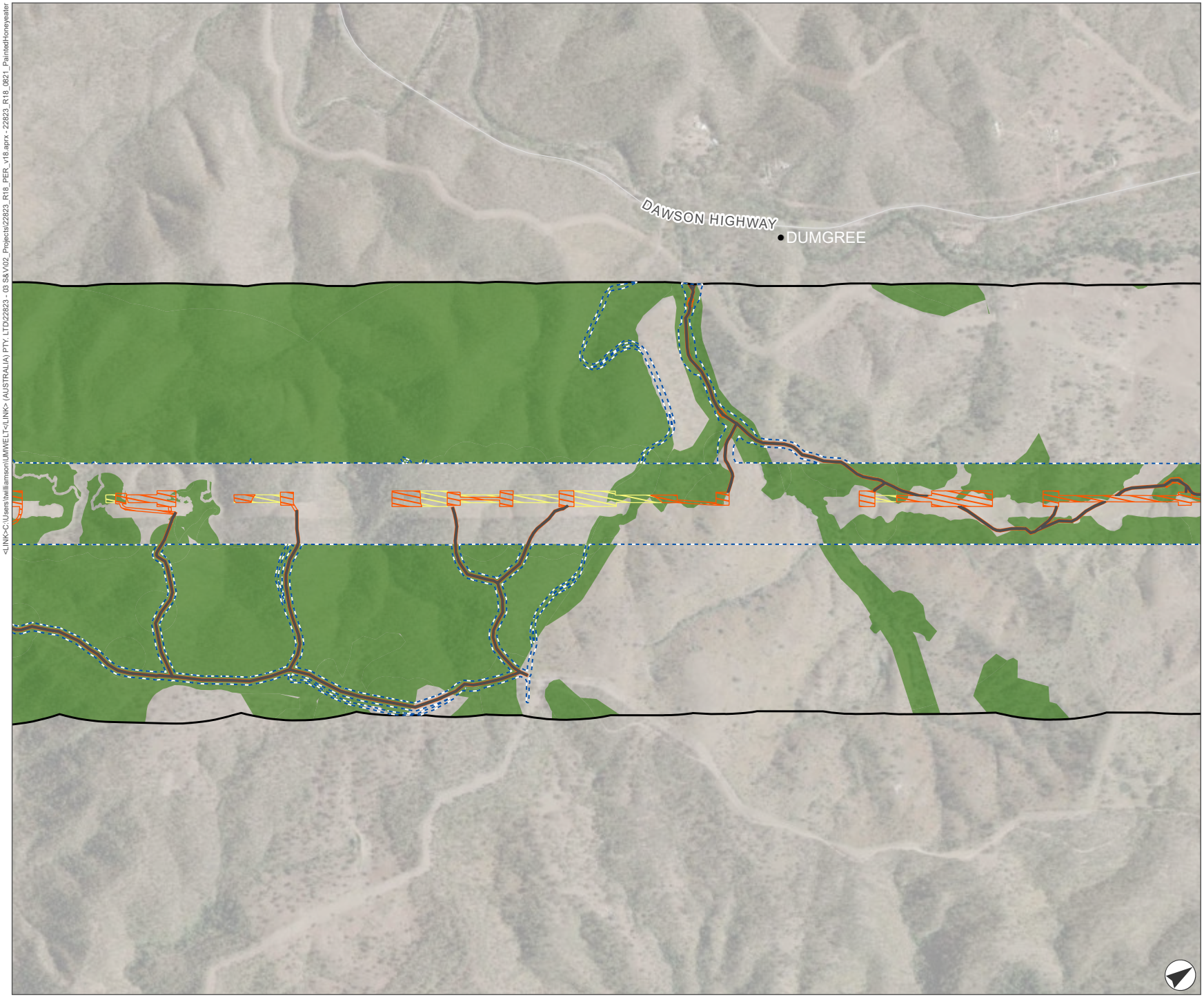


FIGURE 8.21-5

Painted Honeyeater Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

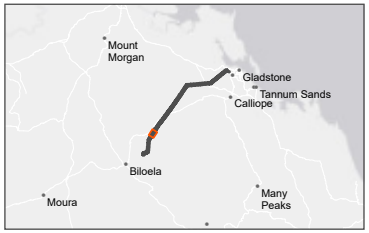
- Roads
- Field Survey Extent
- Project Area

Painted Honeyeater Habitat

- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
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FIGURE 8.21-6

Painted Honeyeater Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

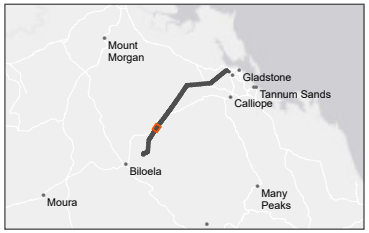
- Roads
- Watercourse
- Field Survey Extent
- Project Area

Painted Honeyeater Habitat

- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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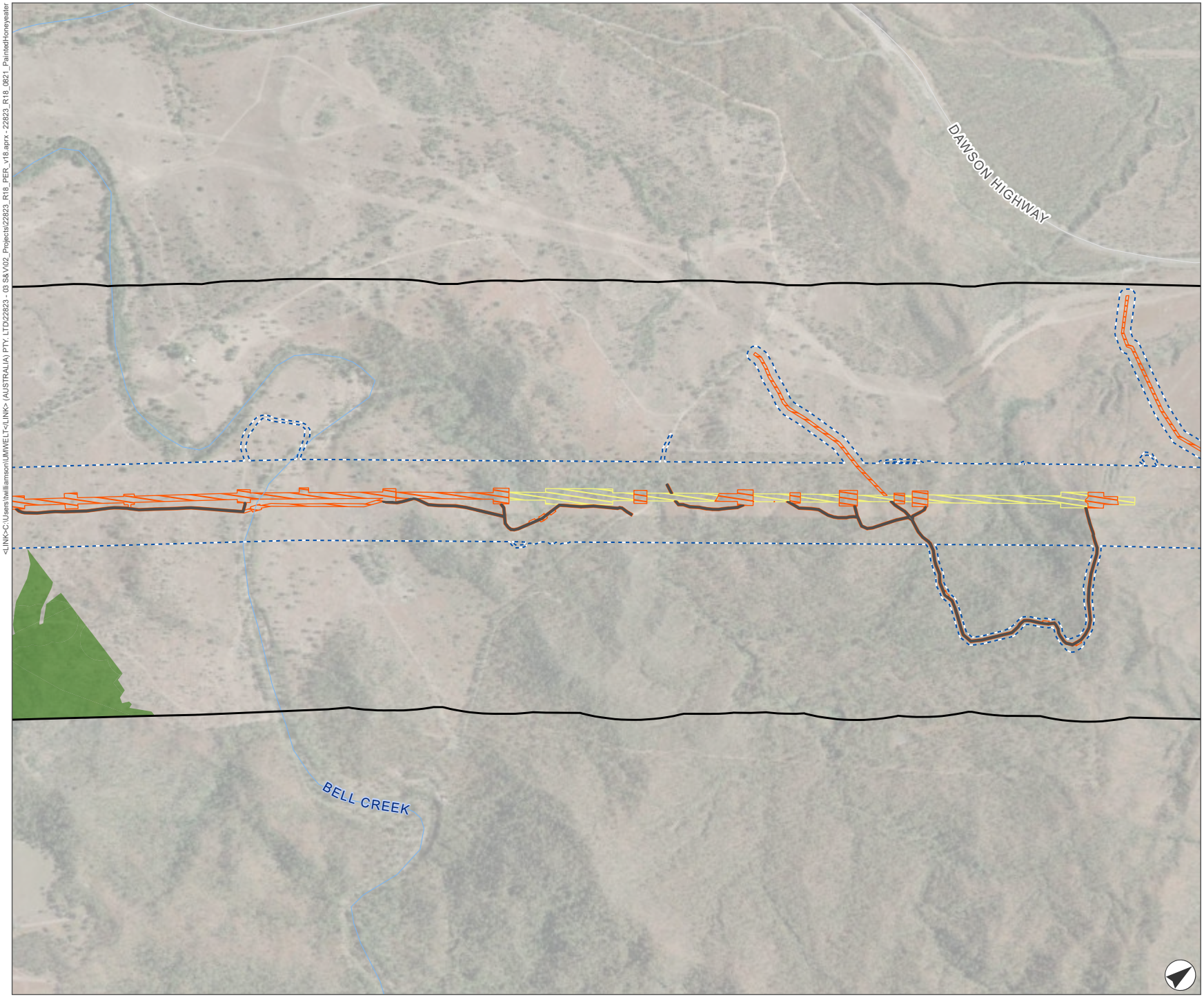


FIGURE 8.21-7

Painted Honeyeater Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

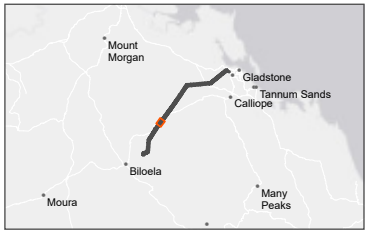
- Roads
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- Field Survey Extent
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Painted Honeyeater Habitat

- Foraging and dispersal

Disturbance Footprint

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8.2.7.8 Squatter Pigeon (southern) (*Geophaps scripta scripta*)

Table 8.68 Squatter Pigeon (Southern): Ecology and Relevance to the Project Area

Squatter Pigeon	
Profile	**Conservation status** Vulnerable **Distribution** Squatter pigeon (southern) occurs on the inland slopes of the Great Dividing Range, from the Burdekin-Lynd Divide in central Queensland, south to West Wyalong in northern New South Wales. As per the species SPRAT, the known distribution is estimated to occur within the latitudes, 17° to 30° S, and the longitudes, 141° to 153° 30' E (Department of Climate Change, Energy, the Environment and Water 2025g). As per the distribution map on SPRAT, the Project Area occurs in the central part of the subspecies range, in the 'likely to occur' extent. North of the Carnarvon Ranges in Central Queensland and possibly in the area between Injune and the Carnarvon Ranges, the species is relatively common and likely to comprise a single, continuous sub-population. Populations in the southern parts of the subspecies' distribution however (i.e. south of Injune and Tin Can Bay, Queensland and New South Wales) are largely fragmented and isolated; in these areas there have also been noticeable disappearances. The southern boundary of the known distribution of the squatter pigeon (southern) is contracting northwards (Department of Climate Change, Energy, the Environment and Water 2025g). **Important Population** Important populations of the squatter pigeon (southern) are identified on SPRAT. As the southern boundary of the subspecies distribution is contracting northwards, important populations are identified as all of the relatively small, isolated and sparsely distributed sub-populations occurring south of the Carnarvon Ranges in Central Queensland (Threatened Species Scientific Committee, 2015c). This includes, but is not limited to: • Populations occurring in the Condamine River catchment and Darling Downs of southern Queensland • The populations known to occur in the Warwick-Inglewood-Texas region of southern Queensland • Any populations potentially occurring in northern New South Wales. As habitat within the Project Area is highly connected in the wider landscape, there is no evidence to indicate that the population present is genetically isolated. Further, the Project Area does not occur within New South Wales or near the limit of the subspecies' distribution. Based on this, any population of individuals utilising the Project Area are not considered an important population. **Historical records within the desktop search extent** The most recent WildNet record within the search extent dates from 2018, approximately 4.8 km north of Section C at Aldoga. There is numerous ALA records scattered along the Project Area, with a large number around Harper Creek 3 km south of Section B and additional records near Sections A, D and E (ALA, 2025). **Habitat**

Squatter Pigeon

The subspecies is known to access suitable waterbodies to drink on a daily basis, including permanent or seasonal rivers, creeks, lakes, ponds and waterholes, and artificial dams. The subspecies prefers to drink where there is gently sloping, bare ground on which to approach and stand at the water's edge.

The requirements for breeding and foraging habitat are well defined. Breeding habitat comprises remnant or regrowth open-forest to sparse, open-woodland or scrub dominated by *Eucalyptus*, *Corymbia*, *Acacia* or *Callitris* spp., on sandy or gravelly soils (predominantly areas mapped as Queensland land zones 3, 5 or 7) within 1 km of a suitable waterbody (Department of Climate Change, Energy, the Environment and Water 2025g). Foraging habitat is almost identical, however occurring within 3 km of a suitable waterbody. As described on SPRAT, the ground layer vegetation in foraging and breeding habitat is typically very patchy consisting of native, perennial tussock grasses or a mix of perennial tussock grasses and low shrubs or forbs. This patchy, ground layer of vegetation rarely exceeds 33% of the ground area. The remaining ground surface consisting of bare patches of gravelly or dusty soil and areas lightly covered in leaf litter and coarse, woody debris (e.g. fallen trees, logs and smaller debris) (Department of Climate Change, Energy ,the Environment and Water 2025g).

Although breeding can occur throughout the year if conditions are good, breeding generally coincides with the dry season (April to October) when their primary food source (grass seed) is most abundant. The nest is a depression scraped into the ground beneath a tussock of grass, bush, fallen tree or log and is sparsely lined with grass.

Squatter pigeon (southern) dispersal habitat is any forest or woodland occurring between patches of foraging or breeding habitat, and suitable waterbodies. Such patches facilitate the local movement of the subspecies between patches of foraging habitat, breeding habitat and/or waterbodies, or the wider dispersal of individuals in search of reliable water sources during the dry season or droughts. The subspecies may also move across cleared or degraded land between remnant trees or patches of habitat that does not exceed 100 m (Department of Climate Change, Energy, the Environment and Water 2025g).

Habitat critical to the survival of the species

There are no species-specific guidelines for determining habitat critical to the survival of squatter pigeon (southern) and at present no recovery plan exists. However, the Significant Impact Guidelines 1.1–MNES (Department of the Environment, 2013a) define habitat critical to the survival of a species or ecological community as 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
- For the reintroduction of populations or recovery of the species or ecological community.

Potential habitat for this species has identified areas categorised as breeding, foraging and dispersal habitat across the Project Area. Whilst these areas provide a sufficient availability of suitable resources for the species ecological requirements, they are still impacted by threatening processes that are a key contributor to the species ongoing threatened status. This includes the persistence of feral species, weed infestation, ongoing maintenance due to the existing transmission line and fragmented patches of habitat. Therefore, habitat within the

Squatter Pigeon

Project Area is not considered a refuge for squatter pigeon (southern) and is not considered to contain any unique characteristics or conditions that do not exist in other areas of habitat that occur in the region. In addition, a large extent of habitat for squatter pigeon (southern) occurs in the surrounding State forests, which is considered better quality and is afforded a higher level of protection than the Project Area.

Based on these factors, habitat within the Project Area is not considered critical to the survival of squatter pigeon (southern) and is not considered to play a critical role in the long-term maintenance of the species.

Current threats to the species

The key threats to the subspecies are the loss and fragmentation of habitat, the degradation of habitat by overgrazing by domesticated herbivores, habitat degradation by invasive weeds such as buffel grass (*Cenchrus ciliaris**), and predation by invasive fauna including the European fox (*Vulpes vulpes**) and feral cat (*Felis catus**). Feral cats and European foxes are likely to have the greatest impact upon the squatter pigeon (southern) population. For example, cats were implicated in the decline of squatter pigeon (southern) sub-populations in the Duaringa and Murphy's Creek districts in south-eastern Queensland and most declines in sub-populations have occurred in areas where European foxes are highly abundant (Department of Climate Change, Energy, the Environment and Water 2025g).

Recovery plans

There is presently no published recovery plan for the squatter pigeon.

In the Project Area

Surveys

422 habitat assessments were undertaken within the Project Area. Diurnal bird surveys were undertaken throughout all field surveys. Walking surveys/flushing in suitable habitat. Tracks, watercourses and water bodies (farm dams) were targeted whilst surveying to detect the squatter pigeon (southern). Active searches for feathers and nests undertaken at each habitat assessment site.

Species occurrence

A total of 53 squatter pigeons (southern) were recorded within and adjacent to the Project Area, 33 of which occurred within the Project Area. They were recorded within Sections A to D, typically in the low-lying areas. The largest flock recorded was 11 individuals. Based on the habitat requirements defined above, excluding SEVT), mangrove communities and saltpan vegetation, all remnant, regrowth and non-remnant vegetation communities within the Project Area are anticipated to provide some form of potential habitat for the subspecies. Wetlands and dams are relatively common and occur in scattered locations across the Project Area. All have conservatively been considered suitable for the squatter pigeon (southern), as well as watercourses stream order 3 or higher.

Due to the prevalence of potentially suitable water sources within the Project Area and the surrounds, most woodlands and open forests on land zone 3 are considered potential breeding habitat where they occur within 1 km of permanent water. All remaining areas of woodlands and open forests on land zone 3 are considered suitable for foraging when they occur within 3 km of permanent or ephemeral water. Remaining vegetation communities (excluding SEVT, mangroves and saltpan vegetation) are considered suitable for dispersal. Potential dispersal habitat areas that are isolated in the landscape and not located in proximity (within 100 m) to an area of potential breeding or foraging habitat were removed.

Squatter Pigeon

The nearby State forests such as the Don River State Forest, the Maxwelton State Forest and the Mount Stowe State Forest, are all expected to provide large areas of suitable habitat for the species and are functionally connected to the Project Area. While barriers to movement exist in as existing roads and fences, the dispersal of the squatter pigeon (southern) between these areas is likely to be high.

Habitat within the project area

Habitat type	Habitat modelling criteria	Area (ha)	
		Project Area	Disturbance Footprint
Breeding	Select patches of REs1 11.3.25, 11.3.25b, 11.3.26, 11.3.4 and 12.3.3, in remnant or regrowth condition, within 1 km of a suitable permanent watercourse/waterbody.	238.9	14.4
Foraging	Select patches of REs1 11.3.25, 11.3.25b, 1.3.26, 11.3.4 and 12.3.3, in remnant or regrowth condition, within 3 km of a suitable permanent or seasonal watercourse/waterbody.	13.8	0.9
Dispersal	REs not mapped as breeding or foraging (excluding 11.11.18, 11.10.8, 12.1.2 and 12.1.3). Select patches of REs include: 11.8.4, 11.10.3, 11.10.4, 11.10.13, 11.11.3, 11.11.3c, 11.11.4, 11.114c, 11.11.10, 11.11.15, 11.12.1, 11.12.6, 11.12.17, 12.11.6 in remnant, regrowth and non-remnant condition. Select patches of non-remnant forests and woodlands and areas of cleared land.	5,592.0	137.0

Table 8.69 Assessment of Potential Project Impacts and Mitigation and Management Commitments for Squatter Pigeon (Southern)

Potential Impact	Assessment	Mitigation Commitments
Direct		
Clearing of vegetation and removal of habitat	Although vegetation clearance is a known threat to the species, it is not anticipated that impacts from the Project would result in isolation of populations of this species due to habitat fragmentation. The species is capable of moving between widely separated habitat patches, including	• Identify MNES fauna habitat and individuals through pre-clearance surveys • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Disturbance activities must be contained to Disturbance Footprint subject to minor micro-siting within the Field Survey Extent • Refer to Table 5.1 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
	across open forest and cleared agricultural land. Connectivity within and to adjacent vegetated areas will be largely maintained and the extent of clearing would not result in a barrier to movement for the species.	
Injury or direct mortality	Construction works will involve the modification, disruption or removal of habitat for the species; therefore, injury or mortality is a risk associated with clearing activities.	• Appropriately qualified fauna spotter catcher to undertake pre-clearance habitat assessment and be present during clearing and disturbance to habitat features • Tampering with an animal breeding place to be carried out in accordance with an approved Species Management Program • Clear delineation of habitat features to be retained • Restrict vehicles to approved access tracks • Vehicle travelling speed restricted to <40 km/hr • Excavations must be secured (e.g. covered) • Nests marked during pre-clearance surveys • Active nests to be managed in accordance with high risk Species Management Program • Flushing of habitat immediately prior to clearing • Refer to Table 5.3 of the MNES Management Plan for further details on mitigation measures.
Increased risk of vehicle or plant collision resulting in mortality.	Injury or mortality from vehicle strike is a potential impact to this species and is a possibility given the activity and movement of machinery associated with construction. It should be noted that this impact will be largely associated with the current point of construction (localised) and will not encompass the full breadth of the project at any single point in time.	• Restrict vehicles to approved access tracks • Vehicle travelling speed restricted to <40 km/hr • Nests marked during pre-clearance surveys • Active nests to be managed in accordance with high risk Species Management Program • Flushing of habitat immediately prior to clearing • Refer to Table 5.3 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Indirect		
Reduced or lost habitat connectivity	An existing transmission line is currently in operation within the Project Area. The Project is to be situated directly adjacent limiting additional fragmentation. In several patches of suitable habitat, Project refinement has ensured that these areas will be over spanned limiting impacts to connectivity.	• Habitat features to be relocated to adjacent areas • Retain habitat trees in-situ (e.g. habitat tree to be stem injected and left in easement) • Implement controls to prevent introduction or spread of weeds that may degrade MNES species • Refer to Table 5.7 of the MNES Management Plan for further details on mitigation measures.
Incursion of weeds may alter the presence, quality and structure of microhabitat features for use by the species.	Exotic grasses fringing vine thicket were often noted within the Project Area. Weed occurrence is widespread in the Project Area and exotic pasture grasses are often actively promoted by landholders to produce fodder for grazing. Further degradation of macro and microhabitat features may occur because the promotion of pasture grasses is likely to continue. Construction activities may also promote the distribution of exotic weed species through ineffective washdown protocols.	• Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • Refer to Table 5.5 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Increased accessibility and incursion of feral species	Predators such as feral cats are a known threat to the predominantly ground dwelling species and were observed during field surveys. The widening of access tracks may promote easier access for introduced predators; however, feral species already exist within the Project Area and the movement of predators from neighbouring areas is highly likely. Further degradation of macro and microhabitat features may occur because of incursion by other feral and non-native species including cattle and feral pigs.	• All waste to be secured • Biosecurity Instrument Permit to be obtained for moving materials out of or within different biosecurity zones • Educate workforce in the identification of pest fauna species • Avoid inclusion of any water retaining voids or pits • Refer to Table 5.6 of the MNES Management Plan for further details on mitigation measures.
Noise, activity and vibration generated during construction and operation may temporarily or permanently displace individual	Construction activities will mostly occur during daylight hours (6.30 am to 6.30 pm), to avoid disturbance during roosting. As clearing will be staged, noise will be limited to discrete locations at the clearing front. Construction noise will primarily occur around infrastructure (not intact habitat). Noise in relation to operation is negligible.	• Plant and equipment to be fitted with appropriate noise attenuation and maintained • Deliveries and removal of material and equipment to and from site within approved hours for construction • Plant to be turned off when not in use • No unnecessary use of horns or other audible signals on mobile plant or equipment • Machinery and equipment will be maintained in good working condition • Refer to Table 5.10 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Alterations to fire regimes and potential for increased accidental bushfire that may result from construction and/or operation.	Changes to fire frequency within the Project Area may impact on habitat and lead to degradation. Construction activities are unlikely to significantly alter existing grazing pressure or the implementation of land management practices currently employed by a landholder. Although the increased plant and vehicle presence will result in an increased number of potential ignition sources, employment of standard construction protocols will ensure the risk of bushfire is actively managed.	• Bushfire Management Plan will be developed • Burning of vegetation strictly prohibited unless a permit is obtained • Designated parking areas for vehicles and machinery • During operation, vegetation within the Disturbance Footprint will be managed in accordance with Powerlink's vegetation specification • Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • Refer to Table 5.5 and Table 5.9 of the MNES Management Plan for further details on mitigation measures.

Table 8.70 Significant Impact Assessment: Squatter Pigeon (Southern)

Impact Criteria	Assessment
Lead to a long-term decrease in the size of an important population of a species	**Unlikely.** The squatter pigeon (southern) is known from the Project Area and surrounds, primarily recorded in cleared non-remnant vegetation. Individuals within the Project Area are not considered to comprise an important population. There is no evidence to indicate that the population present is genetically isolated, and the Project Area does not occur within New South Wales or near the limit of the subspecies' distribution. A maximum of 152.3 ha of suitable habitat including 14.4 ha of breeding habitat, 0.9 ha of foraging habitat, and 137.0 ha of dispersal habitat will be directly impacted via vegetation clearing required for construction of the Project. Existing threats are

Impact Criteria	Assessment
	degrading habitat quality due to the presence of cattle, weeds and pests including feral cat, which were recorded during the field survey program. Nonetheless, direct impacts to habitat will be minimised wherever possible and the final clearing areas are expected to be smaller than the area being assessed. Farm dams will be maintained to ensure the availability of suitable water sources required by the species is not affected by the Project. The quantum of habitat that will remain following construction of the Project, particularly breeding and foraging habitat, will be sufficient to maintain the population present. As the subspecies is predominantly ground-dwelling and known to frequent tracks, there is a risk of mortality during construction as a result of vehicle/plant strike. To manage this risk, speed limits will be strictly enforced and pre-clearance surveys will include flushing for the subspecies in areas of habitat to be cleared. Potential indirect impacts on the species including habitat degradation via weed and pest incursion will be actively managed via the MNES Management Plan Given the implementation of the MNES Management Plan, it is considered unlikely that the Project will lead to a long-term decrease in the population.
Reduce the area of occupancy of an important population	**Unlikely.** The squatter pigeon (southern) occurs across a large portion of eastern Queensland. It's area of occupancy was estimated to be 10,000 km^2 (1,000,000 ha) in 2000. However, it is noted that this estimate may be potentially overstated given the low resolution in the mapping methodology used by the Commonwealth (2 km x 2 km grid). During the field survey program, the subspecies was recorded in highly disturbed areas from continued maintenance under the existing transmission line and ongoing cattle grazing activities. Only 14.4 ha and 0.9 ha of breeding habitat and foraging habitat will be impacted by the Project, respectively. The remainder of impact (137.0 ha) is considered to be dispersal habitat only and is largely made up of non-remnant vegetation. As aforementioned, the population of squatter pigeon (southern) within the Project Area is not considered an important population. Therefore, the Project is unlikely to reduce the area of occupancy of any population including an important population.
Fragment an existing important population into two or more populations	**Unlikely.** As described above, individuals that occur within the Project Area are not considered to comprise an important population. The squatter pigeon (southern) is considered highly mobile and was recorded in highly disturbed and cleared areas within the Project Area, highlighting the subspecies' ability to utilise fragmented landscapes. The Project has been strategically sited to maximise the use of cleared areas, minimising additional habitat fragmentation including within breeding and foraging habitat, which are likely important for the population's persistence in the area. Given the linear nature of the Project and the high dispersal ability of the subspecies, the loss of potential habitat as a result of the Project is unlikely to present significant barriers to movement.

Impact Criteria	Assessment
Adversely affect habitat critical to the survival of a species	**Unlikely.** As described above, the habitat within the Project Area is not considered critical to the survival of the subspecies as it is unlikely to provide a refuge for the species and is average in quality, subject to ongoing impacts from recognised threatening processes. Only 14.4 ha and 0.9 ha of breeding habitat and foraging habitat will be impacted by the Project, respectively. The remainder of impact (137.0 ha) is considered to be dispersal habitat only since the majority of the Project Area occurs on land zone 11 (not considered suitable for breeding or foraging). The dispersal habitat is also made up of large areas of non-remnant vegetation. Therefore, the Project is unlikely to adversely affect habitat critical to the survival of the species.
Disrupt the breeding cycle of an important population	**Unlikely.** Squatter pigeon (southern) may breed throughout the year if conditions are suitable. Within the Project Area, breeding habitat for the subspecies is of average quality and is limited. As described above, individuals that occur within the Project Area are not considered to comprise an important population. Although 14.4 ha of breeding habitat will be impacted via vegetation clearing, the actual clearing required may be reduced. Some vegetation adjacent to the transmission line may remain in place if it does not violate the exclusion zones. Specific mitigation measures are also proposed to ensure no squatter pigeon (southern) nests are impacted during construction, including nest searches during pre-clearance surveys and demarcating any located. Active animal breeding places will only be tampered with under an approved Species Management Program issued by the Queensland Government. Additionally, to reduce vehicle or plant collision or crushing of nests, vehicles will be restricted to approved and mapped access tracks with speed limits restricted (<40 km/hr unless specified) on unsealed and off-road access tracks. The Project is therefore unlikely to disrupt the breeding cycle of an important population.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely.** As described above, vegetation clearing required for construction of the Project will result in direct impacts to a maximum of 152.3 ha of suitable habitat. The majority of habitat to be impacted is suitable for dispersal only (137.0 ha). The quantum of breeding, foraging and dispersal habitat that will remain following construction is expected to be sufficient to support the population present. The subspecies is known to utilise fragmented landscapes and important habitat resources (suitable water sources) will be maintained. Potential indirect impacts on the species including habitat degradation via weed and pest incursion will be actively managed in accordance with the MNES Management Plan. Therefore, the Project is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Impact Criteria	Assessment
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**Unlikely.** Invasive species including weeds and predators such as the feral cat were recorded throughout the field survey program. Historical clearing has occurred in discrete locations across the Project Area primarily for cattle grazing purposes, and ongoing maintenance currently occurs within the existing transmission line. It is considered likely that these areas already act as conduits for pest movement in the landscape. Appropriate biosecurity and weed washdown procedures will be adhered to as outlined within Table 5.5 of the MNES Management Plan. Based on this, it is unlikely the Project will result in invasive species that are harmful to the squatter pigeon (southern) becoming established.
Introduce disease that may cause the species to decline	**Unlikely.** There are no known diseases affecting the subspecies. Nonetheless, the Project will follow best practice biosecurity protocols during both construction and operation; therefore, introduction of a disease is unlikely.
Interfere substantially with the recovery of the species	**Unlikely.** The Australian Minister for the Environment has declared that a national recovery plan for the squatter pigeon (southern) is not required; however current threats to this species include loss and fragmentation of habitat due to clearing for agricultural purposes, the degradation of habitat by overgrazing by domesticated herbivores, the degradation of habitat by invasive weeds, and predation by numerous avian and terrestrial predators. The Project is highly unlikely to interfere with any of the above actions. Although clearing will occur within areas of potentially suitable habitat, the majority of the area to be impacted comprises habitat suitable for dispersal only. Construction of the Project is unlikely to change the subspecies utilisation of the Project Area or limit its success in the region. Therefore, the Project is unlikely to interfere with the recovery of the subspecies.
Significant Residual Impact	**Unlikely to have a significant impact**

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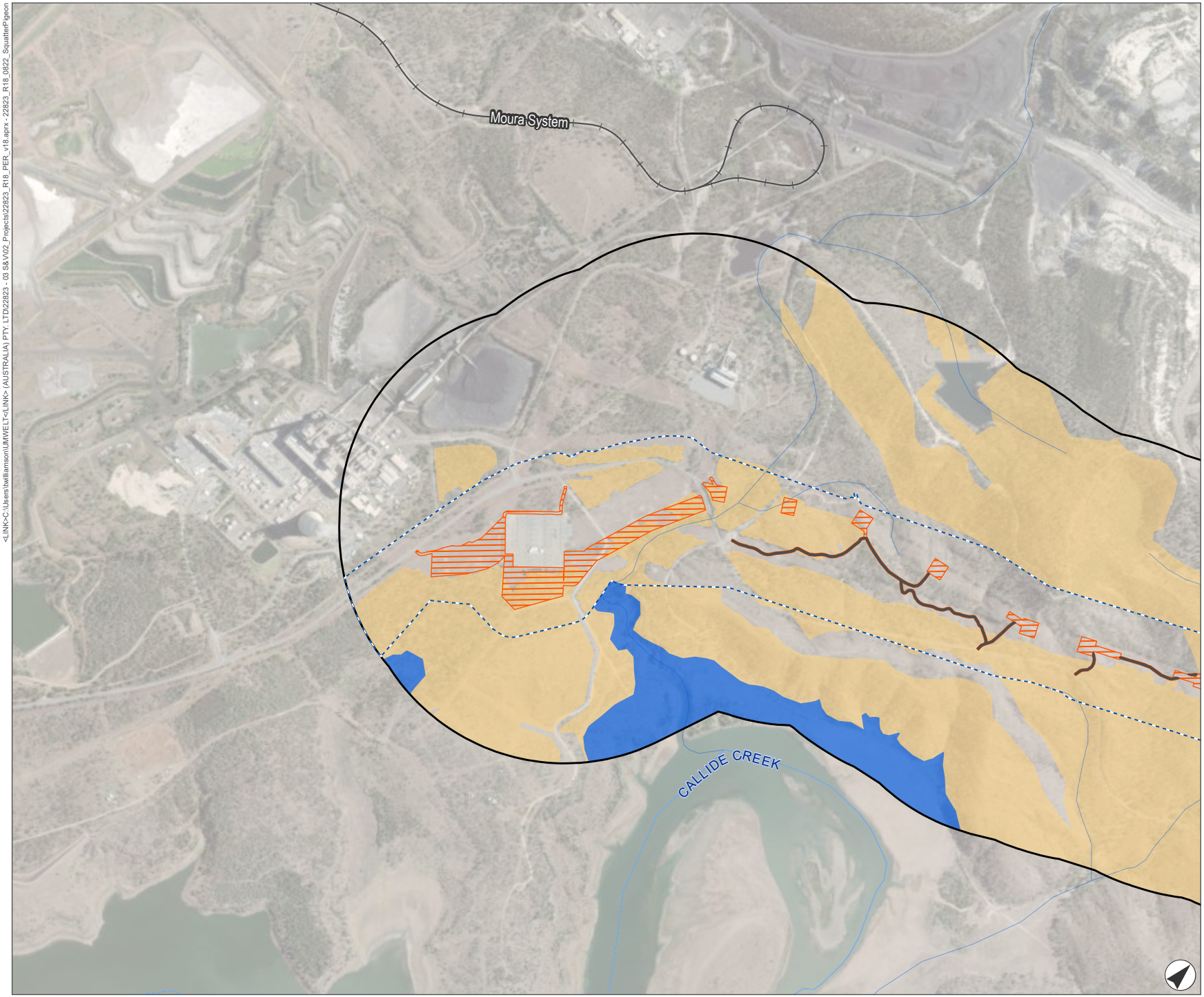


FIGURE 8.22-1

Squatter Pigeon Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

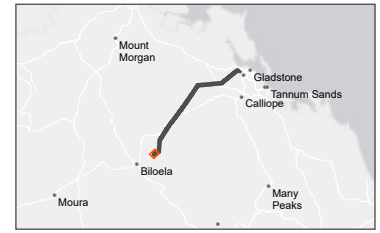
- Railway
- Watercourse
- Farm Dams, Reservoirs and Waterholes
- Field Survey Extent
- Project Area

Squatter Pigeon Habitat

- Dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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Kilometres

Scale 1:20,000 at A4
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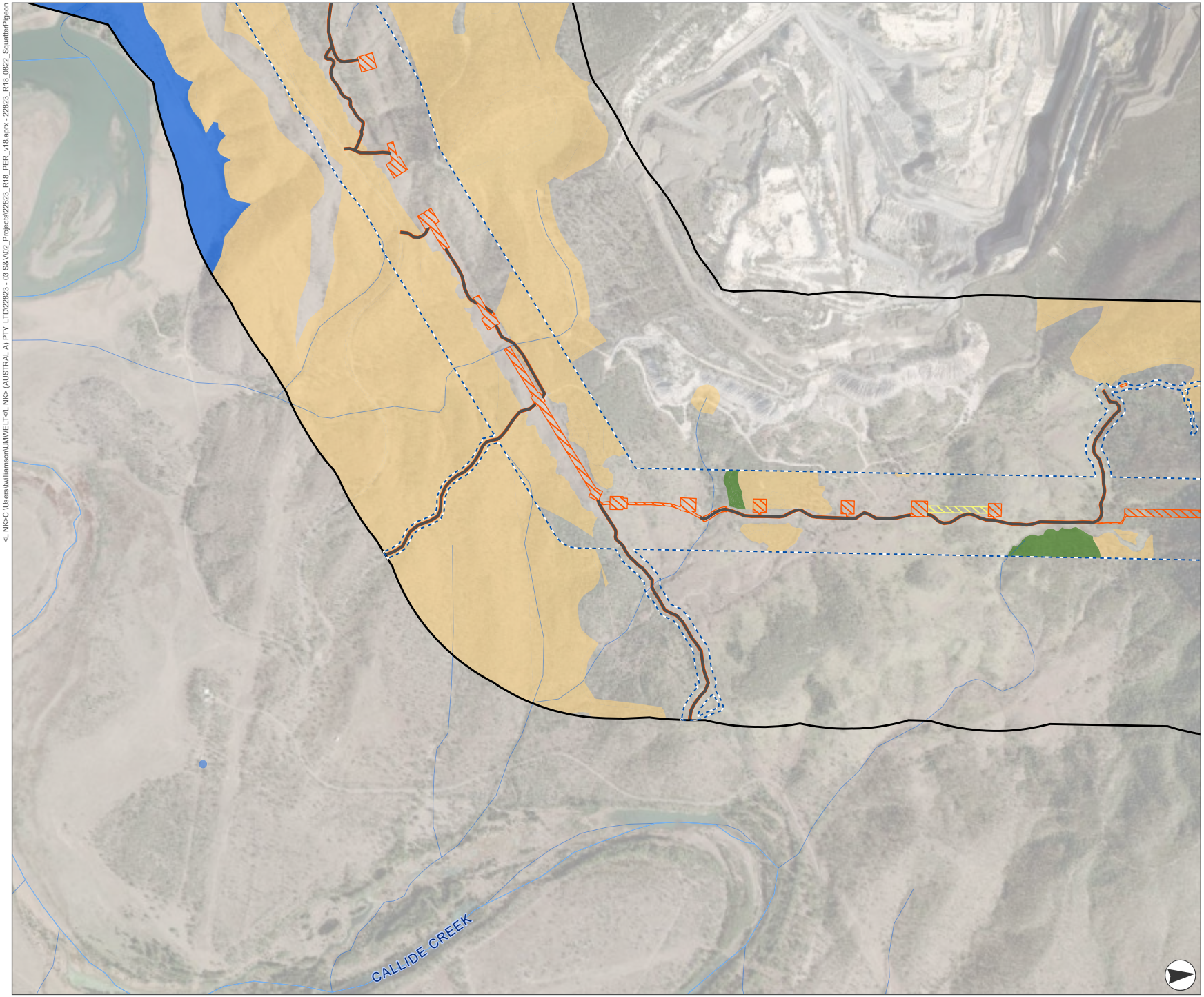


FIGURE 8.22-2

Squatter Pigeon Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

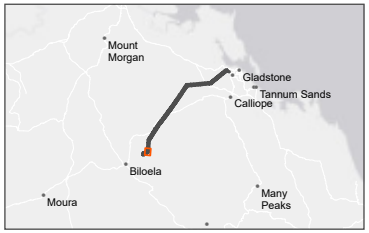
- Watercourse
- Farm Dams, Reservoirs and Waterholes
- Field Survey Extent
- Project Area

Squatter Pigeon Habitat

- Breeding
- Dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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FIGURE 8.22-3

Squatter Pigeon Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

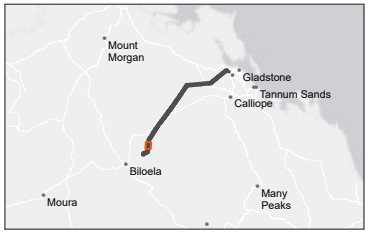
- Farm Dams, Reservoirs and Waterholes
- Field Survey Extent
- Project Area

Squatter Pigeon Habitat

- Breeding
- Dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.22-4

Squatter Pigeon Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

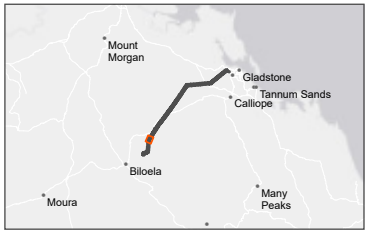
- Farm Dams, Reservoirs and Waterholes
- Field Survey Extent
- Project Area

Squatter Pigeon Habitat

- Dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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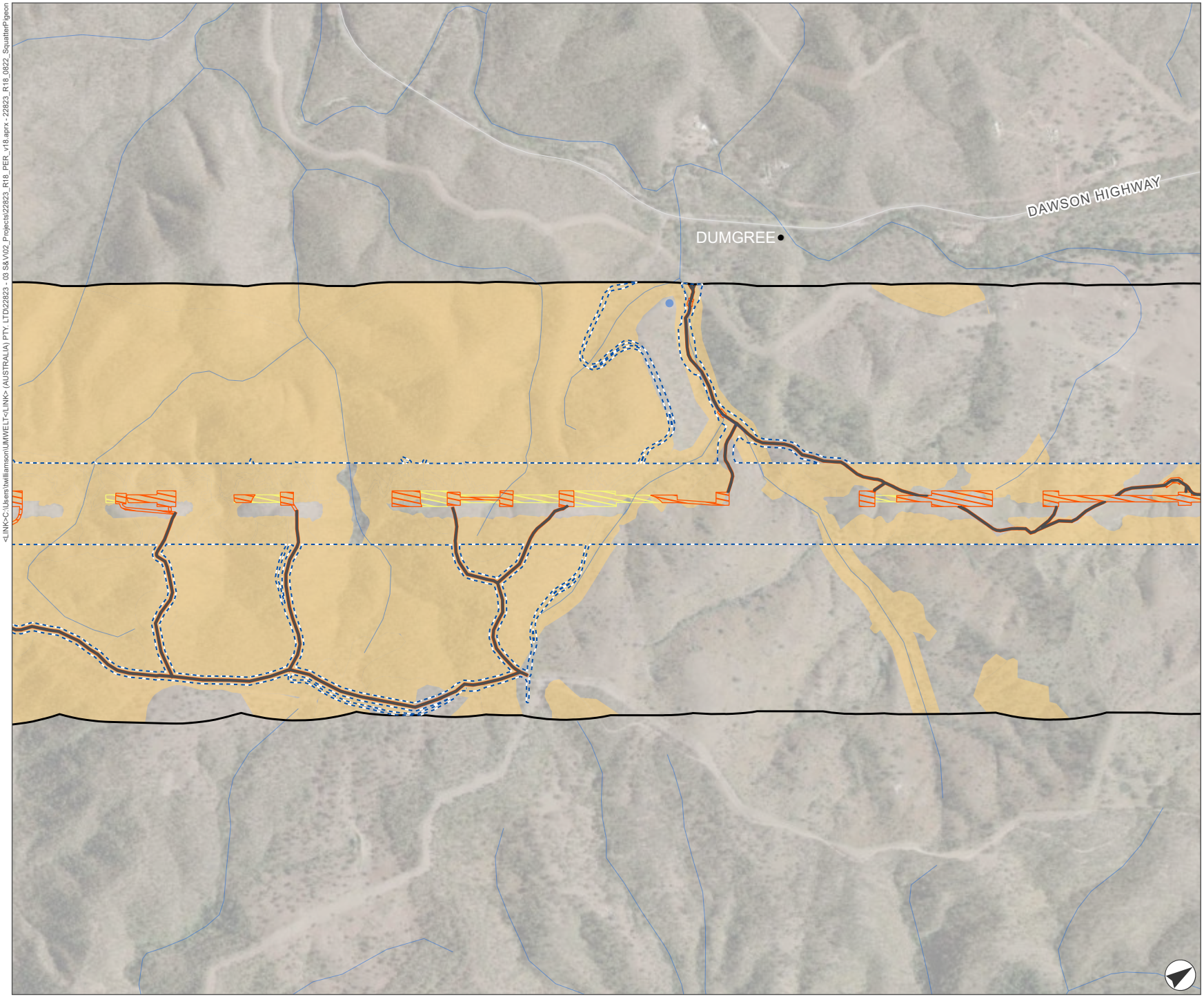
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FIGURE 8.22-5

Squatter Pigeon Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

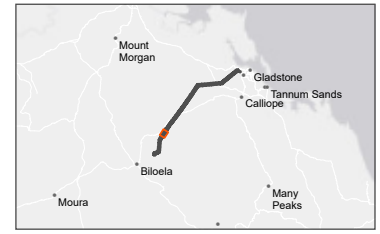
- Roads
- Farm Dams, Reservoirs and Waterholes
- Field Survey Extent
- Project Area

Squatter Pigeon Habitat

- Dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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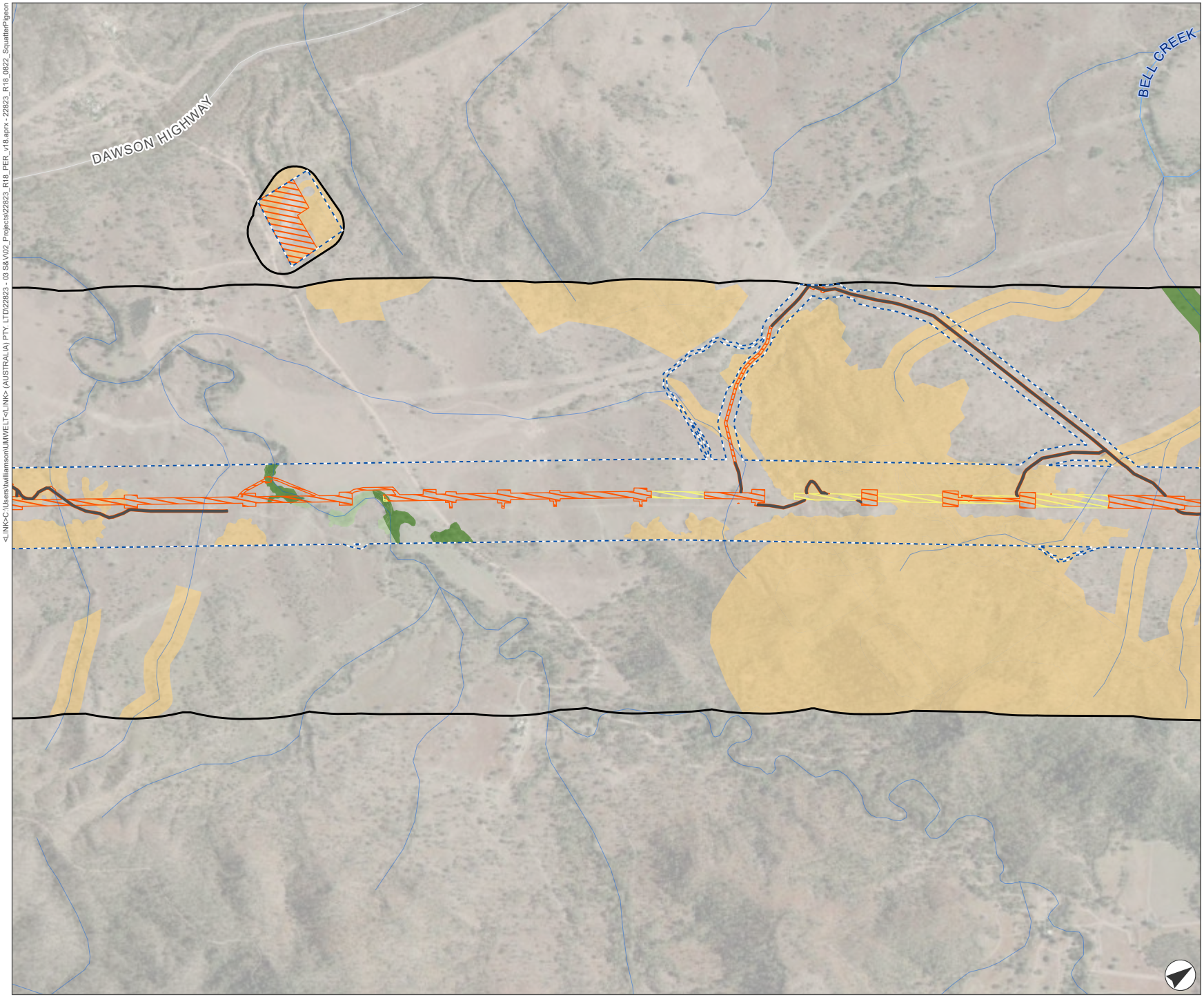


FIGURE 8.22-6

Squatter Pigeon Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

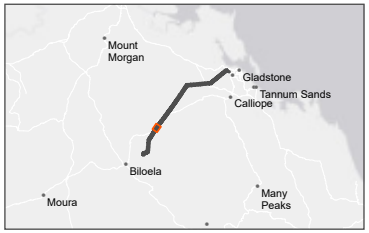
- Roads
- Watercourse
- Farm Dams, Reservoirs and Waterholes
- Field Survey Extent
- Project Area

Squatter Pigeon Habitat

- Breeding
- Dispersal
- Foraging

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



0 0.5 1

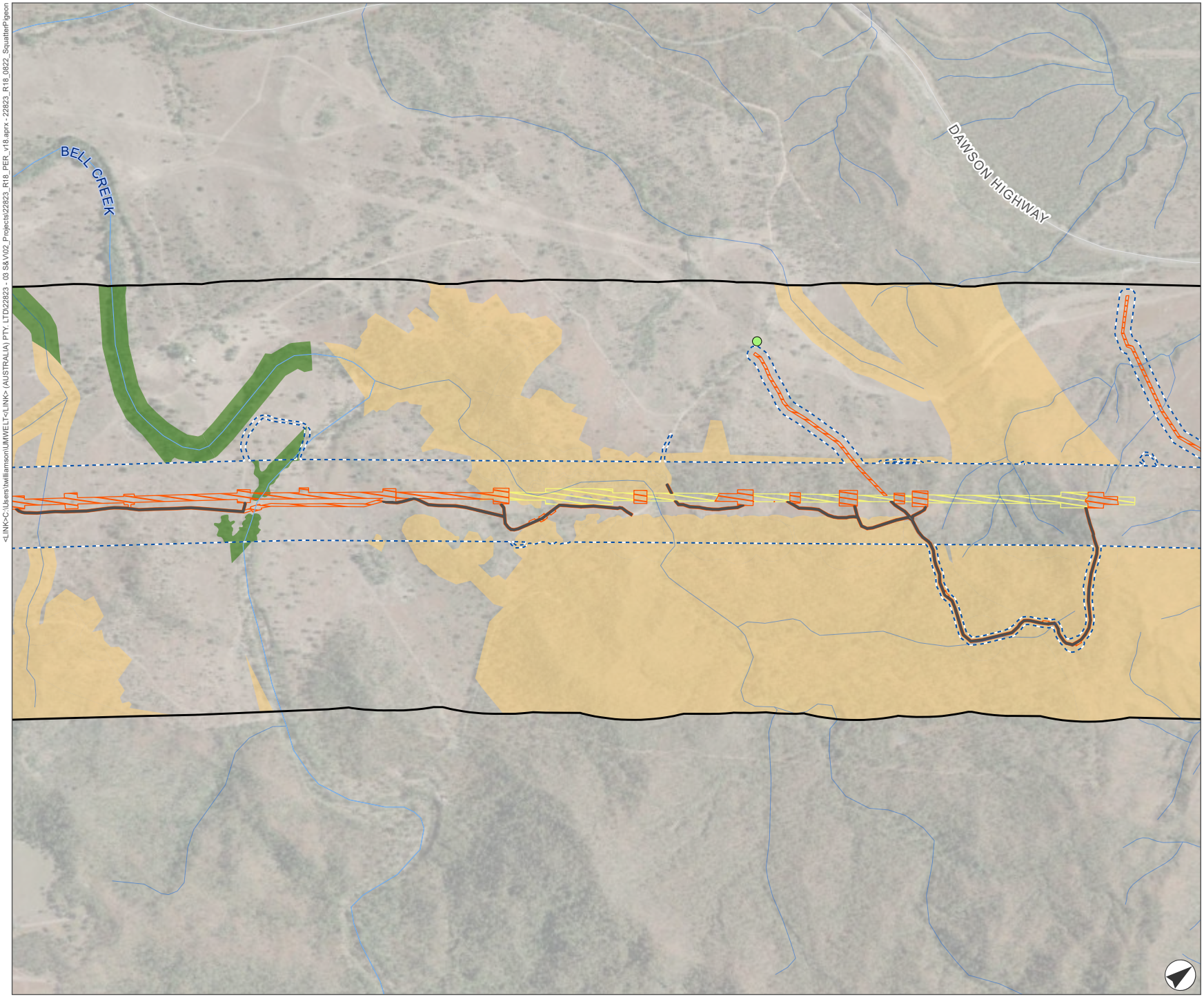
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FIGURE 8.22-7

Squatter Pigeon Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

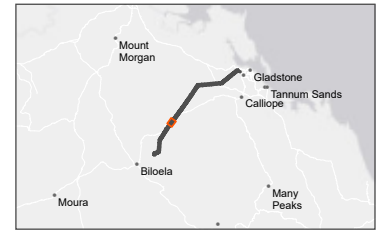
- Roads
- Watercourse
- Farm Dams, Reservoirs and Waterholes
- Field Survey Extent
- Project Area
- Squatter Pigeon Records (Umwelt)

Squatter Pigeon Habitat

- Breeding
- Dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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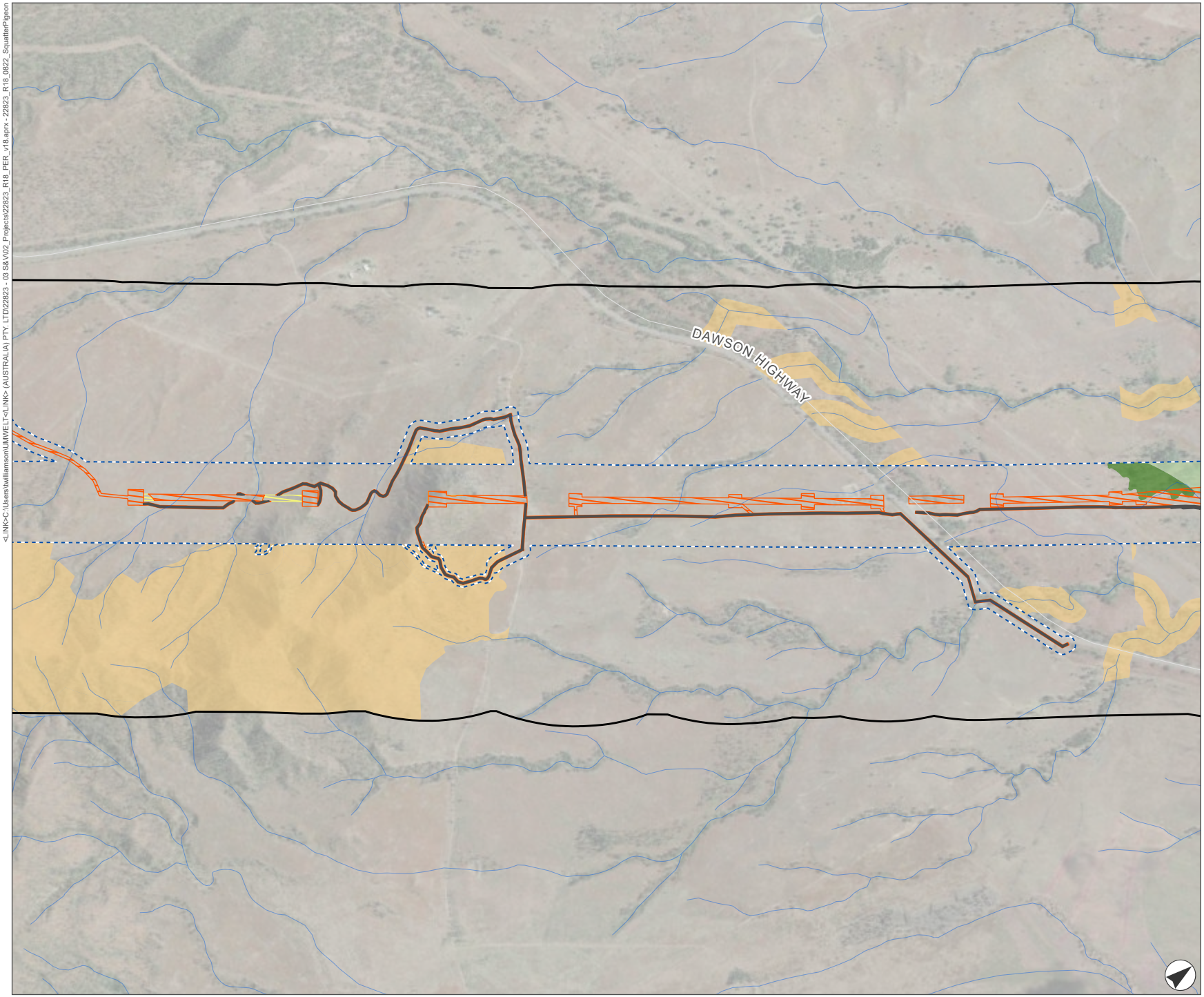


FIGURE 8.22-8

Squatter Pigeon Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

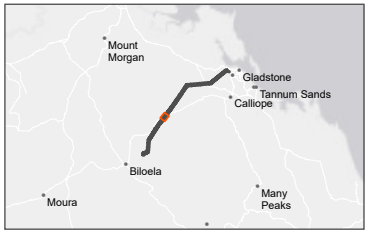
- Roads
- Farm Dams, Reservoirs and Waterholes
- Field Survey Extent
- Project Area

Squatter Pigeon Habitat

- Breeding
- Dispersal
- Foraging

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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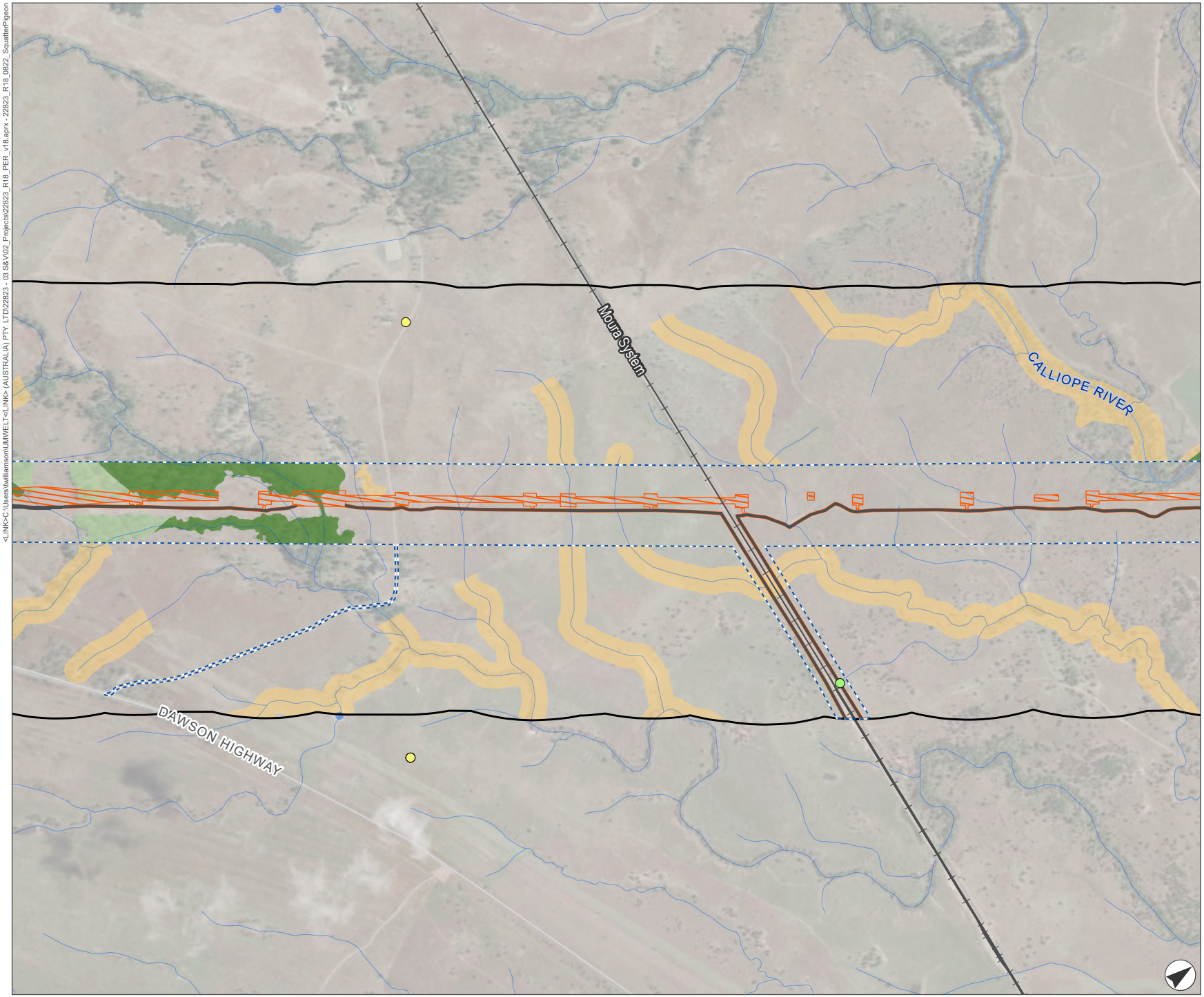


FIGURE 8.22-9

Squatter Pigeon Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

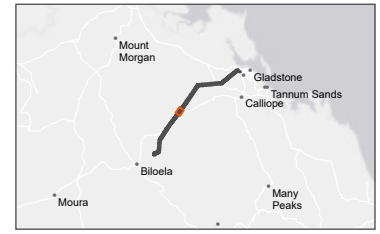
- Roads
- Railway
- Watercourse
- Farm Dams, Reservoirs and Waterholes
- Field Survey Extent
- Project Area
- Squatter Pigeon Records (ALA)
- Squatter Pigeon Records (Umwelt)

Squatter Pigeon Habitat

- Breeding
- Dispersal
- Foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



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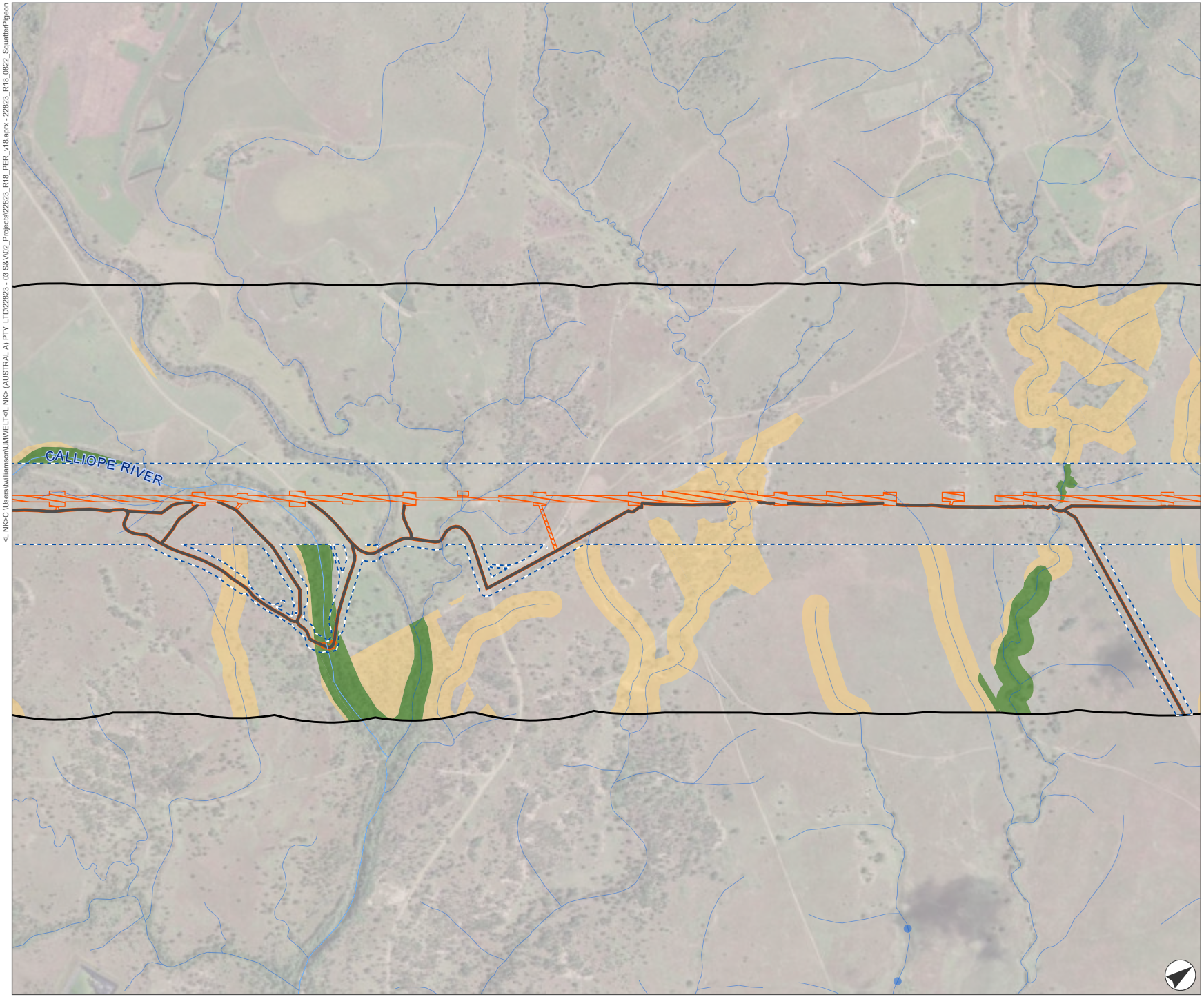


FIGURE 8.22-10

Squatter Pigeon Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

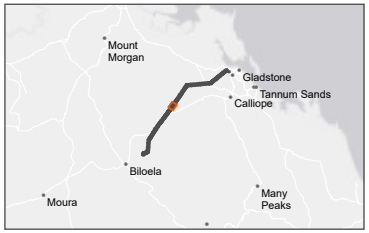
- Watercourse
- Farm Dams, Reservoirs and Waterholes
- Field Survey Extent
- Project Area

Squatter Pigeon Habitat

- Breeding
- Dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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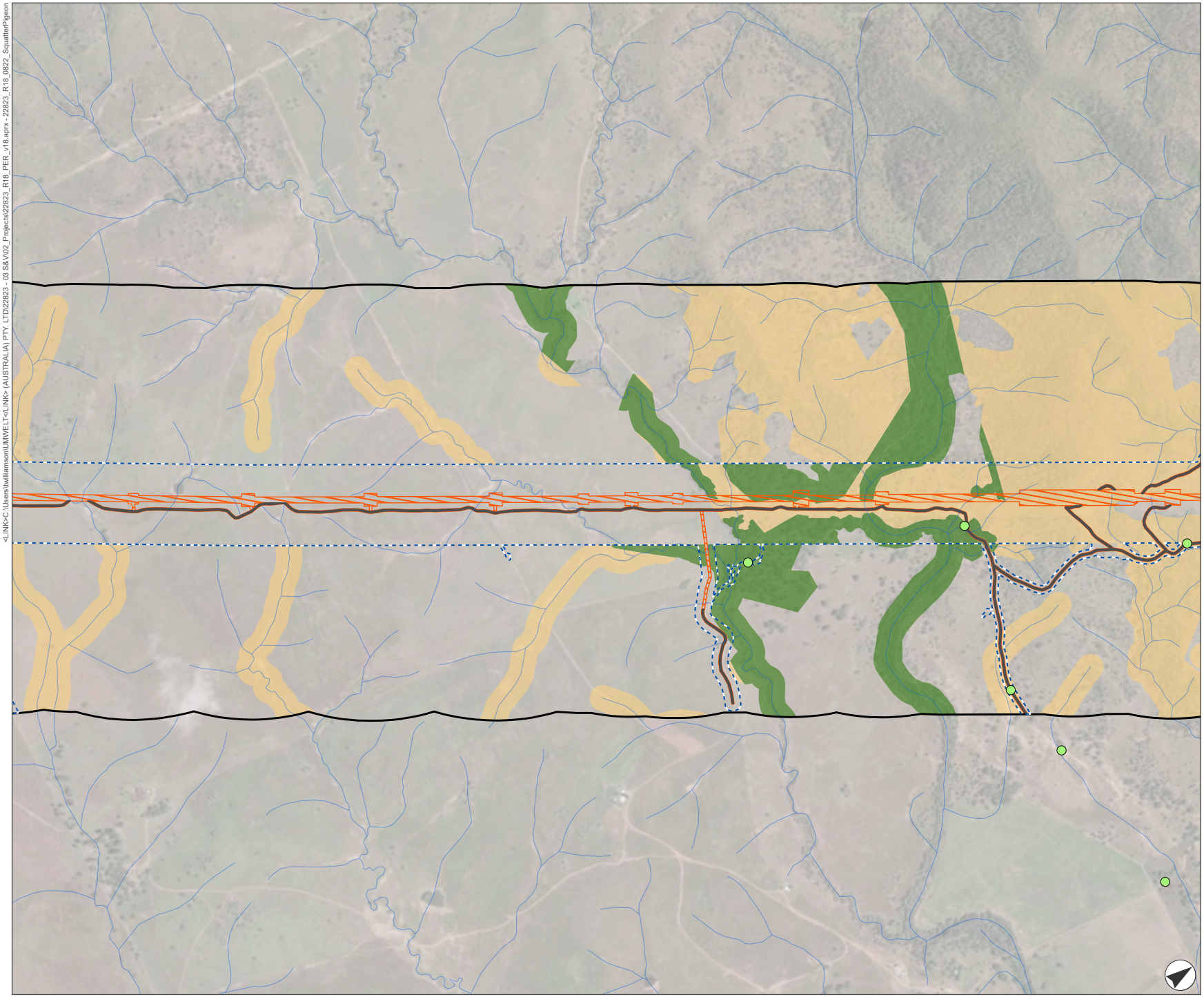


FIGURE 8.22-11

Squatter Pigeon Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

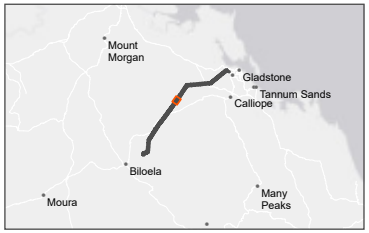
- Farm Dams, Reservoirs and Waterholes
- Field Survey Extent
- Project Area
- Squatter Pigeon Records (Umwelt)

Squatter Pigeon Habitat

- Breeding
- Dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.22-12

Squatter Pigeon Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

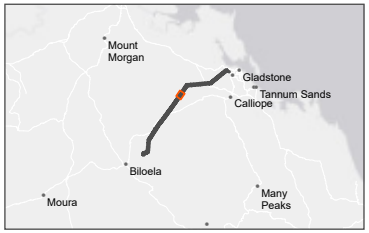
- Farm Dams, Reservoirs and Waterholes
- Field Survey Extent
- Project Area
- Squatter Pigeon Records (Umwelt)

Squatter Pigeon Habitat

- Breeding
- Dispersal
- Foraging

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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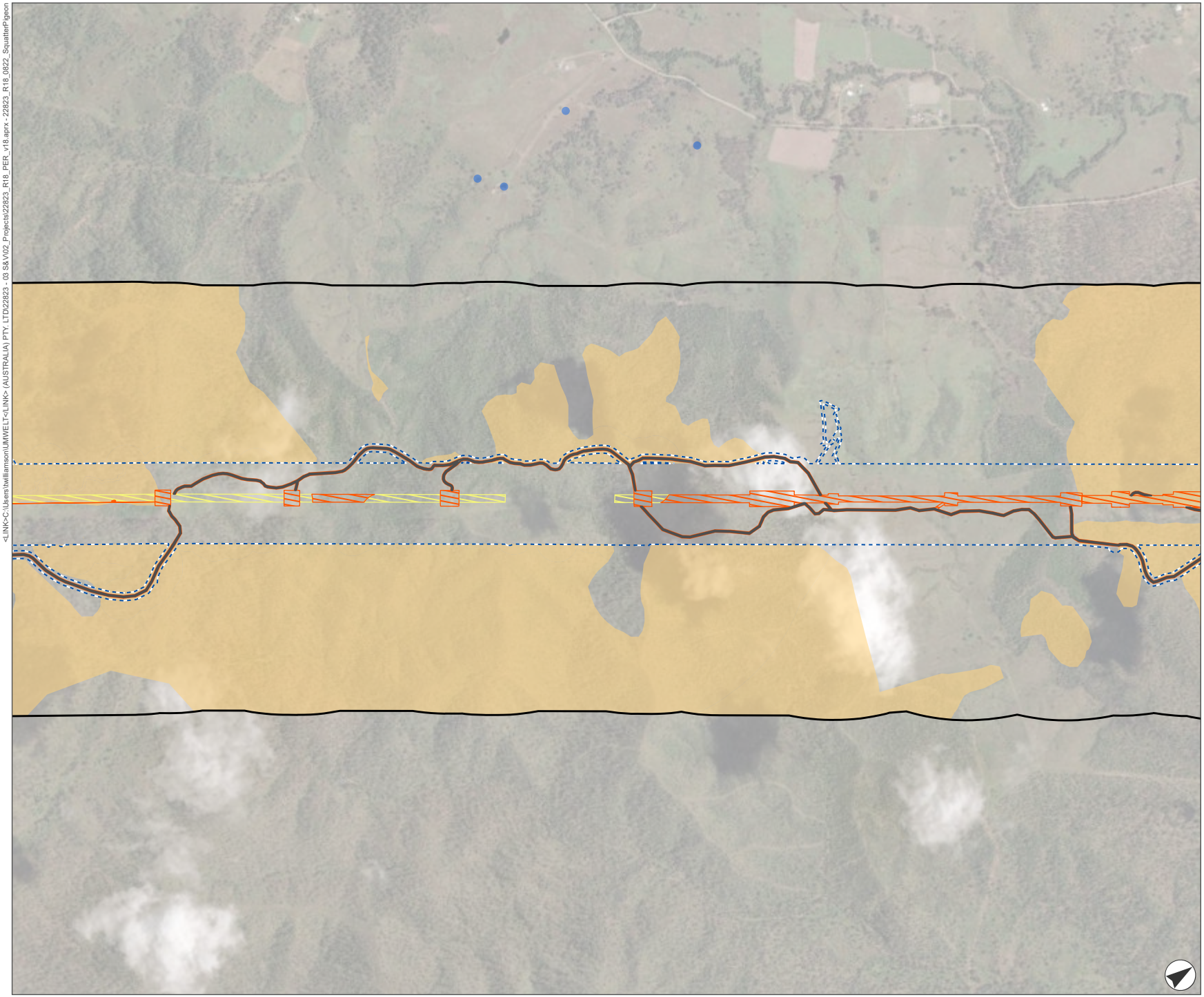


FIGURE 8.22-13

Squatter Pigeon Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

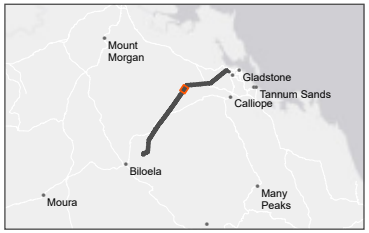
- Farm Dams, Reservoirs and Waterholes
- Field Survey Extent
- Project Area

Squatter Pigeon Habitat

- Dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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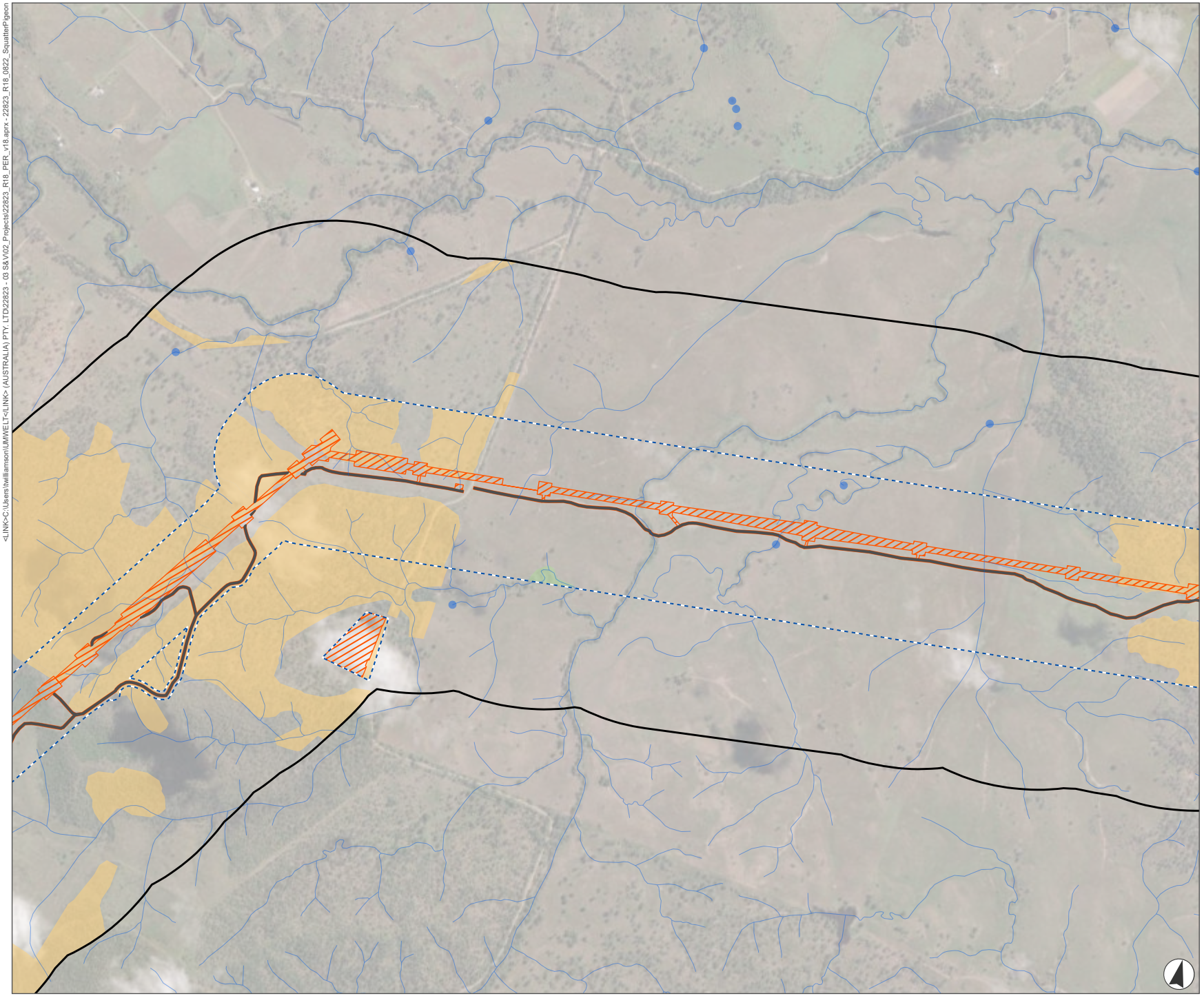


FIGURE 8.22-14

Squatter Pigeon Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

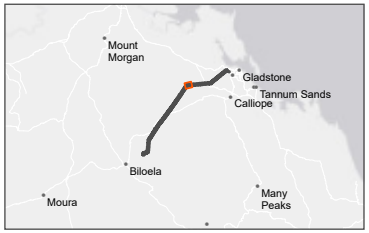
- Farm Dams, Reservoirs and Waterholes
- Field Survey Extent
- Project Area

Squatter Pigeon Habitat

- Dispersal
- Foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



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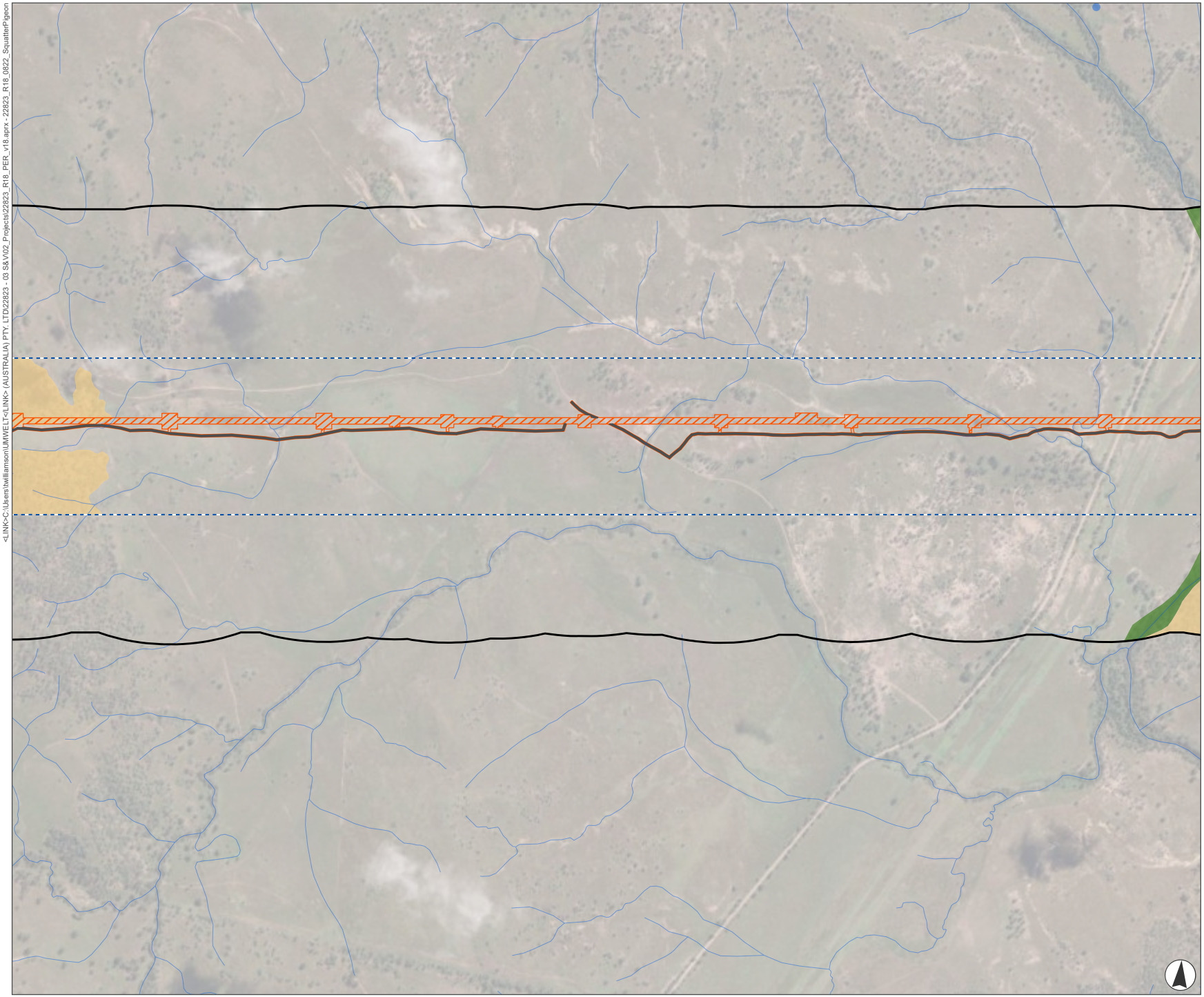


FIGURE 8.22-15

Squatter Pigeon Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

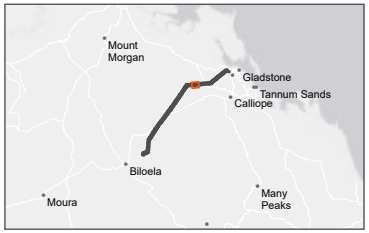
- Farm Dams, Reservoirs and Waterholes
- Field Survey Extent
- Project Area

Squatter Pigeon Habitat

- Breeding
- Dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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FIGURE 8.22-16

Squatter Pigeon Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

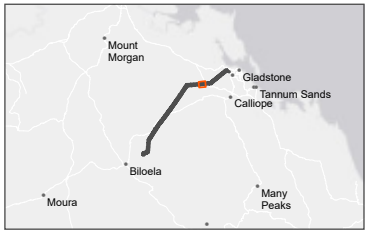
- Roads
- Farm Dams, Reservoirs and Waterholes
- Field Survey Extent
- Project Area

Squatter Pigeon Habitat

- Breeding
- Dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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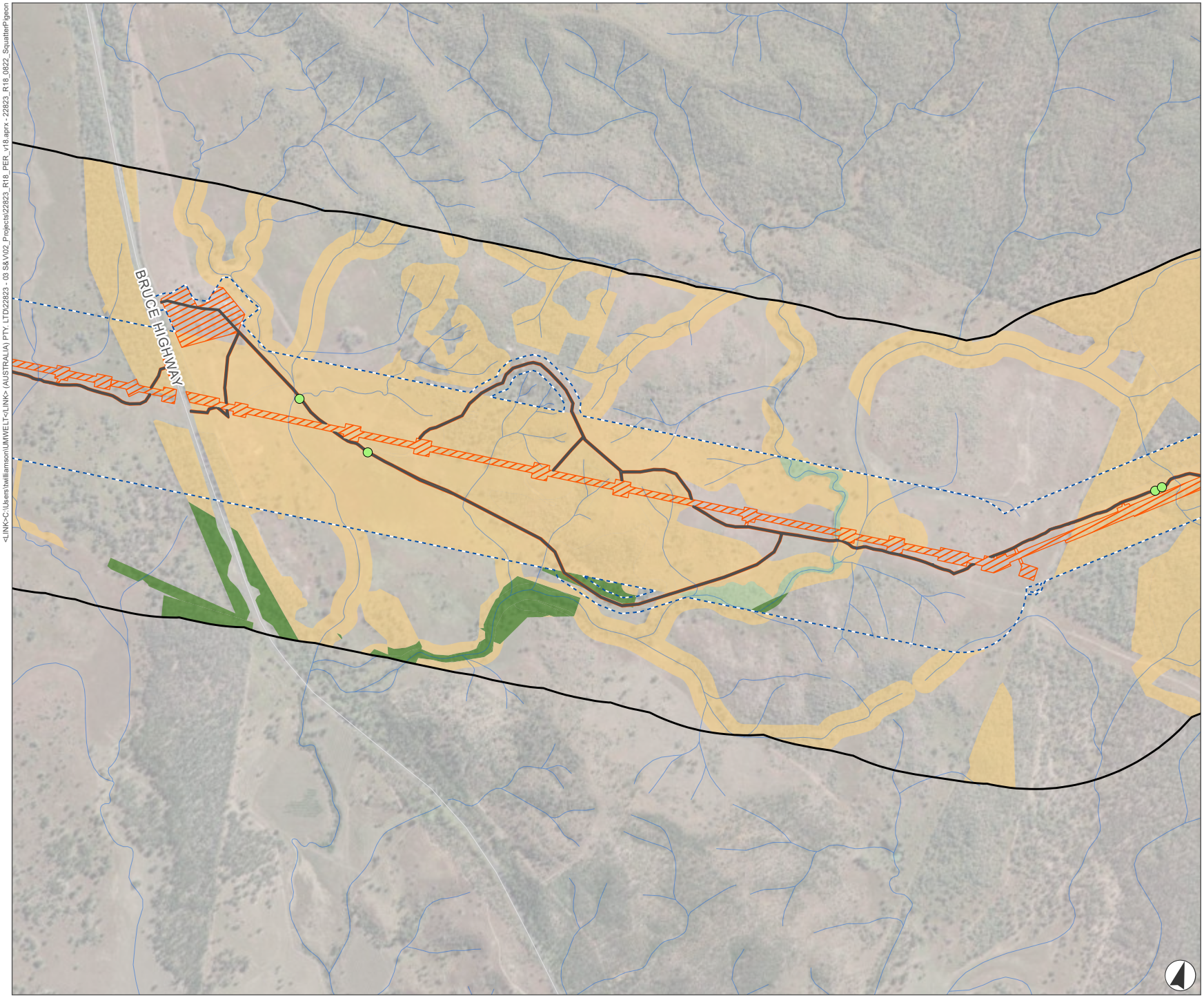


FIGURE 8.22-17

Squatter Pigeon Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

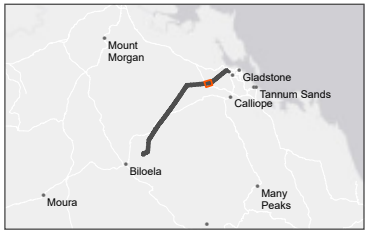
- Roads
- Farm Dams, Reservoirs and Waterholes
- Field Survey Extent
- Project Area
- Squatter Pigeon Records (Umwelt)

Squatter Pigeon Habitat

- Breeding
- Dispersal
- Foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.22-18

Squatter Pigeon Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

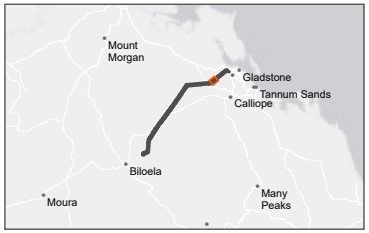
- Farm Dams, Reservoirs and Waterholes
- Field Survey Extent
- Project Area
- Squatter Pigeon Records (Umwelt)

Squatter Pigeon Habitat

- Dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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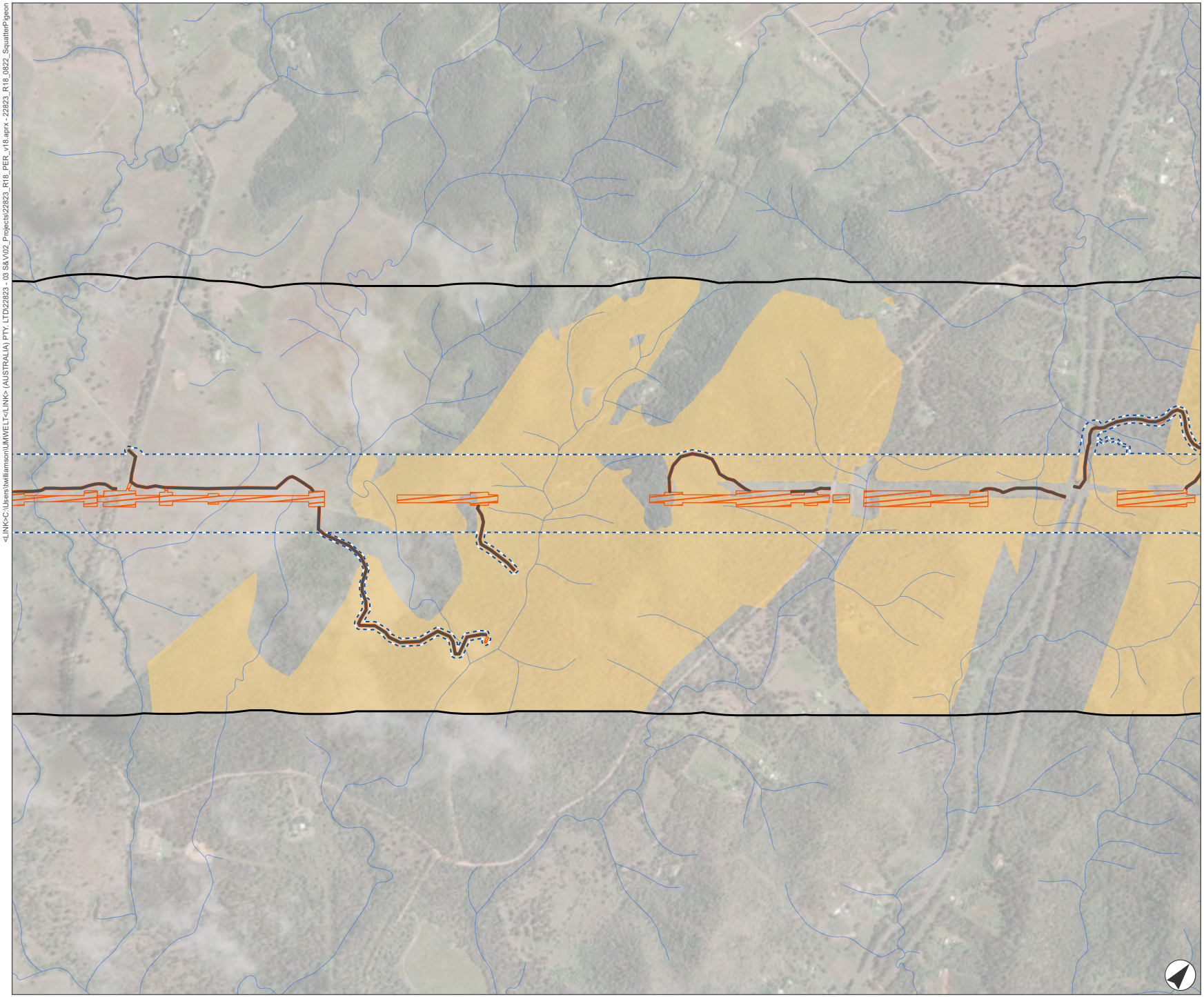


FIGURE 8.22-19

Squatter Pigeon Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

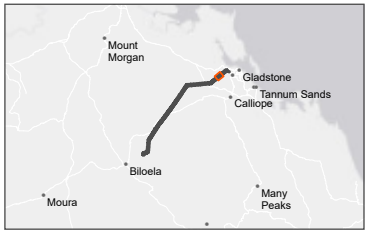
- Farm Dams, Reservoirs and Waterholes
- Field Survey Extent
- Project Area

Squatter Pigeon Habitat

- Breeding
- Dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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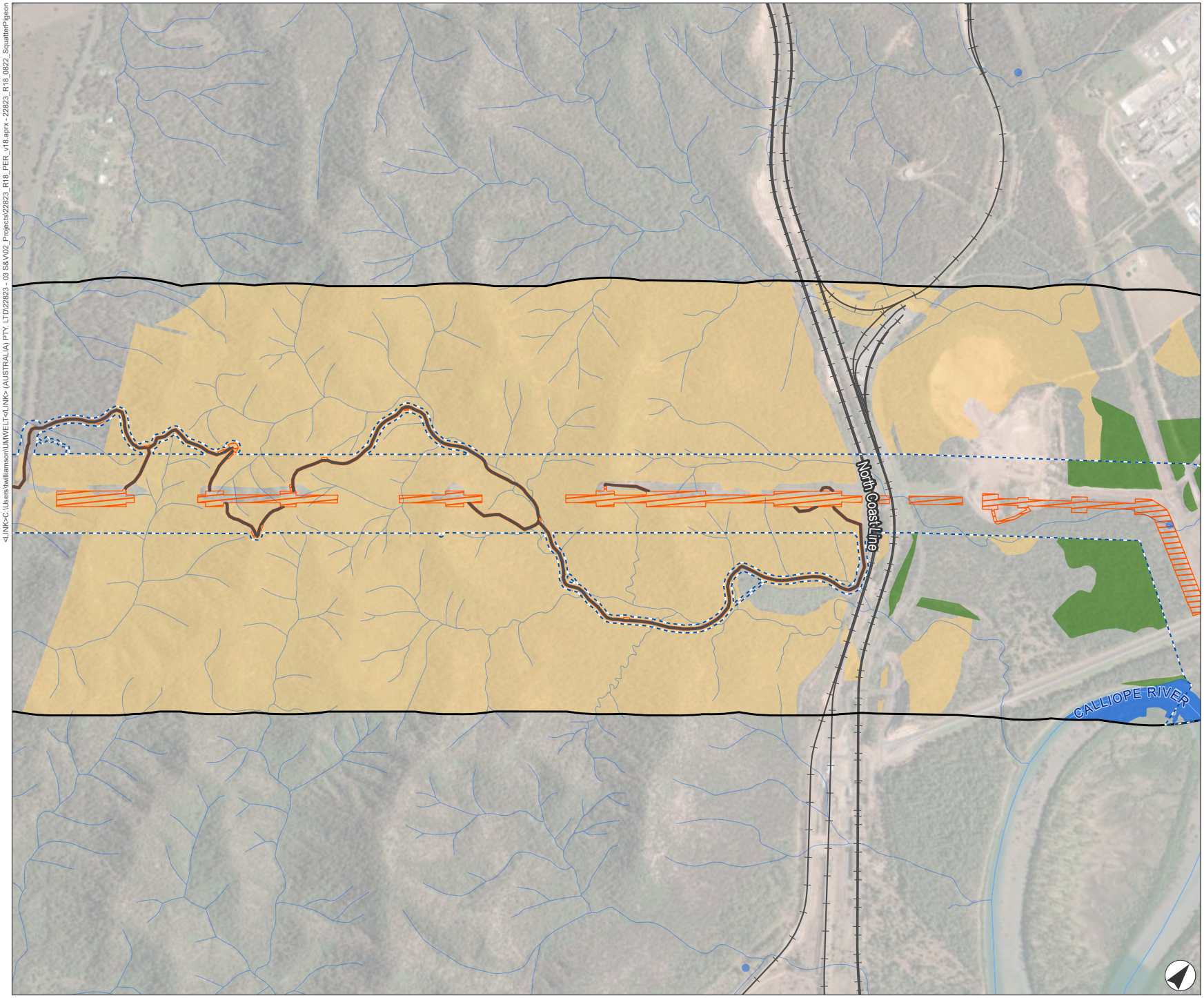


FIGURE 8.22-20

Squatter Pigeon Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

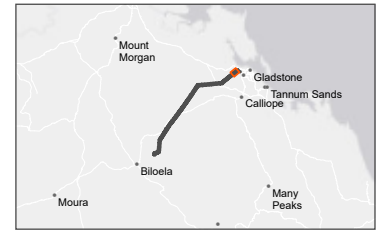
- Railway
- Watercourse
- Farm Dams, Reservoirs and Waterholes
- Field Survey Extent
- Project Area

Squatter Pigeon Habitat

- Breeding
- Dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

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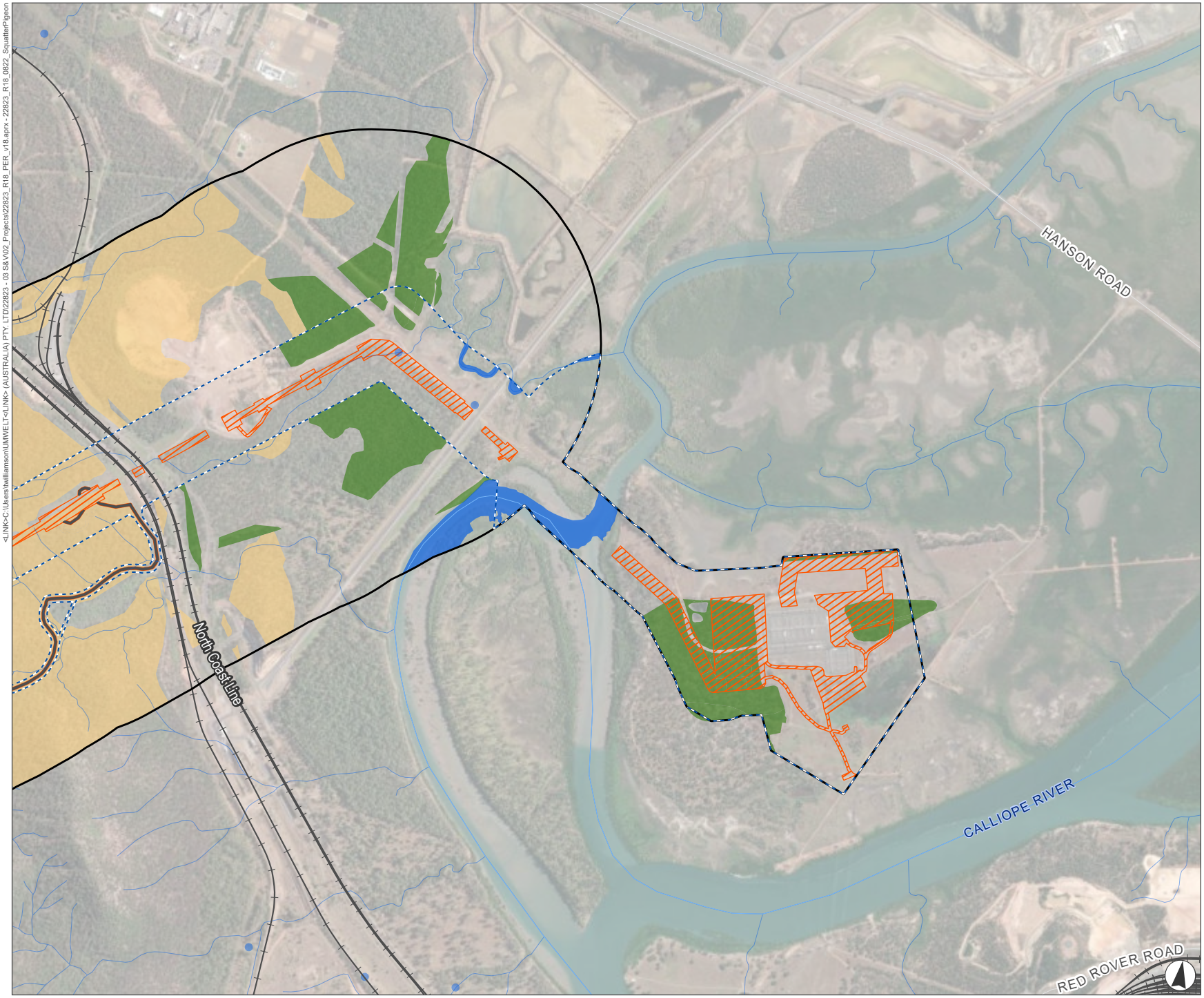


FIGURE 8.22-21

Squatter Pigeon Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

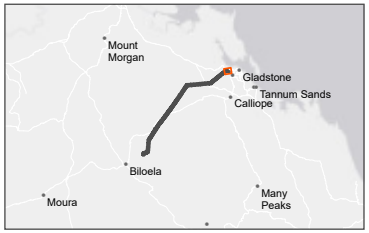
- Roads
- Railway
- Watercourse
- Farm Dams, Reservoirs and Waterholes
- Field Survey Extent
- Project Area

Squatter Pigeon Habitat

- Breeding
- Dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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8.2.7.9 Water Mouse (*Xeromys myoides*)

Table 8.71 Water Mouse: Ecology and Relevance to the Project Area

Water Mouse	
Profile	**Conservation status** Vulnerable **Distribution** The water mouse occurs across an extensive, although almost linear range, in coastal and near-coastal Queensland and the Northern Territory. However, the regions in which it occurs are widely separated. In south-east Queensland, the water mouse is distributed from the Gold Coast and Moreton Bay area to the Great Sandy Strait and as far inland to the Beerwah State Forest. In central eastern Queensland, the water mouse is known to occur from Agnes Water to Mackay, and Cannonvale. More recently, it has been recorded around Gladstone Harbour and on Curtis Island. The discovery of the species along the Jack Barnes Bicentennial Boardwalk, adjacent to Cairns Airport in 2017, represents the sole record of the water mouse from north Queensland, extending its known range in the State northwards by approximately 600 km (Department of Climate Change, Energy, the Environment and Water, 2022g). **Important Populations** As per the species' conservation advice (Department of Agriculture, Water and the Environment, 2021a), the water mouse is considered one single, nationally important population with no genetic divergences across its broad distribution (Benfer et al., 2014). **Historical records within the desktop search extent** Two WildNet records were identified within the desktop search extent from 2011, with the closest situated approximately 10 m away from Section E of the Project Area within the Port of Gladstone. The other record occurs 2km from the Project Area at the mouth of the Calliope River. **Habitat** The habitat of the water mouse predominantly encompasses aquatic environments, including coastal saltmarsh, samphire shrublands, saline reed-beds, saline grasslands, mangroves, coastal freshwater wetlands, and wet heathlands as demonstrated through occupancy by the species continuously, periodically or occasionally in the past or present. Water mice are nocturnal foragers and will search for prey between low and high tides along exposed tidal flats and around the water's edge (Department of Agriculture, Water and the Environment, 2021a). Foraging behaviour can be identified through leftover meal remains, otherwise known as middens. Prey remains can be located at the base of or on the external structure of nests and at feeding stations used by the species within the intertidal zone. The water mouse makes unique and varied mud-based nests for refuge and breeding. These nests are permanent and important features, contributing to the stability of water mouse populations (Department of Agriculture, Water and the Environment, 2021a). Nest construction is

a nocturnal activity and is time-consuming, requiring constant maintenance due to imposing factors such as tidal influence and seasonal storm events.

Habitat critical to the survival of the species

The *Referral guideline for the vulnerable water mouse Xeromys myoides* (Department of the Environment, 2015d) describes critical habitat as all mangrove communities, intertidal communities and coastal freshwater wetlands with one or more of the following features:

- Intact hydrology
- Prey resources (crustaceans, polyclad worms, pulmonated snails and bivalves)
- Active water mouse nest structures
- A defined supralittoral bank that could enable the construction of nests.

The Conservation Advice (Department of Agriculture, Water and the Environment, 2021a) provides somewhat contradictory guidance, stating that it is not considered practicable to describe habitat critical to the survival of the water mouse. Areas with the potential to provide critical habitat for this species are extensive and unsurveyed and newly identified threats to the species are ongoing and intensifying (i.e. predation by foxes and mangrove die back). The true extent and understanding of water mouse habitat can only be achieved through widespread detection-based presence/absence field surveys and/or newly identified novel methods to sample remote/unsafe areas. Despite the inconsistencies, based on the referral description, the wider Project Area does contain elements which reflect habitat critical including intact hydrology and prey resources and, on the southern bank of the Calliope River (on the Island), a supralittoral bank.

Habitat within the Disturbance Footprint is largely saltmarsh with a very sparse mangrove ecotone with the existing remnant mangrove community outside of the Disturbance Footprint. The presence of the existing raised access track adjacent to the Disturbance Footprint has altered the hydrology providing a barrier to further inland tidal movement. In addition, water mouse nest structures or prey resources were not observed during multiple field surveys and the supralittoral bank is absent from the northern side of the Calliope River in the vicinity of the Disturbance Footprint.

Extensive detection surveys have been conducted throughout suitable habitat in the Project Area and Disturbance Footprint, and this species was not observed nor were structures reflective of nesting sighted. The Disturbance Footprint, despite an absence of nest structures and supralittoral bank as outlined in the referral guidelines has functionally connected altered tidal hydrology with scattered ecotonal mangroves, therefore is considered habitat critical.

Current threats to the species

The primary threat to the water mouse is the loss, degradation, and fragmentation of freshwater and intertidal wetland communities utilised by the species. In Queensland, changes in hydrology and expression of acid sulphate soils are causing loss, fragmentation and degradation of habitat.

The water mouse is also seriously threatened by feral predators, particularly in Queensland, where the red fox poses a severe threat to the species. In both Queensland and the Northern Territory, the water mouse may be at risk of predation by domestic and feral cats, though this has not been quantified.

Water Mouse

Recovery plans

National Recovery Plan for the Water Mouse (Xeromys myoides) (Department of Climate Change, Energy, the Environment and Water, 2022g).

In the Project Area

Surveys

Historically, water mouse trapping in Gladstone has resulted in very low capture rates. For example, trapping over a seven-month period in water mouse habitat near Gladstone only resulted in two individuals being caught after thousands of trap nights (3D Environmental, 2012). These rates indicate that trapping is not the most efficient method for determining the presence of the species, and active searches are considered a more reliable method to determine presence of water mouse. Therefore, focus was placed on this method in combination with remote camera trapping.

The Disturbance Footprint overlaps with 'known to occur' habitat for water mouse according to the PMST. Given this, 16 species-specific habitat assessments as well as 25 general habitat assessments were conducted in potential habitat and amongst additional suitable habitat within the Project Area. Active searches (encompassing 2 hr 48 mins) were conducted for nest mounds, tracks and middens. Thirty (30) camera traps were also deployed over a total of 136 camera trap nights to assess presence, which exceeds the referral guidance of 100 trap nights per hectare of suitable habitat.

Species Occurrence

Camera trapping and active searches for nests and signs of presence have occurred in the mapped habitat with the aim of determining presence of the species. No individuals were directly identified during survey effort. It was noted during survey effort that there was considerable mud mounding within the Project Area. The mounding is attributed to mud mounding crabs which can create similar mud shelters to the water mouse, but they lack entrance holes and mud-formed tracks or runways (Burnham, 2000). Further to this, potential prey and remains were identified within the Disturbance Footprint in the form of small crabs. Using the precautionary principle, water mouse is presumed to have a high likelihood of occurrence within the Project Area given it's known occurrence in the vicinity of the Disturbance Footprint (Curtis Island and Gladstone Harbour) and the evidence of potential habitat use (remains of small crabs).

Species Habitat

Across the Project Area, suitable habitat is present for this species within the mangroves, sedges and grasses within intertidal areas of Section E of the Project Area, predominantly on the northern banks of the Calliope River. These areas are associated with RE 12.1.2 and 12.1.3, in which water mouse is known to nest and forage (Department of Agriculture, Water and the Environment, 2021a). Some mangroves contained hollows and buttressed roots, providing suitable shelter for water mouse. The intertidal areas also exhibited suitable muddy banks, driftwood and mud mounds with the potential to house the species. Despite the presence of high quality water mouse habitat within the broader Project Area, the suitable habitat within the Disturbance Footprint was observed to contain scattered low mangroves, with degradation from adjacent historic clearing in the area. Despite this, the habitat within the Disturbance Footprint still has the potential to provide breeding, foraging and dispersal habitat for the species through the provision of buttressed roots and driftwood.

Habitat mapping rules

Habitat modelling criteria	Area (ha)

Water Mouse

Suitable habitat within Project Area		Project Area	Disturbance Footprint
Breeding, foraging and dispersal	Intertidal areas or tidal flats dominated by mangroves, sedges and grasses. Adjacent to and including RE 12.1.2 and 12.1.3 in remnant or regrowth condition. Any mangrove or saltmarsh dominated vegetation, and intertidal area is considered suitable habitat for various life stages for this species. Habitat is limited to Section E.	36.6	0.5

Table 8.72 Assessment of Potential Project Impacts and Mitigation and Management Commitments for Water Mouse

Potential Impact	Assessment	Mitigation Commitments
Direct		
Habitat loss	Vegetation clearing required for construction will result in direct impacts to 0.5 ha of breeding, foraging and dispersal habitat within the Disturbance Footprint. However, the suitable habitat that coincides with Section E of the Disturbance Footprint is already largely degraded by historical clearing, with reduced vegetative complexity and an absence of hollows. Scattered suitable microhabitat features (i.e. mud mounds, buttressed mangrove roots and muddy banks) are present.	• Identify MNES fauna habitat and individuals through pre-clearance surveys • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Disturbance activities must be contained to Disturbance Footprint subject to minor micro-siting within the Field Survey Extent • Habitat features to be relocated to adjacent areas • During the pre-clearance survey, the fauna spotter-catcher will locate, record and mark the habitat features (including those to be retained in situ) • Install tree protection to habitat trees immediately adjacent to areas of earthworks • Refer to Table 5.1 and Table 5.8 of the MNES Management Plan for further details on mitigation measures.
Injury or mortality	The Project has the potential to result in direct injury or mortality to individuals during the construction phase, through collision with vehicles/machinery and entrapment in mangroves or mud mounds.	• Appropriately qualified fauna spotter catcher to undertake pre-clearance habitat assessment and be present during clearing and disturbance to habitat features • Clearing must be staged, with non-habitat trees felled first • Tampering with an animal breeding place to be carried out in accordance with an approved Species Management Program

Potential Impact	Assessment	Mitigation Commitments
		• Clear delineation of habitat features to be retained • Restrict vehicles to approved access tracks • Vehicle travelling speed restricted to <40 km/hr • Excavations must be secured (e.g. covered) • Activity searches for nests must be conducted within 48 hours of clearing • Nests must be recorded and physically marked and where they can be retained buffered by a 10 m protection zone • Where a nest is to disturbed, a trapping program will be implemented • Individuals found during clearing will be relocated to an adjacent area of habitat after dusk • Injured individuals will be taken to a local wildlife carer or vet • Refer to Table 5.3 of the MNES Management Plan for further details on mitigation measures.
Indirect		
Habitat degradation and fragmentation	Habitat degradation and fragmentation may be facilitated through: • Introduction or proliferation of pest and weed species • Altered susceptibility to fire due to vegetation clearing • Contamination due to refuelling and chemical storage activities • Soil exposure resulting in an increased risk of erosion and sedimentation of water bodies, ultimately reducing water quality and degrading aquatic habitats • Temporary changes in hydrology from installation of infrastructure creating a	• Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • All waste to be secured

Potential Impact	Assessment	Mitigation Commitments
	barrier to surface flow and increasing stormwater run-off.	• Biosecurity Instrument Permit to be obtained for moving materials out of or within different biosecurity zones • Educate workforce in the identification of pest fauna species • Avoid inclusion of any water retaining voids or pits • Hazardous materials must be stored and handled appropriately • An Emergency Response Plan will be developed • Spill kits will be available during construction • Hazardous materials locations will be bunded • All waste disposed of in accordance with legislative requirements • No refuelling within 50 m of a watercourse • Application of herbicides in accordance with legislative requirements • Soil sampling and testing to inform both erosion and sediment control (ESC) and rehabilitation • Develop Erosion and Sediment Control Plan (ESCP) in accordance with the IECA Best Practice Erosion and Sediment Control Guidelines 2008 • Extent and duration of soil exposure will be minimised • Disturbed areas will be promptly stabilised. • Site is monitored and controls adjusted to maintain required performance standard • Minimum personnel requirements will apply for ESCP development and verification • Refer to Table 5.4, Table 5.5 and Table 5.6 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Indirect injury or mortality	Injury or mortality has the potential to be exacerbated by the unintended increase in feral predators within and surrounding the Disturbance Footprint due to the Project.	• All waste to be secured • Biosecurity Instrument Permit to be obtained for moving materials out of or within different biosecurity zones • Educate workforce in the identification of pest fauna species • Avoid inclusion of any water retaining voids or pits • Refer to Table 5.6 of the MNES Management Plan for further details on mitigation measures.
Disorientation and disruption of breeding, foraging and dispersal behaviours	Noise, activity and vibration generated during construction and operation may disorientate or startle individuals or interrupt foraging, breeding or dispersal behaviours. Despite this, operational noise and lighting impacts at the Calliope River substation are currently present, and the expansion of the substation is not expected to significantly increase these indirect impacts during the operational phase. The Wiggins Island coal terminal conveyor which is approximately 100 m from potential habitat, operates daily for extended periods and with the potential for approximately 100 decibels or greater when in operation at the noise source. Regular noise pollution from the conveyor potentially contributes to disorientation and disruption of breeding, foraging and dispersal of this species.	• Plant and equipment to be fitted with appropriate noise attenuation and maintained • Deliveries and removal of material and equipment to and from site within approved hours for construction • Plant to be turned off when not in use • No unnecessary use of horns or other audible signals on mobile plant or equipment • Machinery and equipment will be maintained in good working condition • Refer to Table 5.10 of the MNES Management Plan for further details on mitigation measures.

Table 8.73 Significant Impact Assessment: Water Mouse

Impact Criteria	Assessment
Lead to a long-term decrease in the size of an important population of a species	**Unlikely.** As per the Conservation Advice (Department of Agriculture, Water and the Environment, 2021a), the water mouse is considered one single, nationally important population (Benfer et al., 2014). Despite no direct observations of individuals during the field surveys, they are known from the desktop search extent. Given their cryptic nature and presence of suitable habitat within the Project Area, they have been assessed as high likelihood of occurrence within the Project Area. The Project will result in the removal of 0.5 ha of breeding, foraging and dispersal habitat for water mouse within the intertidal mangroves, sedges and grasses of Section E of the Disturbance Footprint. Despite the presence of suitable habitat within the Disturbance Footprint, it was observed to be of reduced quality (i.e. reduced structural complexity with an absence of suitable hollows at the base of mangroves and encroachment of introduced grass species (predominantly *Megathyrsus maximus* (guinea grass)). This is likely due to the impacts of historic clearing to facilitate the installation of existing access tracks, transmission towers and associated infrastructure. Any individuals within the area are more likely to use the patches of suitable habitat adjacent to the Disturbance Footprint that provide a greater array and abundance of habitat features and enhanced structural complexity. Given that there are larger patches of higher quality habitat adjacent to the Disturbance Footprint, the removal of 0.5 ha of suitable habitat is unlikely to result in a decrease in the size of an important population. Furthermore, once constructed, the Project will not create a barrier to movement, as ground surfaces will remain intact and the single tower pad will occur set back from the mangroves fringing the Calliope River, which won't result in the isolation and ultimate decrease in size of an important population. Construction has the potential to indirectly impact this species through the proliferation of weed and pest populations which may further degrade potential habitat and increase predation risk. In addition, clearing within nearby habitats may alter the hydrology of the Calliope River or expose the habitat to acid sulfate soils, chemicals or run-off. However, strict construction protocols adhering to the MNES Management Plan will negate these indirect impacts. As the species is ground-dwelling, there is a risk of mortality during construction as a result of vehicle/plant strike. To manage this risk, speed limits will be strictly enforced. Access within the mangrove or saltmarsh habitat will be via a formed, elevated track which avoids any vehicles driving directly on marine areas. On balance, despite the removal of 0.5 ha of suitable habitat and the potential for indirect impacts to an important population of the species, the existing level of disturbance and the implementation of the MNES Management Plan results in an unlikely outcome for this criterion.
Reduce the area of occupancy of an important population	**Unlikely.** In Queensland, water mouse population estimates range between 1,001 and 10,000 individuals, occupying an area of approximately 101 km^2 to 1,000 km^2 along Queensland's east coast.

Impact Criteria	Assessment
	The Project will result in the removal of 0.5 ha of breeding, foraging and dispersal habitat. This habitat is represented by saltmarsh with scattered low ecotonal mangroves that extend beyond the Disturbance Footprint to join intact unbroken mangroves fringing the Calliope River, in which historic records of the species are known to occur. During design iterations, high quality areas of habitat (e.g. areas within the intertidal zone and mangroves) were intentionally avoided to minimise the impacts on the area of occupancy of the water mouse. Given that the habitat situated within the Disturbance Footprint is already exposed to historic disturbance and exhibits reduced structural complexity and scarce microhabitat features (e.g. hollows at the base of mangroves) compared to larger patches of adjacent suitable habitat, it is less likely to be habitually utilised by individuals in the area. Indirect impacts are unlikely to materially affect mapped habitat for the species nor are they expected to cause the species to leave areas mapped as suitable habitat. Nevertheless, a range of mitigation measures including the implementation of measures as outlined in the MNES Management Plan, to mitigate these potential impacts. On balance, the removal of a small amount of habitat (0.5 ha) that has already been exposed to disturbance and is situated amongst larger tracts of higher quality habitat is unlikely to reduce the area of occupancy of an important population of the species.
Fragment an existing important population into two or more populations	**Unlikely.** There is a lack of scientific literature on water mouse dispersal capacity and coastal barriers to population connectivity. However, the water mouse is known to travel over 600 m per night between shelter and feeding grounds and 2.9 km during foraging events. Only small amounts of migration are required to maintain the genetic resilience of water mouse populations across their distribution. This suggests that irregular dispersal events across large distances of seemingly inhospitable terrain may be sufficient to ensure connectivity. The single elevated tower pad is to be co-located with the existing transmission line and situated adjacent to the existing elevated access track limiting any changes to the tidal hydrological regime. The elevated tower pad will not create any additional barriers to movement to what already exists. As a consequence, the direct removal of 0.5 ha of suitable breeding, foraging and dispersal habitat is unlikely to fragment the important population into two or more populations.
Adversely affect habitat critical to the survival of a species	**Unlikely.** Habitat critical to the survival of the water mouse is present within the Project Area and Disturbance Footprint. According to Commonwealth conservation advice (Department of Agriculture, Water and the Environment, 2021a), all known and potential habitat may be considered critical to the survival of the water mouse due to its reliance on intact estuarine and tidal ecosystems for breeding, nesting and foraging. While 0.5 ha of the Disturbance Footprint falls within this definition, it comprises low-density mangroves interspersed with saltmarsh grasses, offering limited structural complexity. No evidence of water mouse activity (such as nests, middens, or tracks) was recorded during multiple field surveys. Furthermore, the site is situated within a broader

Impact Criteria	Assessment
	catchment that remains largely intact, suggesting that the specific area proposed for impact may be of lower relative importance to the species' survival compared to higher-quality habitat elsewhere in the region. A single elevated tower pad collocated with an existing elevated access track (servicing the existing transmission lines) will impact potential habitat of this species. The presence of the existing elevated access track likely alters the overland flow of fresh water as it stretches from the coal terminal conveyor southward to the northern bank of the Calliope River. Similarly, tidal movement in the area is likely also impeded by the elevated access track reducing or altering water flow. The raised tower pad abuts the existing elevated access track limiting any changes to freshwater hydrological regime and will not alter tides from their natural or ambient volume, frequency or duration. In addition, the presence of the elevated access track may already alter foraging and dispersal pattern of this species, and the collocation of the tower pad is unlikely to restrict water mouse dispersal. The single raised tower pad is positioned within poorer quality potential habitat and does not impact the intact fringing mangroves associated with the Calliope River. There will be no narrowing of the fringing mangroves, and no net loss of habitat features such as woody debris, as these will be retained in adjacent suitable habitat. Therefore, prey abundance and foraging effectiveness is unlikely to be impacted as a result of the Project. Cattle grazing was not observed as occurring in this portion of the Project Area and is not expected to occur in the future. Mangroves and remnant vegetation isolate the existing and proposed infrastructure in the vicinity of water mouse habitat and the coal conveyor fence which is regularly monitored/patrolled eliminates access from the north. The status quo for access to this portion of the Disturbance Footprint is unlikely to be changed as a result of this Project with any vehicular access requiring an escort from the Wiggins Island Coal Terminal security team. A suite of best practice management plans will be implemented to manage and mitigate indirect impacts to the water mouse. An ASSMP and ESCP will be implemented to manage water quality and acid sulphate soils. These plans will incorporate provisions for tidal areas and be implemented to avoid potential contamination of surface water or adjacent habitats or allowing above baseline water and sediment runoff into potential habitat. A BMP encompassing Powerlink bushfire protocols will be implemented to assist in the managing the incidence of fire. In total 0.5 ha of low habitat complexity potential water mouse habitat considered habitat critical will be removed as part of this Project. Higher quality habitat will remain in adjacent areas, tidal and overland flow will not be changed above existing altered levels. Therefore, the Project is unlikely to adversely affect habitat critical to the survival of the species.
Disrupt the breeding cycle of an important population	**Unlikely.** Male and female water mice can be detected in breeding condition throughout most of the year in south-east Queensland and camera monitoring of shelters suggests that they breed up to twice per year. Habitat mapped within the Disturbance Footprint contains scattered low mangroves (largely *Avicennia marina*) and driftwood and is interspersed with saltmarsh grasses more suitable for foraging rather than breeding. Further, during the targeted field surveys, no nest mounds were observed. Despite the direct removal of 0.5 ha of breeding, foraging and dispersal habitat, this habitat is of reduced structural complexity compared to

Impact Criteria	Assessment
	adjacent habitat within the Project Area. Once constructed, the Project will not create a barrier to movement between breeding grounds, as ground surfaces will remain intact and towers will occur in discrete locations, with the potential for restoration of removed breeding habitat. Similarly, there is no noise or light impacts affecting the breeding of this species once the Project has been constructed. Indirect impacts such as increased dust exposure, degradation from weeds, water quality changes and increased risk of bushfire may alter the species utilisation of this habitat. However, indirect impacts to the Project will be managed in accordance with the MNES Management Plan. Given these impacts will be managed appropriately and that the Project won't be inhibiting access of high-quality breeding grounds, the Project is unlikely to disrupt the breeding cycle of an important population of the species.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely.** Despite the presence of potential habitat within the Disturbance Footprint, it was observed to be of reduced quality when compared to the habitat within the broader Project Area, due to historic clearing and disturbance. Any individuals which may occur within the area are more likely to use the larger patches of suitable habitat adjacent to the Disturbance Footprint that provide a greater array and abundance of habitat features and enhanced structural complexity. Furthermore, once constructed, the single elevated tower pad will be stablished and hydro-mulched with a native seed mix to limit degradation of adjacent habitat through erosion and sedimentation. Given that there are larger patches of higher quality suitable habitat adjacent to the Disturbance Footprint and that the habitat may be able to regenerate in the future, the removal of 0.5 ha of habitat is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. Indirect impacts including increased dust exposure, degradation from weeds, water quality changes and increased risk of bushfire have the potential to modify habitat for the species, but the impacts are considered low risk and will be appropriately managed by the MNES Management Plan. Any indirect impacts are unlikely to impact habitat for the species to the extent that the species is likely to decline. Operational impacts within the mapped habitat will remain similar to the present condition, as the existing substation already affects the wider Project Area through increased lighting, noise and human disturbances. Any additional noise and vibration resulting from by the Project is unlikely to isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming	**Unlikely.** Weeds have the potential to degrade water mouse habitat, particularly exotic grasses. Water mouse is also susceptible to predation by exotic predators such as the European red fox and feral cats, while feral pigs are known to predate on water mouse and dismantle critical shelters. All three species were recorded within the Project Area; however, it is considered unlikely that the shape and scale of the clearing required for construction of the Project will significantly exacerbate the movement of exotic predators or result in elevated hunting success. Further, as described above, the location of the Disturbance Footprint would not result in fragmentation of water mouse habitat–a process which is likely to result in the exacerbation feral predator impacts.

Impact Criteria	Assessment
established in the vulnerable species' habitat	
Introduce disease that may cause the species to decline	**Unlikely.** Disease has not been identified as a threat to the species. Nevertheless, the Project will follow appropriate biosecurity protocols; therefore, introduction of a disease is unlikely.
Interfere substantially with the recovery of the species	**Unlikely.** The National Recovery Plan sites key actions required for the recovery of the water mouse as: • Confirming and documenting the current distribution of the species. • Mapping known populations and their habitat. • Assessing the impact of known threatening processes. • Developing and implementing a threat management plan to rehabilitate habitat at priority sites. • Engaging the community in efforts to protect existing populations by establishing voluntary agreements with relevant landowners and managers. • Coordinating the recovery process. Proposed vegetation clearing for Project construction will occur within 0.5 ha of habitat for this species, however this will not interfere with the recovery actions, given the existing disturbances present within the Disturbance Footprint and the purposeful retention of high-quality habitat adjacent to the Disturbance Footprint. Based on the implementation of Project EMPs, indirect impacts to the species are likely to be negligible. The Project is unlikely to interfere with any of the abovementioned recovery objectives and is therefore unlikely to interfere substantially with the recovery of the species.
Significant Residual Impact	**Unlikely to have a significant impact**

<LINK<C:\Users\tswilliamson\UMWELT<LINK> (AUSTRALIA) PTY LTD\22823 - 03 S&V\02_Projects\22823_R18_PER_v18.aprx - 22823_R18_0823_WaterMouse

FIGURE 8.23-21

Water Mouse Records and Habitat within the Field Survey Extent and Disturbance Footprint



Legend

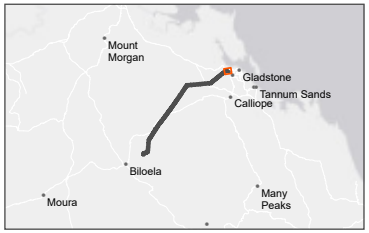
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area
- water mouse (Wildlife Online)

Water Mouse Habitat

- Breeding, foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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Image Source: ESRI Basemap (2025) | **Data Source:** Queensland D of Resources (2025)

8.2.7.10 White-throated Needletail (*Hirundapus caudacutus*)

Table 8.74 White-throated Needletail: Ecology and Relevance to the Project Area

White-throated Needletail	
Profile	**Conservation status** Vulnerable and Migratory. **Distribution** The white-throated needletail is a large species of swift which is a non-breeding migrant to Australia typically arriving in September and departing in April. They most commonly migrate to Australia via the Torres Strait and disperse in a southerly direction along the eastern and western sides of the Great Divide in Queensland and New South Wales. By November the species reaches the southern extent of its range in Australia dispersing throughout parts of Victoria, south-eastern South Australia and Tasmania. In the Northern Territory and Western Australia, they occur as vagrants (Department of Climate Change, Energy, the Environment and Water 2025h). Estimates place the white-throated needletail's range in Australia at 126,200 km^2 (Department of Climate Change, Energy, the Environment and Water 2025h). **Important Population** The white-throated needletail is an almost exclusively aerial, large-bodied swift that are insectivorous feeding on a variety of insect prey items during their migration in Australia across a range of habitat types and landscapes. Whilst in Australia the species is gregarious observed flying in flocks of hundreds and even thousands of birds. They are occasionally observed individually or in smaller groups and can sometimes be found in mixed flocks with other insectivorous aerial species such as fork-tailed swift (*Apus pacificus*) and fairy martins (*Hirundo ariel*) (Department of Climate Change, Energy, the Environment and Water, 2025h). The SPRAT database does not identify 'important populations' of the white-throated needletail. However, it does state that while in Australia, all individual white-throated needletails are expected to comprise a single, continuous population. The total population for the species is estimated to be approximately 41,000 (S. T. Garnett et al., 2022). An ecologically significant proportion of a population for white-throated needletail is considered to be 410 individuals with a significance internationally and 41 individuals with a significance nationally (Department of the Environment, 2015b). The spatio-temporal occurrence of white-throated needletails is considered to be dynamic and dependent on weather conditions, such as storm fronts. It is unlikely that the habitat within the Project Area supports a nationally or internationally significant proportion of the population. Therefore, it is not considered to support an important population. **Historical records within the desktop search extent** Distribution modelling on the SPRAT database for the species intersects with the Project Area; coinciding with its 'likely to occur' and 'may occur' extents (Department of Climate Change, Energy, the Environment and Water, 2025k). The most recent WildNet record that occurs within the desktop search extent dates from 1999 and occurs approximately 7.5 km north-west of Section E, in former Targinie State Forest (Department of the Environment, Tourism, Science and Innovation, 2025b). Other ALA records are scattered within the desktop search extent, with a large cluster at Kroombit Tops National Park, and most recent records from 2023 approximately 8 km south of the Project Area at River Ranch (ALA, 2025).

White-throated Needletail

Habitat

They are regularly recorded above wooded areas including open forest and rainforest, though may also fly below the canopy between trees or in clearings. When flying above farmland, they are more often recorded above partly cleared pasture, plantations, or remnant vegetation at the edge of paddocks. According to the Referral guideline for 14 birds listed as migratory species under the EPBC Act (Department of the Environment, 2015b), trees with dense canopy foliage and tree hollows are considered to provide roosting habitat for white-throated needletail, though the degree to which the species roosts in trees is potentially over-emphasised. A radiotracking study on white-throated needletails was able to track an individual to a roosting site in open sclerophyll forest. Although the study was unable to detect the exact roosting tree, the dominant tree species included *Eucalyptus crebra*, *Eucalyptus muelleriana*, *Eucalyptus gummifera* and *Lophostemon confertus*. It is thought the species will return to roost sites over consecutive nights. Home ranges and territories in breeding grounds are not maintained while the birds are in Australia.

During non-breeding migrations to Australia, the white-throated needletail feeds on a variety of insects including beetles, cicadas, flying ants, bees, wasps, flies, termites, moths, locusts and grasshoppers (Department of Climate Change, Energy, the Environment and Water, 2025h). The species feeds up to the height of clouds over a variety of foraging habitats including heavily treed forests. Open foraging habitats include farmland, heathland or mudflats, although the species has been observed feeding at lower altitudes closer to the ground as low as 15 cm at a coastal saltworks. They occasionally forage above recently disturbed habitats, such as recently burned or cleared forest, or above paddocks being ploughed or cut. The species is also known to hunt in updraught locations like ridges, cliffs, or sand dunes. Low pressure systems both lift food sources and provide assistance with flight and needletails often forage at the edge of these systems (Department of Climate Change, Energy, the Environment and Water 2025h).

Habitat critical to the survival of the species

Habitat critical to the survival of the species is not specifically defined for the species. However, the Significant Impact Guidelines 1.1–MNES (Department of the Environment, 2013a) define habitat critical to the survival of a species or ecological community as 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.
- For the reintroduction of populations or recovery of the species or ecological community.

The species is a non-breeding migrant to Australia and is mostly aerial, foraging on the wing and moving with weather systems. Foraging habitat requirements are therefore very broad. The species may roost in tall, hollow bearing trees at the top of ridges, on vertical tree trunks, rock faces and dense canopy foliage (Department of the Environment, 2015b). Relative to foraging and dispersal habitat, roosting habitat is likely to be more restrictive. As such, modelled roosting and foraging habitat within the Project Area may conservatively be considered as habitat critical to the survival of the species.

White-throated Needletail

Current threats to the species

Within Australia threats to white-throated needletails include wind turbine collision, overhead wires, windows, and lighthouses. Further research is required to determine the extent of the impact at the population level for this species (Threatened Species Scientific Committee, 2019).

It is possible that the species may decline as a result of pesticide use either through a reduction of prey abundance or secondary poisoning through the accumulation of sublethal doses in prey species (Tarburton, 2014). The decrease of roosting locations in Australia may potentially be a factor in the species' decline. It's possible that the decline in invertebrate prey was also a result of the loss of woodland and forest ecosystems (Tarburton, 2014).

Recovery plan

A recovery plan has not been adopted for this species.

In the Project Area

Surveys

Records throughout a migration event generally begin during spring when the species arrives in Australia and ends in autumn when the species is leaving Australia. The white-throated needletail was not confirmed during the field survey program, despite field surveys occurring when the species is present within Australia, including 3 separate trips in March 2023 and 4 in April 2023.

Species occurrence

As aforementioned, white-throated needletail was not detected within the Project Area during any of the field program. Potential habitat for white-throated needletail consists of roosting, foraging and dispersal habitat. Given the species is a non-breeding migrant to Australia, no breeding habitat exists and will not be considered. The Project Area is dominated by woodland communities dominated by eucalypt species, semi-evergreen vine thicket and non-remnant pasture which provide foraging habitat for the species. Given the preference for roosting on tall and /or hollow bearing trees at the top of ridges, as well as vertical tree trunks, rock faces and dense canopy foliage, white-throated needletail roosting habitat is limited to remnant vegetation with mature stands of trees confined to ridgelines throughout the Project Area. To ensure a conservative approach, all areas with an elevation of 400 m or higher were therefore considered the limit of potential roosting and foraging habitat. Due to the species broad habitat requirements and aerial nature, all remaining areas of regrowth and remnant vegetation are considered potential foraging and dispersal habitat.

Habitat within the project area

Habitat type	Habitat modelling criteria	Area (ha)	
		Project Area	Disturbance Footprint
Roosting and foraging	REs: 11.3.4, 11.3.25, 11.3.25b, 11.3.26, 11.8.4, 11.10.3, 11.10.4, 11.11.3, 11.11.3c, 11.11.4, 11.11.4c, 11.11.10, 11.11.15, 11.11.18, 11.12.1, 12.3.3, 11.12.6 and 11.12.17 in remnant condition.	3,459.5	84.6

White-throated Needletail			
	Remnant forest and woodland vegetation communities within the Project Area that contains tall and/or hollow bearing trees, as identified by field data. REs with a structural category of dense or mid-dense (as per the Queensland Herbarium Regional Ecosystem Description Database) were included irrespective of hollow or tall tree presence.		
Foraging and dispersal	All remaining vegetation communities excluding non-remnant.	3,235.5	70.3

Table 8.75 Assessment of Potential Project Impacts and Mitigation and Management Commitments for White-throated Needletail

Potential Impact	Assessment	Mitigation Commitments
Direct		
Vegetation clearing causing habitat loss and fragmentation	The Project has been strategically designed to make use of an existing transmission line corridor, thereby minimising the clearing and fragmentation impacts. Additionally, the species is known to utilise airspace over a range of habitat types, including fragmented landscapes, therefore it is anticipated there would be little impact.	• Identify MNES fauna habitat and individuals through pre-clearance surveys • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Disturbance activities must be contained to Disturbance Footprint subject to minor micro-siting within the Field Survey Extent • Habitat features to be relocated to adjacent areas • During the pre-clearance survey, the fauna spotter-catcher will locate, record and mark the habitat features (including those to be retained in situ) • Install tree protection to habitat trees immediately adjacent to areas of earthworks • Refer to Table 5.1 and Table 5.8 of the MNES Management Plan for further details on mitigation measures.
Injury or direct mortality	Overhead transmission lines are considered a potential threat to the species. As the Project will run parallel to existing transmission line infrastructure, the footprint of new structures across the landscape will be minimised,	• Appropriately qualified fauna spotter catcher to undertake pre-clearance habitat assessment and be present during clearing and disturbance to habitat features • Clearing must be staged, with non-habitat trees felled first • Tampering with an animal breeding place to be carried out in accordance with an approved Species Management Program • Clear delineation of habitat features to be retained • Habitat trees must be soft-felled

Potential Impact	Assessment	Mitigation Commitments
	thereby reducing the risk of additional impacts.	• Where canopy trees cannot be retained in potential roosting habitat they will be inspected by a fauna-spotter catcher and any white-throated needletails will be flushed prior to felling • Refer to Table 5.3 of the MNES Management Plan for further details on mitigation measures.
Changes to habitat quality (degradation)	The species relies minimally on terrestrial habitats within the Project Area and no breeding or roosting habitat occurs locally.	• Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • Refer to Table 5.5 of the MNES Management Plan for further details on mitigation measures.
Indirect		
Noise, activity and vibration generated during construction and operation interrupting foraging, breeding or dispersal behaviours	Construction activities will mostly occur during daylight hours (6.30 am to 6.30 pm), so as not to disturb potential roosting. As clearing will be staged, noise will be limited to discrete locations at the clearing front. Construction noise will primarily occur around infrastructure (not intact habitat). Noise in relation to operation is negligible.	• Plant and equipment to be fitted with appropriate noise attenuation and maintained • Deliveries and removal of material and equipment to and from site within approved hours for construction • Plant to be turned off when not in use • No unnecessary use of horns or other audible signals on mobile plant or equipment • Machinery and equipment will be maintained in good working condition • Refer to Table 5.10 of the MNES Management Plan for further details on mitigation measures.

Table 8.76 Significant Impact Assessment: White-throated Needletail

Impact Criteria	Assessment
Lead to a long-term decrease in the size of an important population of a species	**Unlikely.** The white-throated needletail has not been recorded in the Project Area. The species is a non-breeding migrant to eastern Australia, often occurring transiently under influence by prevailing weather conditions. The species generally arrives in Australia during spring and migrates along both sides of the Great Diving Range in Queensland and New South Wales to the southern extents of its range. The journey is reversed as the species leaves Australia in autumn. While migrating, it is likely the species will inhabit any part of the airspace above the Project Area. A maximum of 84.6 ha of roosting and foraging habitat and 70.3 ha of foraging and dispersal habitat will be directly impacted by vegetation clearing for construction of the Project. Relative to the area that will be cleared, large areas of suitable habitat will remain. Given the species' aerial nature and broad requirements for roosting and foraging, it is unlikely this loss of habitat will result in a material change to the species' utilisation of the area. Implementation of the MNES Management Plan will assist to minimise potential indirect impacts of the Project, such as habitat degradation from increased dust, edge effects and weeds. Further, any population utilising the Project Area is not considered an important population. Therefore, a long-term decrease in the size of an important population of this species is unlikely to occur.
Reduce the area of occupancy of an important population	**Unlikely.** While in Australia the species has a large distribution that extends across eastern Australia. The estimated area of occupancy within Australia is >18,000 km^2, noting that this estimate is based on a 2 km resolution and may be an overestimate. The Project will result in a maximum loss of up to 84.6 ha of roosting and foraging habitat and 70.3 ha of foraging and dispersal habitat. However, this habitat is likely to be used only temporarily during migration, and the remaining habitat within the Project Area is sufficient to meet the ecological requirements of any individuals present. Suitable habitat is also widely available throughout the broader region. Given the species' aerial nature, high mobility, broad habitat requirements, and the extensive availability of habitat, the Project is unlikely to reduce the area of occupancy of an important population.

Impact Criteria	Assessment
Fragment an existing important population into two or more populations	**Unlikely.** As noted, an important population of White-throated Needletail is unlikely to utilise the Project Area. The species is highly mobile, flying thousands of kilometres during migration, and is known to occur across fragmented landscapes and a variety of habitat types. The Project has been strategically sited to make use of already cleared areas, minimising additional habitat fragmentation, including within potential roosting and foraging habitat. Given the aerial nature of the species, vegetation clearance sociated with the Project is unlikely to impede movement or fragment any population. Accordingly, the Project is unlikely to fragment an existing important population into two or more populations.
Adversely affect habitat critical to the survival of a species	**Unlikely.** Modelled roosting and foraging habitat within the Project Area is conservatively considered habitat critical to the survival of the species. Vegetation clearing required for the Project may result in the loss of up to 84.6 ha of such habitat. The final extent of clearing is expected to be lower, and the remaining habitat is likely sufficient to meet the ecological requirements of any individuals that may use the area. For these reasons, the Project is unlikely to adversely affect habitat critical to the survival of the species.
Disrupt the breeding cycle of an important population	**Unlikely.** The species is a non-breeding migrant to Australia. As the species forages predominantly on insects, foraging resources are widely available and are not a limitation to building sufficient energy reserves required for their return migration to breeding grounds. Therefore, the Project is unlikely to disrupt the breeding cycle of a population of the species.

Impact Criteria	Assessment
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely.** As described above, vegetation clearing required for construction of the Project will result in direct impacts to a maximum of 84.6 ha of roosting and foraging habitat and 70.3 ha of foraging and dispersal habitat. Despite this, the species lifecycle is predominantly aerial and may only use this habitat periodically while migrating further north or south. The species is known to utilise fragmented landscapes and will occur over cleared areas. The area of habitat, and habitat resources including hollow-bearing trees, that will remain following construction is expected to be sufficient to support any population present in the future. Although some further fragmentation impacts are anticipated, it is highly unlikely these will impact the species or limit its mobility. The Project will not lead to the further degradation of retained habitat, as potential indirect impacts such as altered fire regimes, weeds and pests will be actively managed through the MNES Management Plan. Therefore, the Project is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**Unlikely.** Invasive species are not known to be a threat to the white-throated needletail. Nonetheless, the Project will employ best practice control methods for weeds and pests and is unlikely to introduce or exacerbate weeds or pests beyond existing levels.
Introduce disease that may cause the species to decline	**Unlikely.** There are no known diseases affecting the species. The Project will employ best practice biosecurity protocols during construction and operation; therefore, introduction of a disease that may cause the species to decline is unlikely.
Interfere substantially with the recovery of the species	**Unlikely.** A National Recovery Plan for the white-throated needletail has not been determined a requirement for this species, however, the species' Conservation Advice identifies the primary conservation actions for the species as: • the protection of breeding habitat in East Asia • the protection of important habitat in Australia. There is currently no evidence to suggest that the species relies on the habitat of the Project Area while in Australia or on migration. No roosting locations were identified during the field survey program, however potential roosting habitat has been identified based on the topography of the site and presence of hollow-bearing trees. Following construction of the Project, large and extensive areas of potential roosting and foraging habitat will remain which are of sufficient scale to support any individuals that may occur. Given the above, it is unlikely that Project will interfere with recovery of the species.
Significant Residual Impact	**Unlikely to have a significant impact**

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FIGURE 8.24-1

White-throated Needletail Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

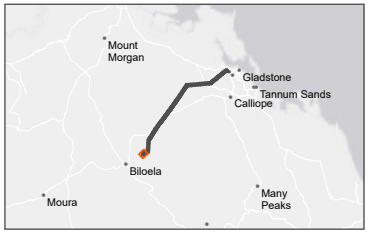
- Railway
- Watercourse
- Field Survey Extent
- Project Area

White Throated Needletail Habitat

- Foraging and dispersal
- Roosting and foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
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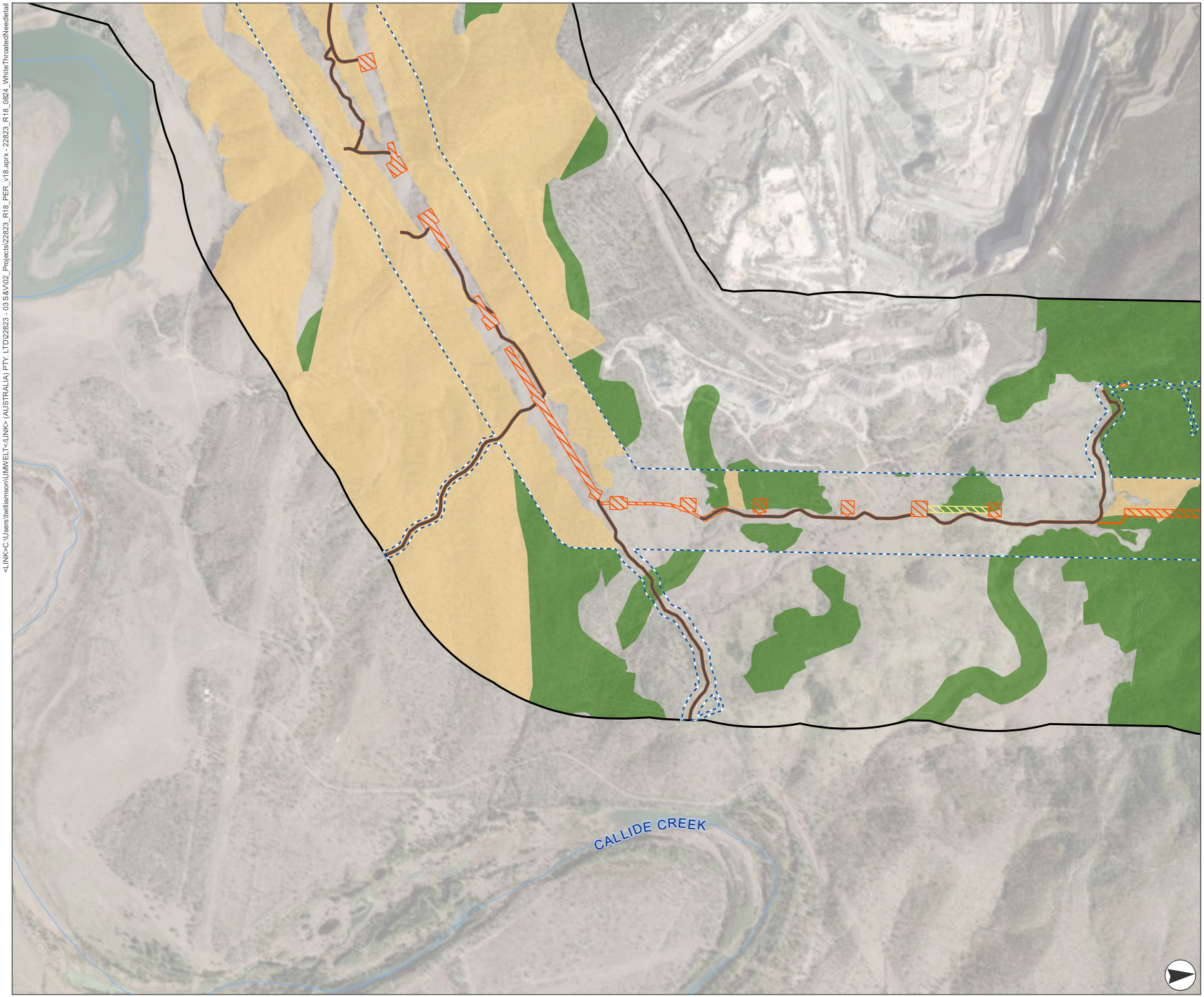


FIGURE 8.24-2

White-throated Needletail Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

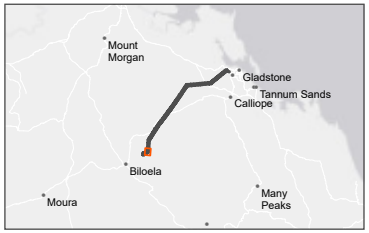
- Watercourse
- Field Survey Extent
- Project Area

White Throated Needletail Habitat

- Foraging and dispersal
- Roosting and foraging

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.24-3

White-throated Needletail Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

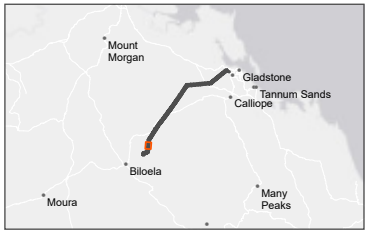
- Field Survey Extent
- Project Area

White Throated Needletail Habitat

- Foraging and dispersal
- Roosting and foraging

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.24-4

White-throated Needletail Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

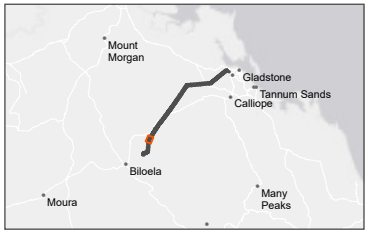
- Field Survey Extent
- Project Area

White Throated Needletail Habitat

- Foraging and dispersal
- Roosting and foraging

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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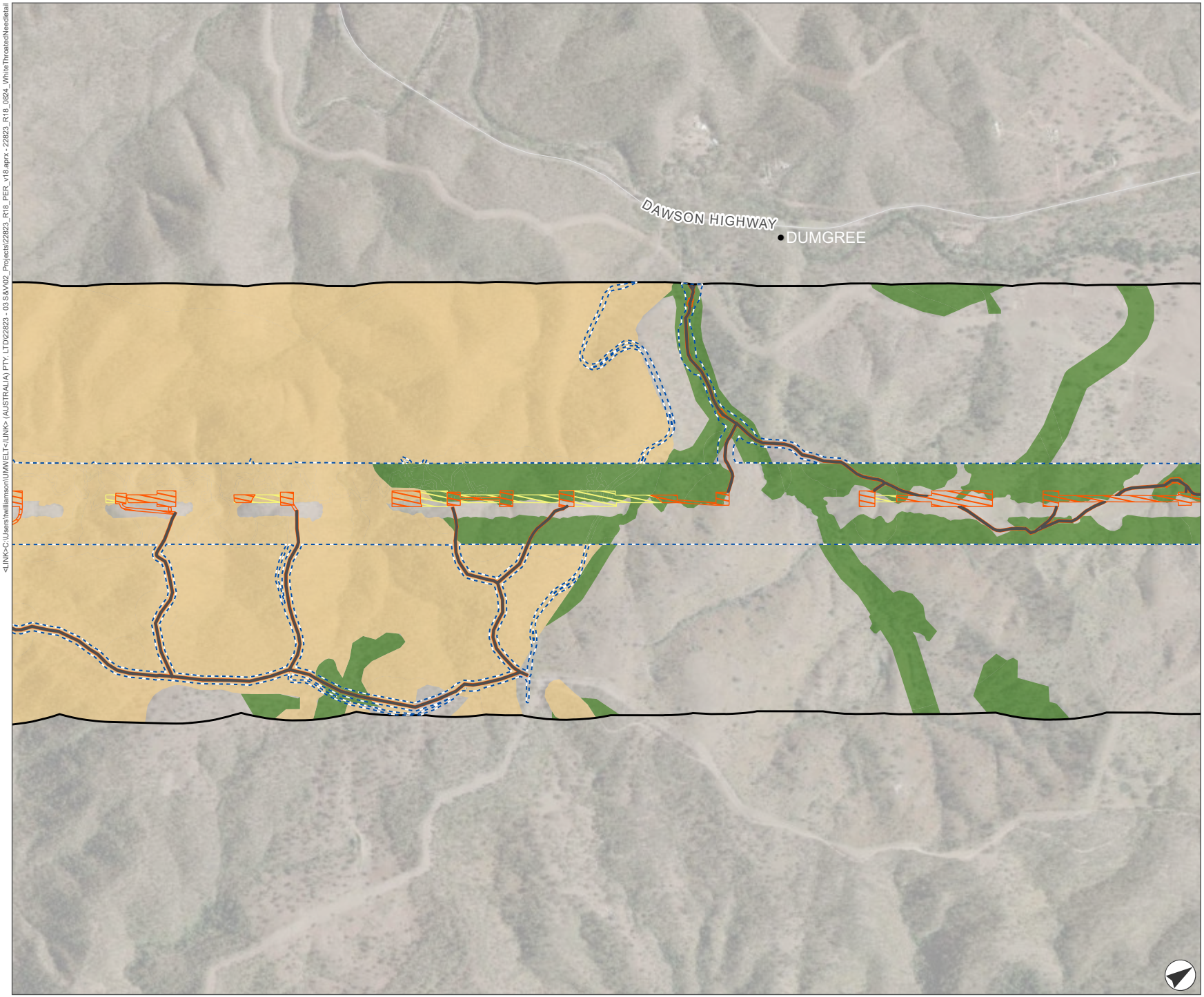


FIGURE 8.24-5

White-throated Needletail Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

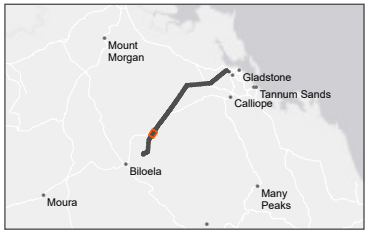
- Roads
- Field Survey Extent
- Project Area

White Throated Needletail Habitat

- Foraging and dispersal
- Roosting and foraging

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.24-6

White-throated Needletail Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

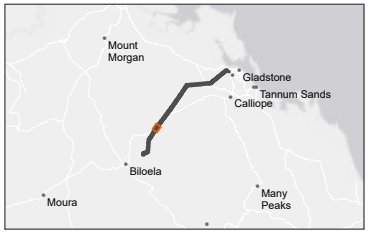
- Roads
- Watercourse
- Field Survey Extent
- Project Area

White Throated Needletail Habitat

- Foraging and dispersal
- Roosting and foraging

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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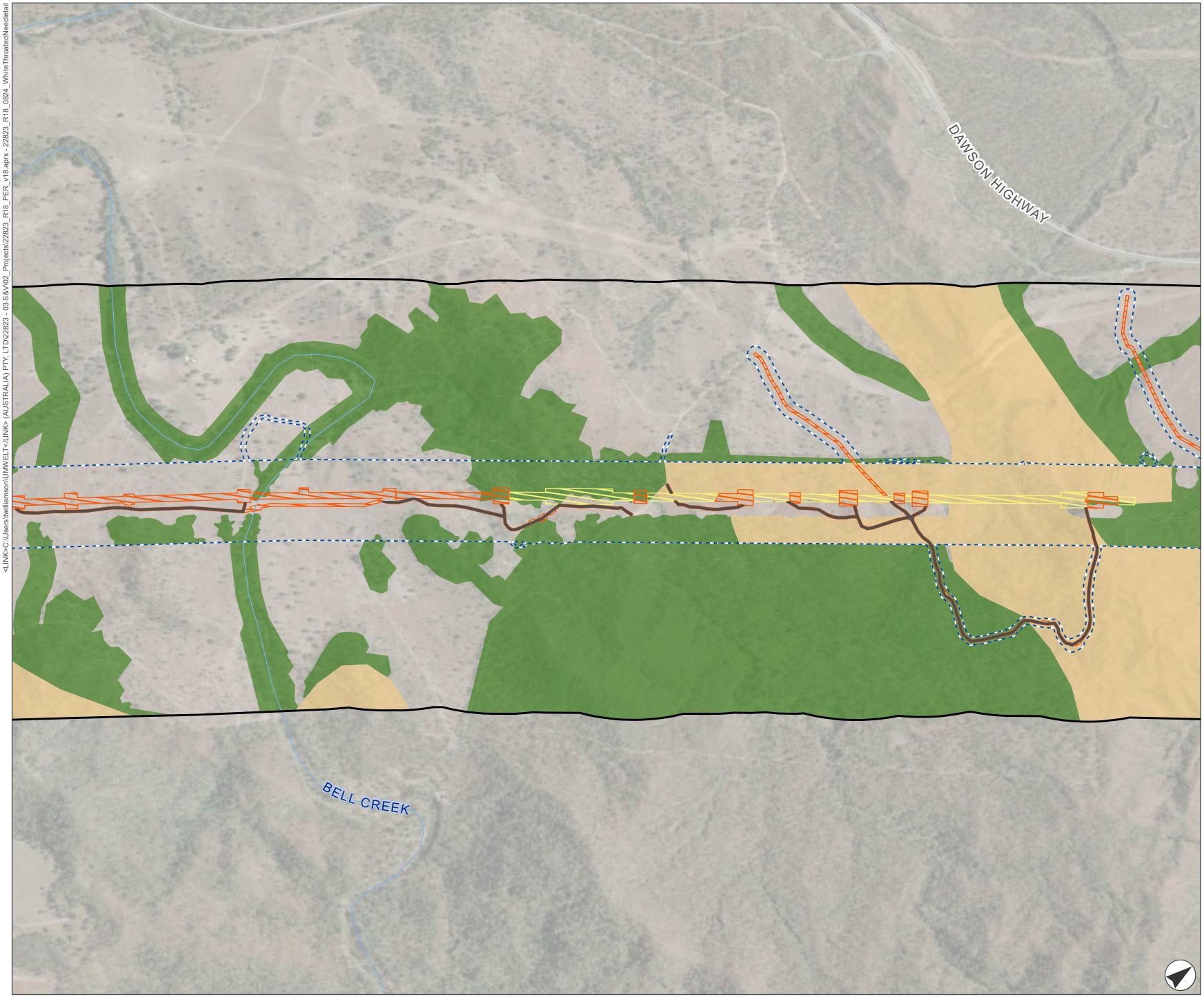


FIGURE 8.24-7

White-throated Needletail Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

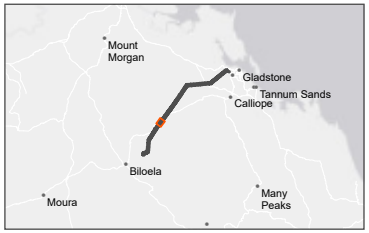
- Roads
- Watercourse
- Field Survey Extent
- Project Area

White Throated Needletail Habitat

- Foraging and dispersal
- Roosting and foraging

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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Kilometres

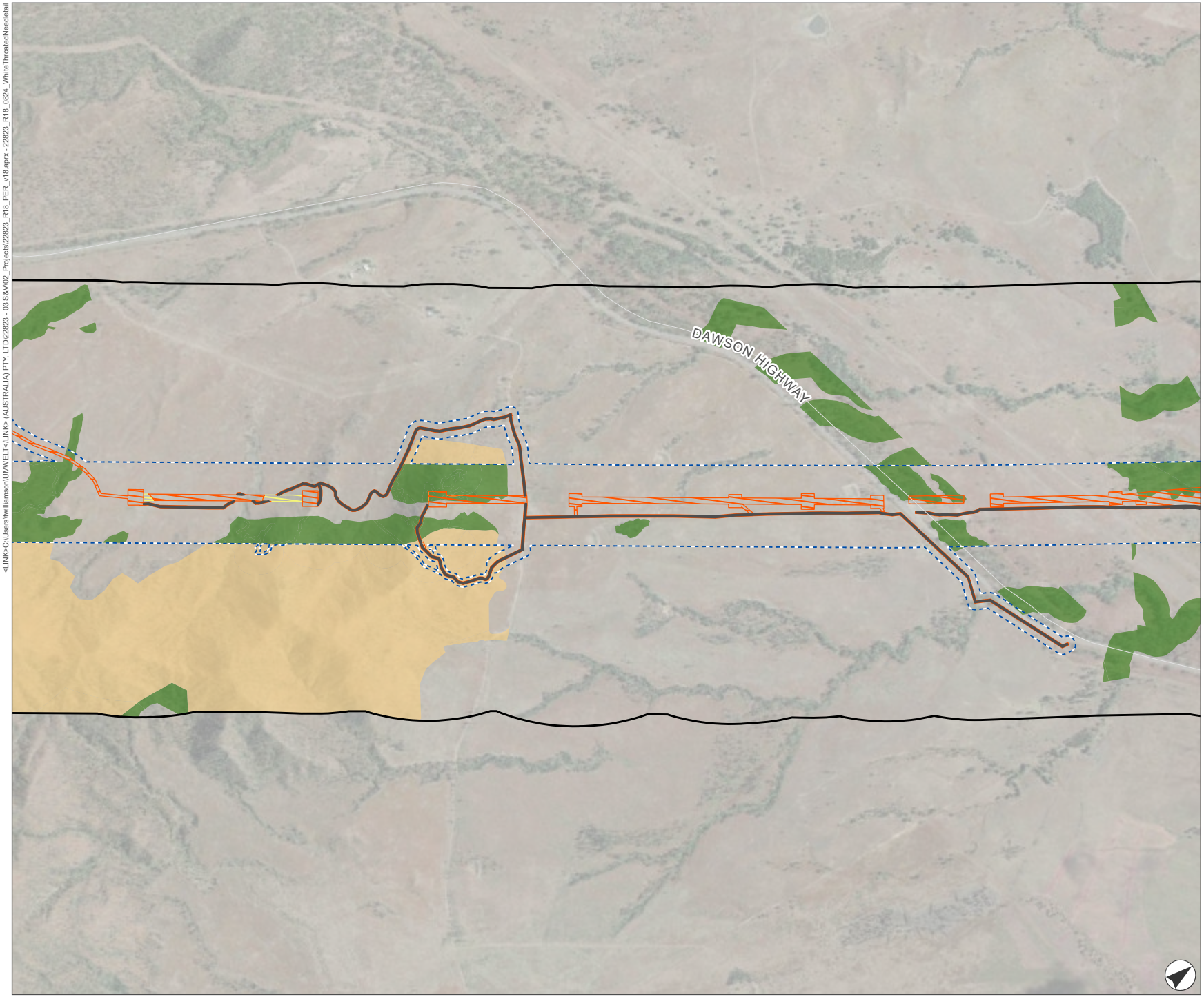
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FIGURE 8.24-8

White-throated Needletail Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

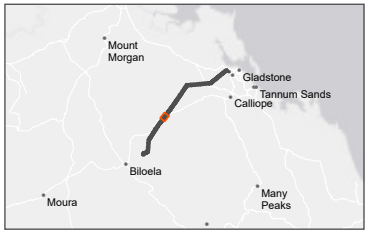
- Roads
- Field Survey Extent
- Project Area

White Throated Needletail Habitat

- Foraging and dispersal
- Roosting and foraging

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.24-9

White-throated Needletail Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

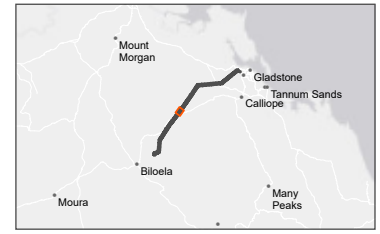
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area

White Throated Needletail Habitat

- Foraging and dispersal
- Roosting and foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



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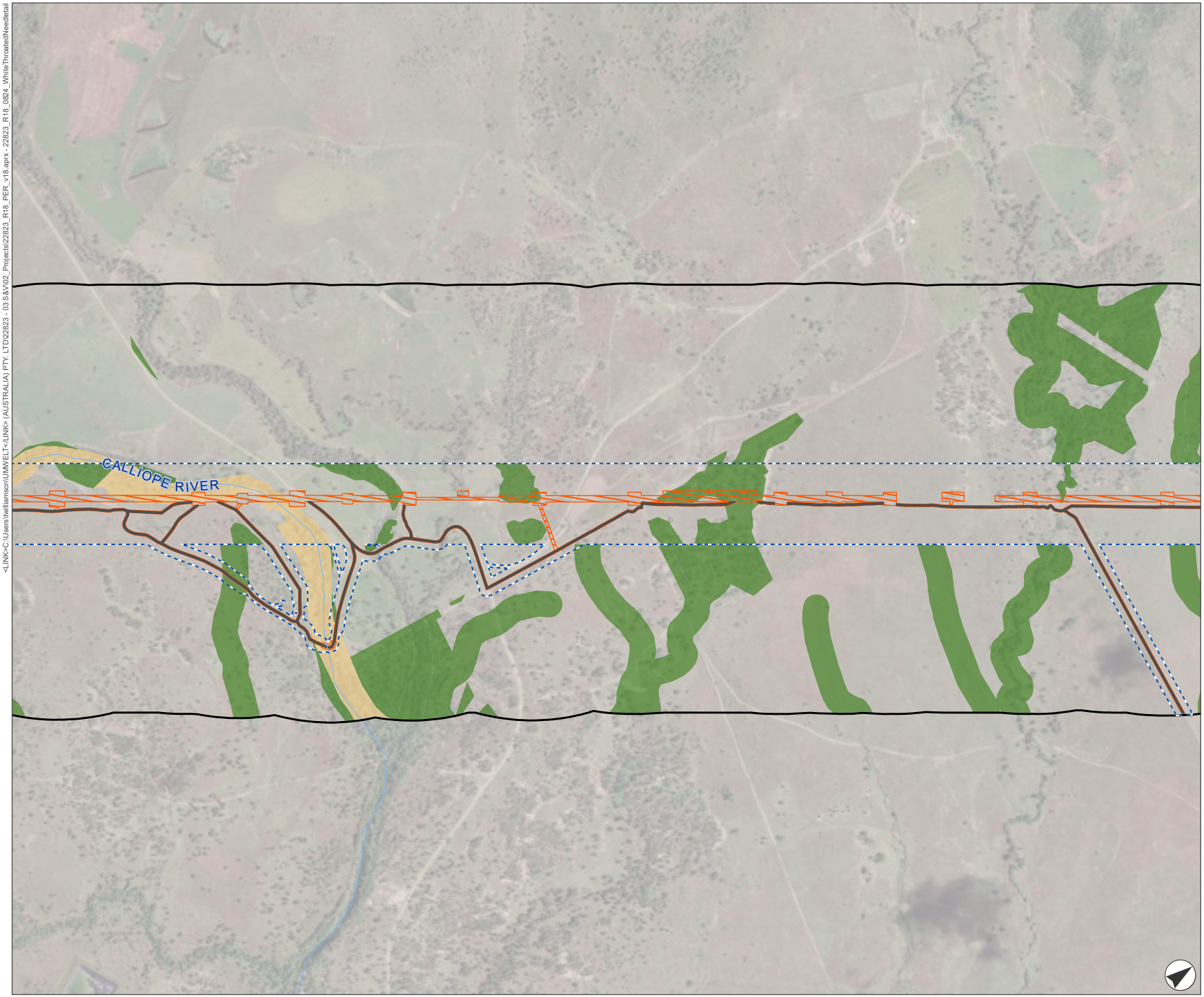


FIGURE 8.24-10

White-throated Needletail Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

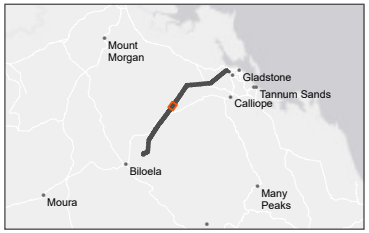
- Watercourse
- Field Survey Extent
- Project Area

White Throated Needletail Habitat

- Foraging and dispersal
- Roosting and foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.24-11

White-throated Needletail Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

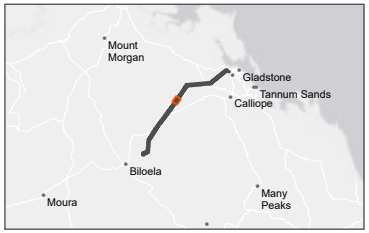
- Field Survey Extent
- Project Area

White Throated Needletail Habitat

- Foraging and dispersal
- Roosting and foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



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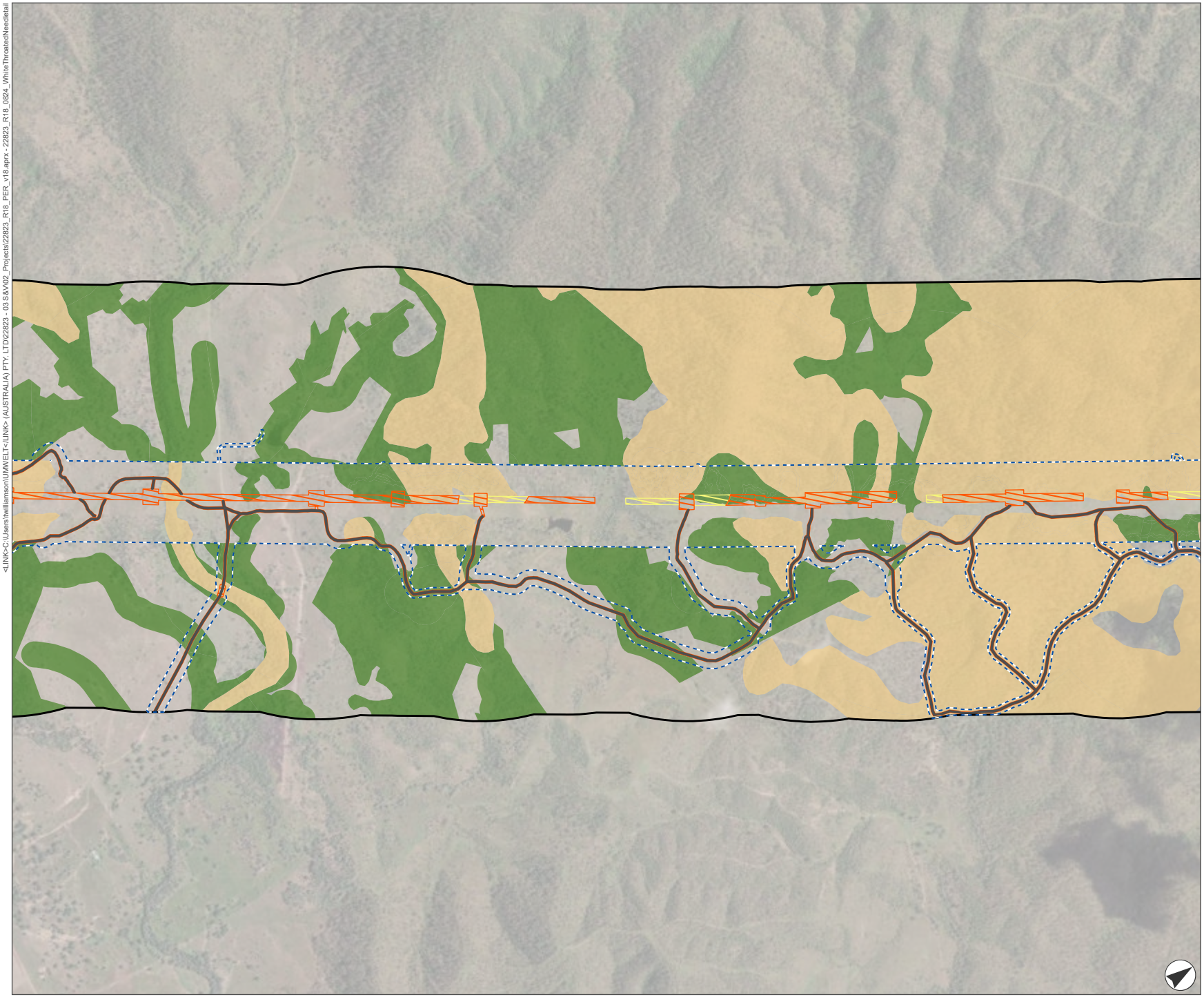


FIGURE 8.24-12

White-throated Needletail Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

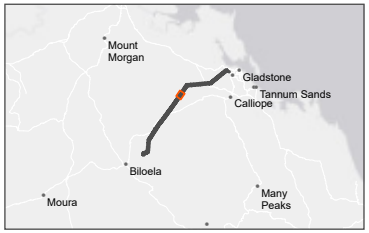
- Field Survey Extent
- Project Area

White Throated Needletail Habitat

- Foraging and dispersal
- Roosting and foraging

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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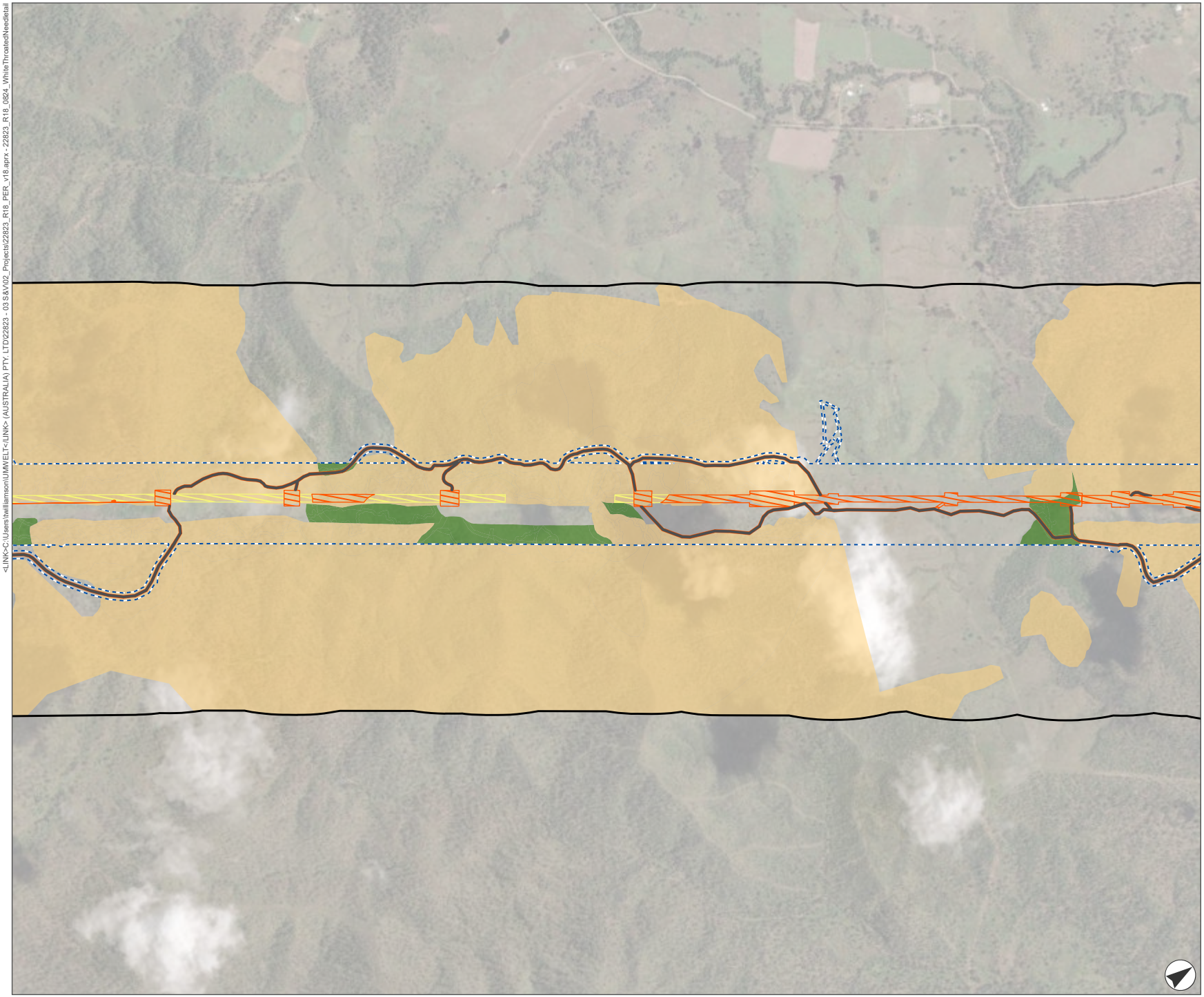


FIGURE 8.24-13

White-throated Needletail Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

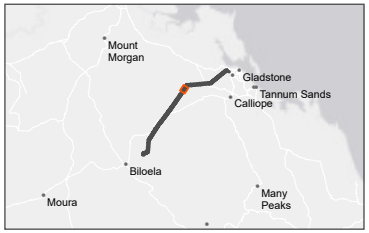
- Field Survey Extent
- Project Area

White Throated Needletail Habitat

- Foraging and dispersal
- Roosting and foraging

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.24-14

White-throated Needletail Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

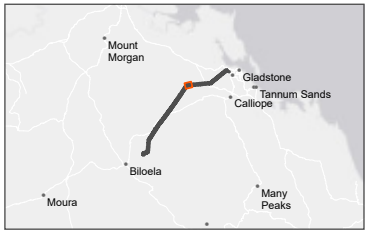
- Field Survey Extent
- Project Area

White Throated Needletail Habitat

- Foraging and dispersal
- Roosting and foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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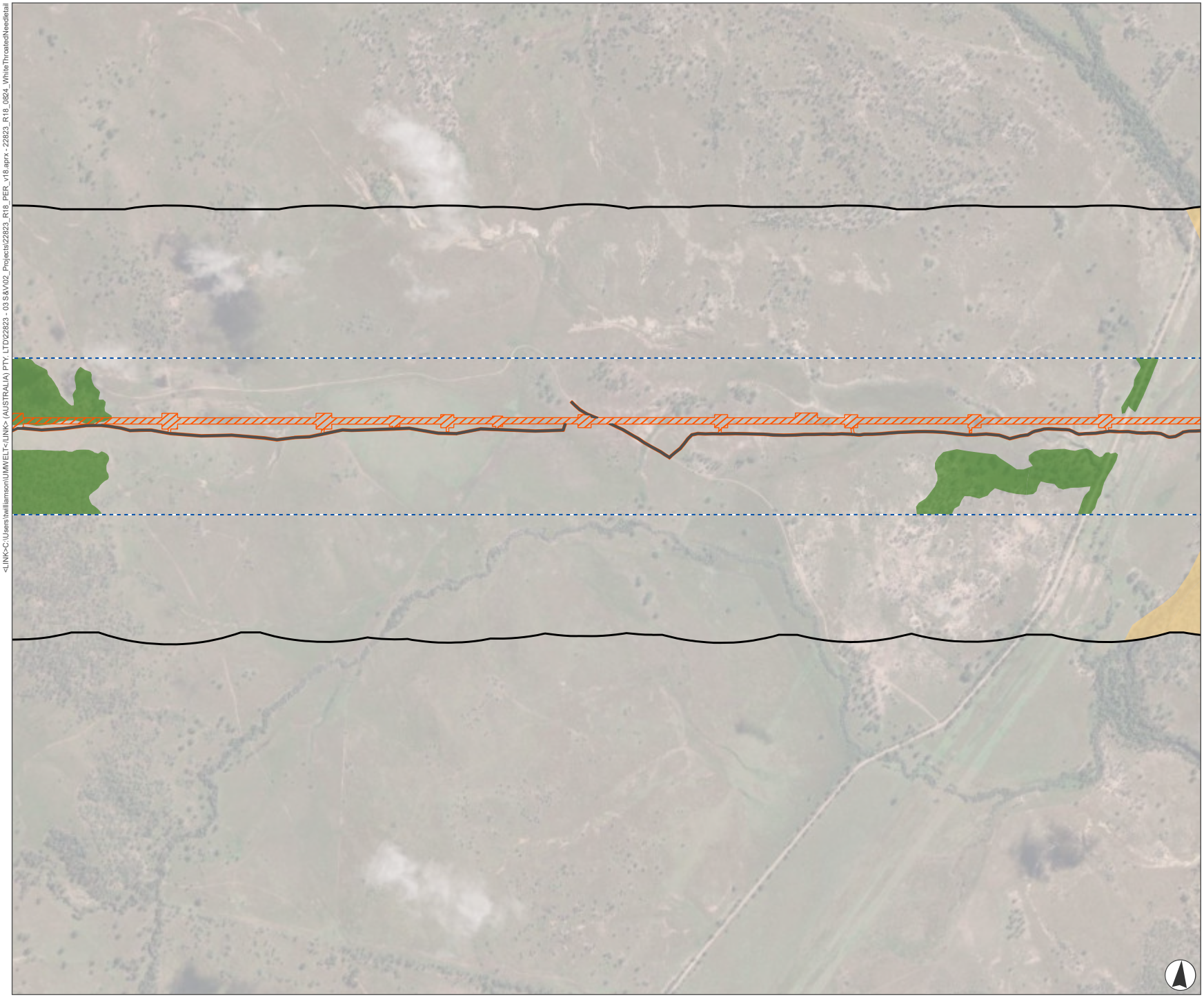


FIGURE 8.24-15

White-throated Needletail Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

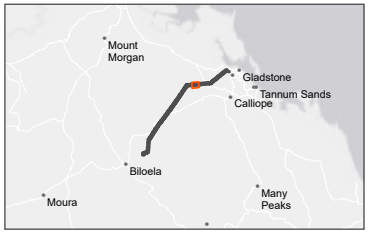
- Field Survey Extent
- Project Area

White Throated Needletail Habitat

- Foraging and dispersal
- Roosting and foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

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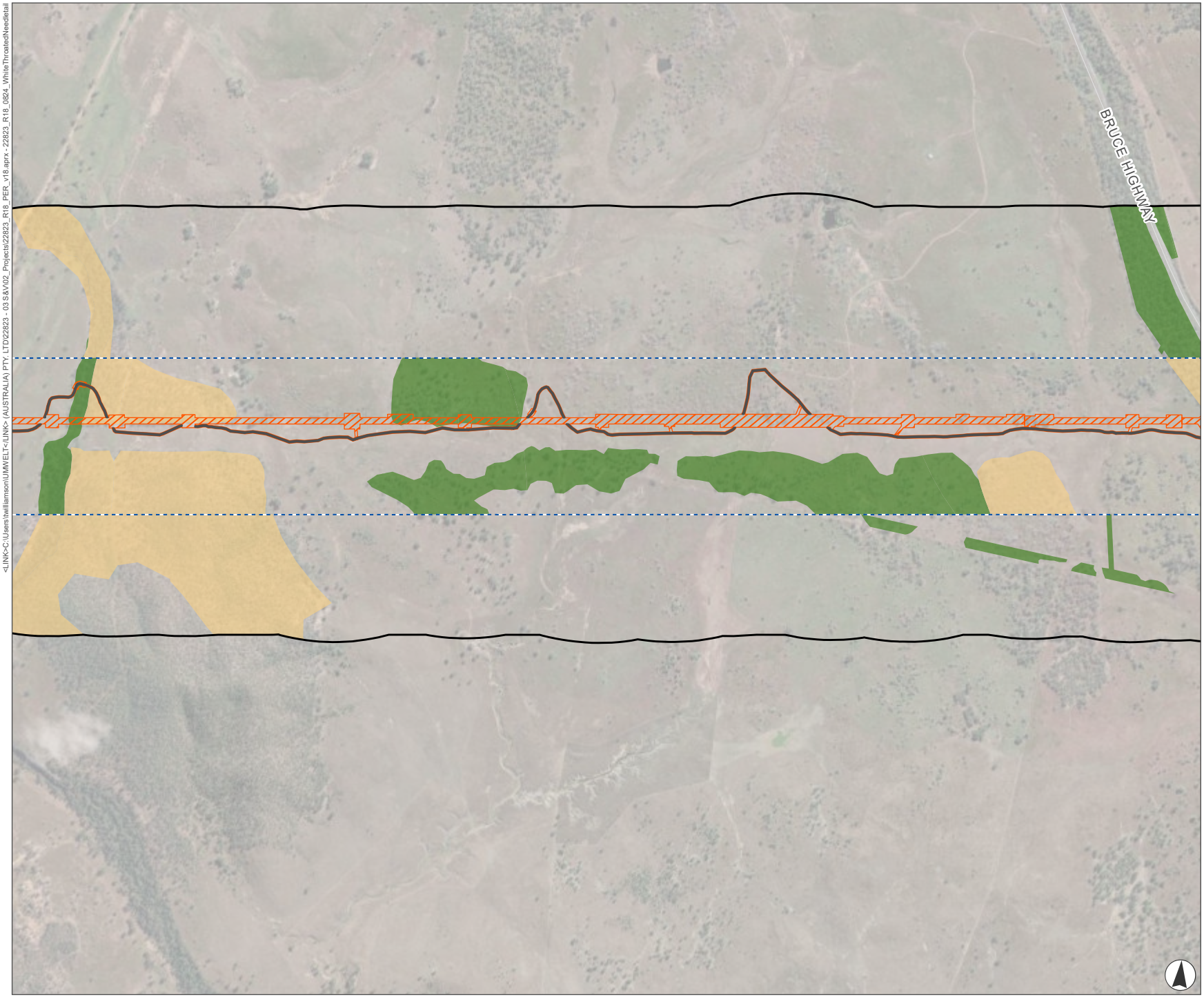


FIGURE 8.24-16

White-throated Needletail Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

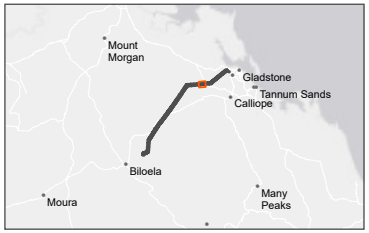
- Roads
- Field Survey Extent
- Project Area

White Throated Needletail Habitat

- Foraging and dispersal
- Roosting and foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.24-17

White-throated Needletail Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

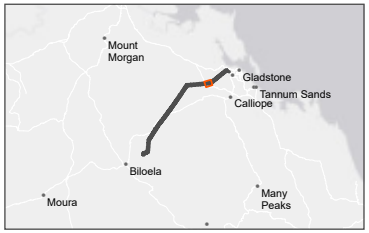
- Roads
- Field Survey Extent
- Project Area

White Throated Needletail Habitat

- Foraging and dispersal
- Roosting and foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



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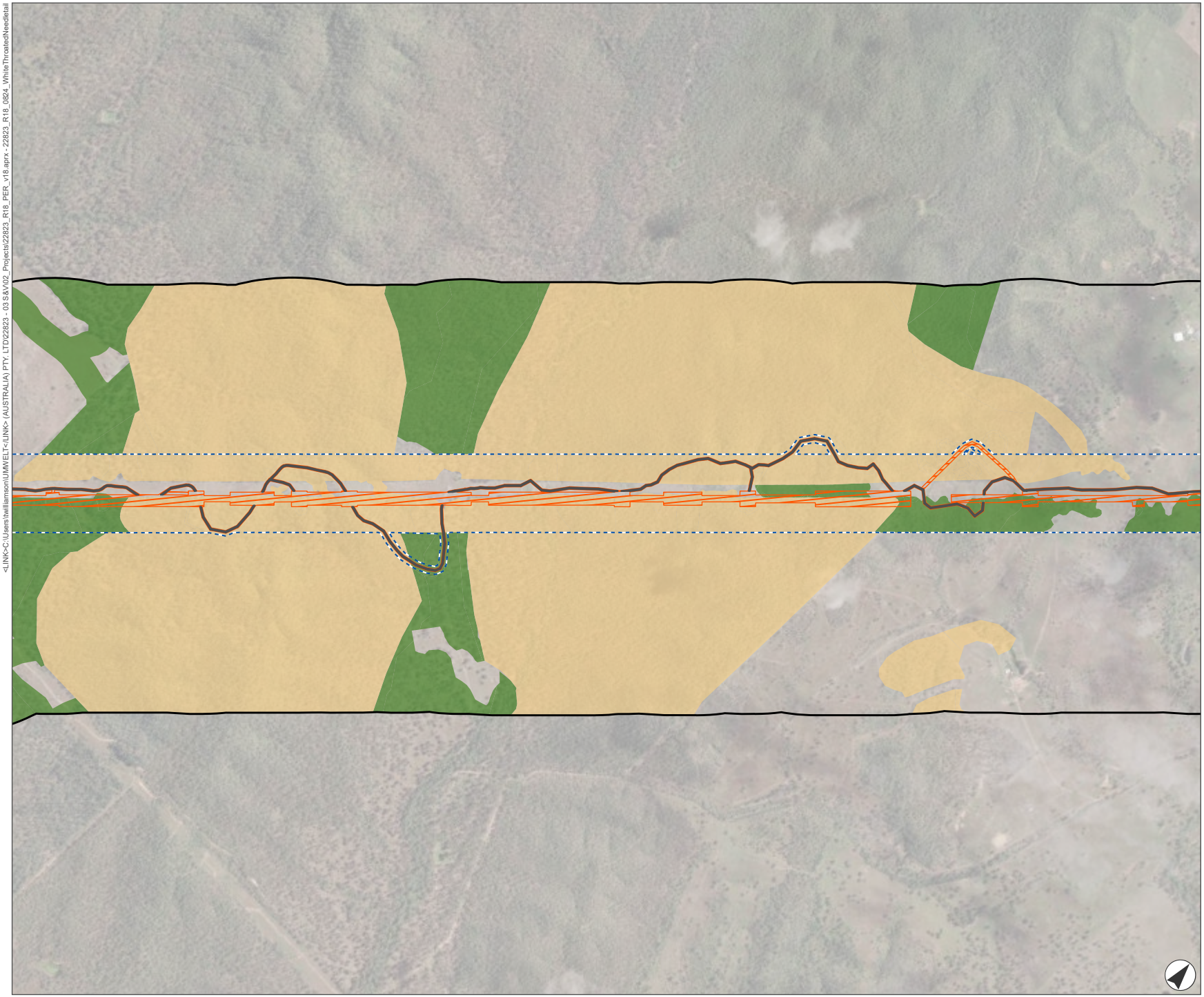


FIGURE 8.24-18

White-throated Needletail Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

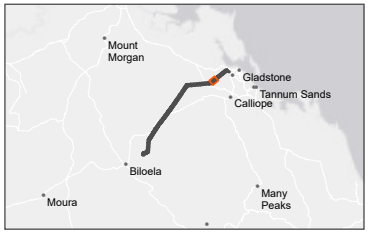
- Field Survey Extent
- Project Area

White Throated Needletail Habitat

- Foraging and dispersal
- Roosting and foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



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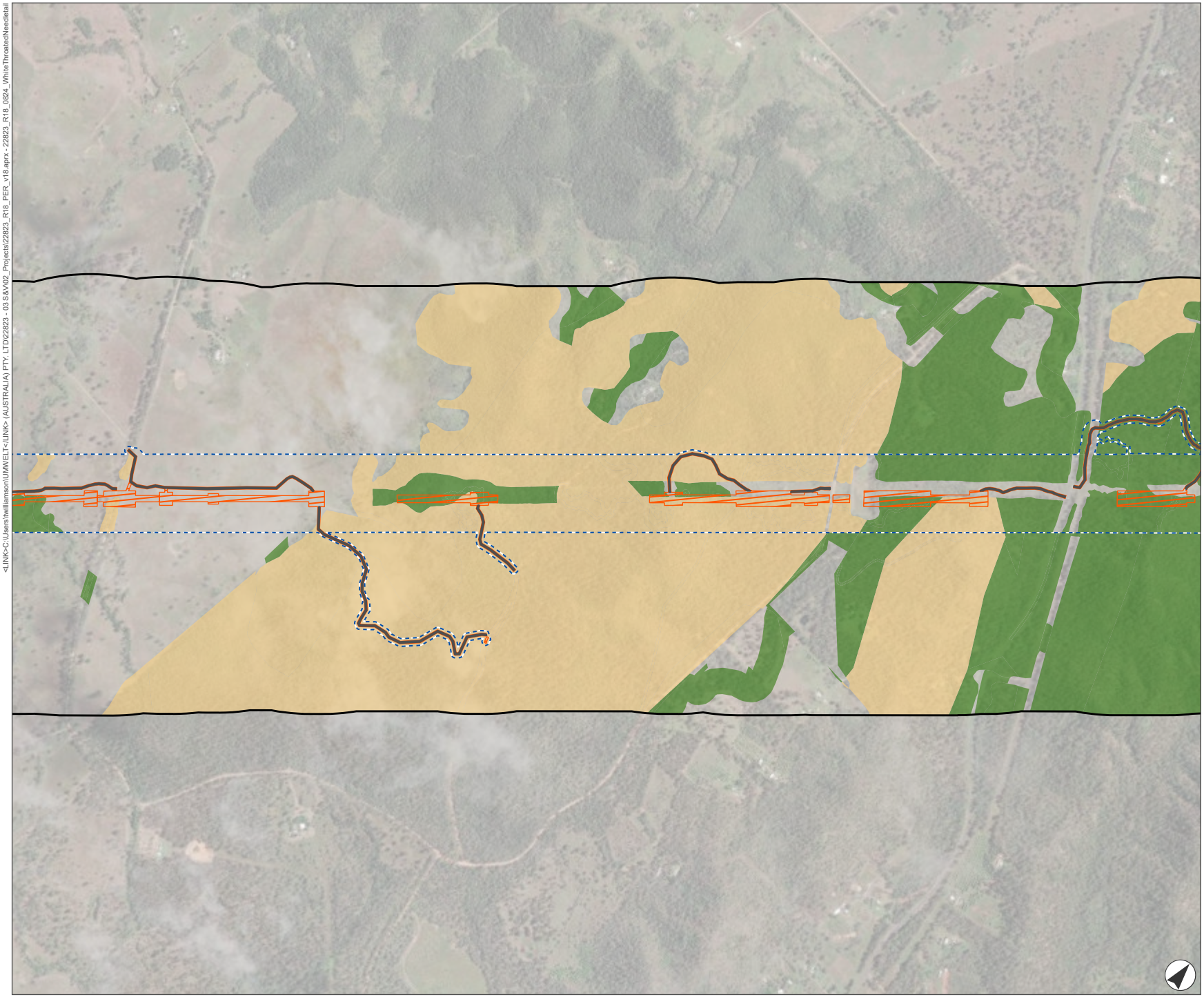


FIGURE 8.24-19

White-throated Needletail Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

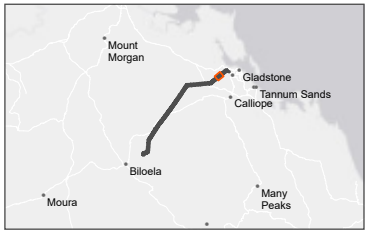
- Field Survey Extent
- Project Area

White Throated Needletail Habitat

- Foraging and dispersal
- Roosting and foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.24-20

White-throated Needletail Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

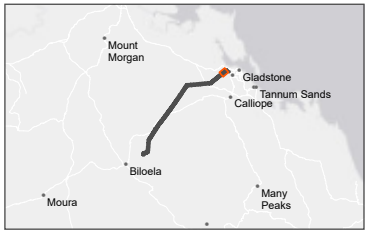
- Railway
- Watercourse
- Field Survey Extent
- Project Area

White Throated Needletail Habitat

- Foraging and dispersal
- Roosting and foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.24-21

White-throated Needletail Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

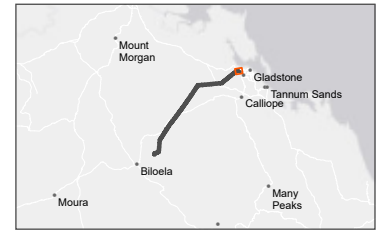
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area

White Throated Needletail Habitat

- Foraging and dispersal
- Roosting and foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



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8.2.7.11 Yellow-bellied Glider (south-eastern) (*Petaurus australis australis*)

Table 8.77 Yellow-bellied Glider (South-eastern): Ecology and Relevance to the Project Area

Yellow-bellied Glider (South-eastern)	
Profile	**Conservation status** Vulnerable **Distribution** The yellow-bellied glider (south-eastern) has a patchy distribution extending from south-eastern Queensland to far south-eastern South Australia. It occurs from sea level up to 1,400 m, with most populations found in forests along the New South Wales east coast (Department of Agriculture, Water and the Environment 2022b). In Queensland, the species is mainly distributed along the coast from north of Mackay to the New South Wales–Queensland border, with additional subpopulations in the Blackdown and Carnarvon ranges of central Queensland. Although the overall range is extensive, it is highly fragmented due to a combination of biogeographic processes and land clearing. Their specialised habitat requirements can also lead to disjunct populations even within otherwise continuous tracts of forest. This distribution overlaps with parts of the Gondwana Rainforests of Australia World Heritage Area (Department of Agriculture Water and the Environment, 2022b). **Important population** The Conservation Advice (Department of Agriculture Water and the Environment, 2022b) defines important populations as stronghold populations, ecologically or genetically distinct populations (e.g. those at the limits of the subspecies' range, outlying populations), research populations, and other populations where recovery actions are being implemented. However, this list of important populations is not exhaustive. In the absence of such information, all known populations should be considered important. All known populations of this subspecies are also considered important populations including: • Carnarvon Range (inland population) • Blackdown Tableland (inland population). Numerous publicly available records of this subspecies are located within the nearby State forests directly north and south of the Project Area, including the Don River State Forest and Kroombit Tops National Park. Connected vegetation may facilitate the movement of this subspecies into the Project Area from these areas, and therefore any population of yellow-bellied glider (south-eastern) potentially occurring within the Project Area is considered an important population. **Historical records within the desktop search extent** SPRAT distribution modelling for the species overlaps with the Project Area; intersecting both ‘habitat likely to occur’ and ‘habitat may occur’ extents (Department of Climate Change, Energy, the Environment and Water, 2025j). WildNet records were identified within the desktop search extent, with the most recent dating from 1999, 3.5 km north of Section D at Gravel Creek, south of Aldoga. Additional nearby records occur at former Targinie State Forest and Kroombit Tops National Park (Department of the Environment, Tourism, Science and Innovation, 2025b).

Yellow-bellied Glider (South-eastern)

Habitat

The yellow-bellied glider (south-eastern) occurs in eucalypt-dominated woodlands and forests, including both wet and dry sclerophyll forests (Department of Agriculture Water and the Environment, 2022b). They show a preference for large patches of mature old growth forest that provide suitable trees for foraging and shelter. There is a clear preference for forests with a high proportion of winter-flowering and smooth-barked eucalypts due to the foraging resources they provide (Department of Agriculture Water and the Environment, 2022b). Yellow-bellied gliders (south-eastern) also require habitat with floristic diversity for year-round food supplies (e.g., the presence of sap feed trees) and are unlikely to persist in forests dominated by only one or two tree species. Abundance is highly dependent on habitat suitability, which is dependent on floristics and forest age.

This species has low dispersal capabilities and shelters in live tree hollows usually more than one meter in diameter (Department of Agriculture, Water and the Environment 2022b). Small social groups occupy large and exclusive home ranges at low densities (groups of 2–6 individuals within a home range of approximately 50–65 ha) due to the wide dispersal of trees used as foraging substrates. Hence, the protection of large areas of forest is required to maintain viable subpopulations. They also have a slow generation time of four to five years (Department of Agriculture, Water and the Environment 2022b).

Yellow-bellied glider (south-eastern) habitat suitability is based on the availability of the total set of attributes (i.e. presence of feed and shelter trees, connectivity) required by the subspecies to meet its' survival and feeding requirements. In consideration of this, yellow-bellied glider (south-eastern) habitat will often include:

- Mature forest, with live-hollow bearing trees for denning, preferably winter-flowering and smooth barked eucalypt
- Sap feed trees with floristic diversity
- Access to forest corridors to facilitate movement to habitat resources over time and space.

Habitat critical to the survival of the species

Habitat critical to the survival of this subspecies (Department of Agriculture, Water and the Environment 2022b) is defined as:

- Large contiguous areas of floristically diverse eucalypt forest, which are dominated by winter-flowering and smooth-barked eucalypts, including mature living hollow-bearing trees and sap trees.
- Areas identified as refuges under future climate change scenarios.
- Short or long-term post-fire refuges (i.e., unburnt habitat within or adjacent to recently burnt landscapes) that allow the species to persist, recover and recolonise burnt areas.
- Habitat corridors required to facilitate dispersal of the subspecies between fragmented habitat patches and/or that enable recolonisation or movement away from threats. Yellow-bellied gliders (south-eastern) have a glide ratio (horizontal distance/height dropped) of around 1:2, and corridors spanning gaps larger than the distance gliders are likely to be able to travel should be considered critical to the survival. There is not enough evidence to define the canopy and width characteristics of appropriate corridors. In the absence of such information, a precautionary approach should be taken to maximise dispersal by considering all habitat corridors in the species' range to be habitat critical to the survival.

Yellow-bellied Glider (South-eastern)

- Areas in which some trees have evidence of use for sap extraction by the yellow-bellied glider (south-eastern).

Habitat meeting any one of the criteria above is considered habitat critical to the survival of the yellow-bellied glider (south-eastern), irrespective of the abundance or density of the species or the perceived quality of the site. Forest areas currently unoccupied by the yellow-bellied glider (south-eastern) may still represent habitat critical to survival, if the recruitment of hollow-bearing trees in the future could allow the species to colonise these areas and ensure persistence of a population.

The habitat within the Project Area is largely fragmented, however habitat corridors to facilitate dispersal, particularly to the nearby State forests, do occur. Based on this, all modelled habitat within the Project Area is conservatively considered to be habitat critical to the survival of the species.

Current threats to the species

As outlined in the subspecies' Conservation Advice (Department of Agriculture Water and the Environment, 2022b), key threats to the yellow-bellied glider (south-eastern) are:

- clearing of habitat
- fragmentation and timber harvesting
- fire disturbance, invasive species predation
- mortality by barbed wire fencing
- habitat degradation.

The subspecies is particularly sensitive to habitat fragmentation, primarily as a result of extensive land clearing for agriculture and development throughout the species' range. Yellow-bellied gliders (south-eastern) are vulnerable to fragmentation impacts due to their large, exclusive home ranges. They require large areas of forest for habitat and have an inability to cross cleared areas of land due to restrictions of gliding distances.

Recovery plans

A recovery plan has not been adopted for this species.

In the Project Area

Surveys

Methods relevant to the detection of yellow-bellied glider (south-eastern) included 422 habitat assessments including collection of DBH data. Fifty-one (51) person hours of spotlight searches on foot and by vehicle within representative yellow-bellied glider (south-eastern) habitat were undertaken. Call playback was utilised during these surveys to maximise chance of detection. Calls were played for approximately 2 minutes at a time with 3 rounds per spotlighting site in suitable habitat for the species.

Species occurrence

Yellow-bellied glider (south-eastern) was not confirmed during the field survey program. It is considered to have a high likelihood of occurring within the Project Area, based on the presence of potential habitat where *Blakella citriodora* and eucalypt woodlands occur.

Yellow-bellied Glider (South-eastern)

The nearby State forests such as the Don River State Forest, the Calliope Conservation Park, the Maxwelton State Forest and the Mount Stowe State Forest, are all expected to provide large areas of suitable habitat for the species and are functionally connected to the Project Area. While barriers to movement exist in the form of the existing transmission lines, roads and fences, it is likely that there is a high level of dispersal throughout these patches.

Habitat Mapping Rules

Habitat type	Habitat modelling criteria	Area (ha)	
		Project Area	Disturbance Footprint
Denning, foraging and dispersal	Select remnant patches of the following REs: 11.3.4, 11.3.25, 11.8.4, 11.10.13, 11.11.3, 11.11.3c, 11.11.4, 11.11.4c, 11.11.10, 11.11.15, 11.12.1, 11.12.6, 11.12.17, 12.3.3, and 12.11.6. Includes all areas of suitable vegetation communities where patches are considered viable for the sub-species', noting their large home ranges, territorial nature and inability to persist in narrow linear fragments. Patch size assessments considered the continuity of vegetation beyond the Project Area bounds using aerial imagery and State mapping.	3,195.2	20.9

Table 8.78 Assessment of Potential Project Impacts and Mitigation and Management Commitments for Yellow-bellied Glider (South-eastern)

Potential Impact	Assessment	Mitigation Commitments
Direct		
Vegetation clearing causing habitat loss and fragmentation	Vegetation clearing required for the construction of the Project would result in direct impacts of up to 20.9 ha of denning, foraging and dispersal habitat. The results of habitat clearance include reduced abundance of microhabitat for denning.	• Identify MNES fauna habitat and individuals through pre-clearance surveys with hollows for yellow-bellied glider identified and salvaged as per the Hollow Salvage Protocol • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Disturbance activities must be contained to Disturbance Footprint • During the pre-clearance survey, the fauna spotter-catcher will locate, record and mark the habitat features (including those to be retained in situ) • Install tree protection to habitat trees immediately adjacent to areas of earthworks • Refer to Table 5.1 and Table 5.8 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Injury or direct mortality from clearing impacts	Construction works will involve the modification, disruption or removal of habitat for the species; therefore, injury or mortality is a risk associated with clearing activities. Clearing may cause physical injury or fatality through entrapment in tree hollows during vegetation removal.	• Appropriately qualified fauna spotter catcher to undertake pre-clearance habitat assessment and be present during clearing and disturbance to habitat features • Clearing must be staged, with non-habitat trees felled first • Tampering with an animal breeding place to be carried out in accordance with an approved Species Management Program • Clear delineation of habitat features to be retained • Habitat trees must be soft-felled • Restrict vehicles to approved access tracks • Vehicle travelling speed restricted to <40 km/hr • Excavations must be secured (e.g. covered) • Any new fencing used for the perimeter or within the Project Area must be constructed entirely of plain (non-barbed) wire where landholder preferences allow and where no security, safety, or insurance requirements apply. • The second preference for new fencing will incorporate a top strand of plain (non-barbed) wire with barbed wire only to be used where required to meet Australian safety standards, electrical security requirements, insurance conditions, or specific landholder or security restrictions. • Where new fencing incorporating barbed wire is established within the Project Area, fence visibility must be increased by affixing durable visibility tags or tape at 30 cm intervals along the top strand of the barbed wire fencing. • Pre-clearance surveys for glider hollows • Suitable trees (stem injected where required) will be retained in situ as suitable gliding poles in riparian areas • Injured individuals transported to local wildlife carer or vet • Refer to Table 5.3 of the MNES Management Plan for further details on mitigation measures.
Indirect		
Alterations to fire regimes and potential for increased accidental bushfire	Construction activities and ongoing vehicle use within the	• Bushfire Management Plan will be developed • Burning of vegetation strictly prohibited unless a permit is obtained • Designated parking areas for vehicles and machinery

Potential Impact	Assessment	Mitigation Commitments
that may result from construction and/or operation	Project Area may increase the ignition potential.	• During operation, vegetation within the Disturbance Footprint will be managed in accordance with Powerlink's vegetation specification • Refer to Table 5.9 of the MNES Management Plan for further details on mitigation measures.
Loss of movement opportunities, barriers created within suitable habitat	Although the Project is linear in nature, clearing widths of up to 60 m for transmission line spans would exceed the species volplane capabilities in some locations and would reduce functional connectivity for any local population. An existing transmission line is currently in operation within the Project Area. The Project is to be situated adjacent limiting additional fragmentation with a maximum width of clearance of approximately 100 m (except Section C which will be greater than 100m). However, the existing transmission line already presents a gap too large for the species to volplane across. Project refinement has ensured that several patches of suitable habitat will be over spanned, limiting impacts to connectivity.	• Identify MNES fauna habitat and individuals through pre-clearance surveys • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Disturbance activities must be contained to Disturbance Footprint • Habitat features to be relocated to adjacent areas • During the pre-clearance survey, the fauna spotter-catcher will locate, record and mark the habitat features (including those to be retained in situ) • Install tree protection to habitat trees immediately adjacent to areas of earthworks • Suitable trees (stem injected where required) will be retained in situ as suitable gliding poles in riparian area • Refer to Table 5.1 and Table 5.8 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Increased incidence of feral predators such as feral cats and foxes	Clearing of vegetation for tracks and transmission line infrastructure within suitable habitat is unlikely to exacerbate the threat of pest predators by facilitating movement throughout the site. Populations of pest predators are already known to exist throughout the Project Area and interactions between yellow-bellied gliders (south-eastern) and these predators are likely to be infrequent given the species almost exclusive use of the canopy.	• Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • All waste to be secured • Biosecurity Instrument Permit to be obtained for moving materials out of or within different biosecurity zones • Educate workforce in the identification of pest fauna species • Avoid inclusion of any water retaining voids or pits • Refer to Table 5.5 and Table 5.6 of the MNES Management Plan for further details on mitigation measures.
Noise, activity and vibration generated during construction and operation interrupting foraging, breeding or dispersal behaviours	Construction activities will primarily occur during daylight hours (6.30 am to 6.30 pm), which is outside of yellow-bellied glider daily peak activity periods. As clearing will be staged, noise will be limited to discrete locations at the clearing front. Construction noise will primarily occur around	• Plant and equipment to be fitted with appropriate noise attenuation and maintained • Deliveries and removal of material and equipment to and from site within approved hours for construction • Plant to be turned off when not in use • No unnecessary use of horns or other audible signals on mobile plant or equipment • Machinery and equipment will be maintained in good working condition • Refer to Table 5.10 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
	infrastructure (not intact habitat). Noise in relation to operation is negligible.	
Dust generated during construction activities disturbing behaviours or health/palatability of foraging resources	Dust emissions may result following construction activities and affect adjacent habitat. Dust can settle on adjacent vegetation, coating leaves and reducing photosynthesis, respiration, and growth.	• Dust suppression measures including vehicles restricted to approved tracks, cover all loose loads and set speed limits (<40 km/hr) • Application of dust suppressants as required • Dust generating activities will be limited on days with strong winds blowing towards sensitive receptors or dust sensitive locations • Regular monitoring and visual surveillance to trigger management actions will be undertaken • Refer to Table 5.4 of the MNES Management Plan for further details on mitigation measures.

Table 8.79 Significant Impact Assessment: Yellow-bellied Glider (South-eastern)

Impact Criteria	Assessment
Lead to a long-term decrease in the size of an important population of a species	**Unlikely.** The Conservation Advice notes that there is no reliable estimate of the population size of the yellow-bellied glider (south-eastern) (Department of Agriculture Water and the Environment, 2022b). (J. Woinarski et al., 2016) suggest that there are over 100,000 mature individuals. However, due to ongoing decline and the 2019–20 bushfires, the current population size is likely to be below 100,000 mature individuals but still substantially above 10,000 mature individuals. Yellow-bellied glider (south-eastern) was not recorded during the field survey program. As described above, any individuals present are considered to constitute an important population as they may be important for maintaining genetic diversity. Direct impacts to potential habitat include clearing of 20.9 ha of denning, foraging and dispersal habitat. A number of communities identified to comprise habitat occur within the Disturbance Footprint and Project Area. This habitat is characterised by large patches of remnant woodland communities containing sap-feeding, winter-flowering and smooth barked eucalypts. Suitable habitat for the yellow-bellied glider (south-eastern) in the Project Area is not considered unique or high quality due to the rocky substrate and low water availability (resulting in stunted tree growth and low hollow abundance), historical clearing and ongoing disturbance from weeds and pests. Habitat availability is expected to be high in the wider local area. There are large areas of mapped remnant woodlands which are functionally connected to the Project Area

Impact Criteria	Assessment
	including several protected areas. These areas are likely to provide a greater abundance of important habitat resources including hollow bearing trees and stags. Potential indirect impacts on the species as a result of the Project are expected to be limited but will be actively managed in accordance with the MNES Management Plan which will include specific measures for the yellow-bellied glider (south-eastern) including pre-clearance survey requirements. Based on the above, a long-term decrease in the size of a population is unlikely to result from the Project.
Reduce the area of occupancy of an important population	**Unlikely.** The subspecies area of occupancy is estimated at 12,724 km^2, however this may be overstated given the low resolution in the mapping methodology used by the Commonwealth (2 km x 2 km grid). An important population of the species is considered present within the Project Area. Direct impacts via vegetation clearing will occur to a maximum of 20.9 ha of potential denning, foraging and dispersal habitat. The Project is linear in nature and clearing will be minimised wherever possible. The Project is collocated with the existing easement ensuring current habitat connectivity is maintained allowing for continued movement of individuals beyond the Project Area. Mapped habitat patches will not be isolated any more than already exists. The Project Area does not occur near the limit of the species distribution. Based on this, Project works are considered unlikely to materially reduce the availability or quality of habitat for the species to the point where the occupancy of an important population would be reduced.
Fragment an existing important population into two or more populations	**Likely.** Modelled habitat within the Disturbance Footprint has existing fragmentation as a result of historical clearing, the existing transmission lines and ongoing agricultural practices. While yellow-bellied gliders (south-eastern) can volplane distances up to 140 m, they typically glide up to 40 m. The existing transmission line has created a north-south barrier to movement for this species, as it has a linear cleared width of approximately 55 m, although there are several existing uncleared mid span sections to provide movement for this species; this is a rare occurrence. This cleared distance is unlikely to be traversed by any current population within the Project Area. At its widest distance, the Project will increase these clearing widths to approximately 100 m (or greater than 100 m in Section C). The subspecies is known to have limited dispersal capacity and is sensitive to habitat fragmentation, preferring large patches of continuous woodland habitat. Some direct impacts will also occur within riparian vegetation which is likely to provide the preferred movement pathways for the subspecies. Furthermore, although highly unlikely, the infrastructure may present a barrier to movement in areas where connecting wires may be low enough to obstruct gliding. As such, the local population of yellow-bellied gliders (south-eastern) may be disrupted as dispersal across the easement may be restricted. Therefore, it is possible that the Project may fragment an existing important population into two or more populations.

Impact Criteria	Assessment
Adversely affect habitat critical to the survival of a species	**Likely.** As described above, all suitable yellow-bellied glider (south-eastern) habitat within the Project Area has been conservatively considered to meet the definition of habitat critical to the survival of the species. Up to 20.9 ha of suitable habitat will be directly impacted via vegetation clearing for construction of the Project. While the final extent of clearing may be less than this, the loss of some habitat will be unavoidable, and it is noted these are a limited features in the landscape. While large areas of suitable habitat will remain following the construction of the Project, the removal of habitat and key habitat features may be of the magnitude to be considered an 'adverse effect' on habitat critical as per the Conservation Advice.
Disrupt the breeding cycle of an important population	**Unlikely.** The subspecies has low breeding potential, with a single offspring produced per year or every second year. Tree hollows are required for this subspecies to breed, and potential breeding habitat will be directly impacted. The use of fauna spotter catchers, particularly during the breeding period, will ensure that any displaced individuals possibly bearing young are captured and relocated as part of the high-risk SMP. While reduction of hollow-bearing trees is anticipated as part of clearing works for the Project, the species has not been detected within the Project Area and likely exists as a transient, low density population given the species preference for large, productive habitat patches and large home ranges (Department of Agriculture Water and the Environment, 2022b). As such, the removal of hollow-bearing trees is unlikely to functionally disrupt breeding activity, particularly given the minor extent of clearing and the availability of suitable habitat adjacent to the Disturbance Footprint.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Potential.** A maximum of 20.9 ha of suitable habitat will be directly impacted via vegetation clearing for construction of the Project. Suitable habitat for the yellow-bellied glider (south-eastern) is not considered unique or high quality due to the low hollow abundance, historical clearing for agricultural works and ongoing disturbance from weeds and pests. The Project is linear in nature and clearing will only be completed as strictly required. Within areas of yellow-bellied glider habitat, suitable glider hollows (tree DBH >30 cm and hollow size greater than 8 cm) will be prioritised for avoidance within the Disturbance Footprint or otherwise salvaged in accordance with the MNES Management Plan. The results of habitat clearance also include indirect impacts such as, greater incursion of invasive predators such as the red fox and feral cat, as well as potential for altered fire regimes. Pest species which may predate on yellow-bellied glider (south-eastern) such as red fox and feral cat, were recorded during the field survey program and are established throughout the Project Area and surrounding region. Predation by these species is likely limited as yellow-bellied glider (south-eastern) would only be susceptible to attack when they come to the ground, which is uncommon. The species is known to come to ground after they have been displaced by bushfires, which suggest that fire-predation interactions

Impact Criteria	Assessment
	may amplify this threat to the species. Bushfire can also lead to significant population decline as a result of lethal heating or suffocation from smoke, or indirectly from loss of habitat features and resources. Potential impacts from pests will be actively managed in accordance with mitigation measures outlined within Table 5.6 of the MNES Management Plan. Impacts of fire will be actively managed by the Project's BMP. However, past large-scale fires in the region highlight that wider area is susceptible to bush fires of variable intensity and frequency potential impacting the habitat of this species particularly the loss of den and shelter sites. Whilst the suite of mitigation measures will minimise the impact to the species as a result of the Project; due to the potential for localised population level impacts, the quantum and/or severity may assist in overall species decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**Unlikely.** Predation by red fox and feral cat have been identified as a threat to the yellow-bellied glider (south-eastern). Populations of both of these species are already established throughout the Project Area. However, roads and other forms of habitat disturbance related to the Project may promote increased infiltration of carnivores. The Project Area already contains conduits for movement, and therefore it is considered unlikely that clearing required for construction of the Project will significantly exacerbate the movement of exotic predators. The Project will employ best practice control methods for weeds and pests and is unlikely to introduce or exacerbate weeds or pests beyond existing levels.
Introduce disease that may cause the species to decline	**Unlikely.** There are no known diseases affecting the species directly. Phytophthora root fungus (*Phytophthora cinnamomi*) has the potential to indirectly impact the species via the infection of eucalyptus trees. The Project will employ best practice biosecurity protocols; therefore, introduction of a disease is unlikely.
Interfere substantially with the recovery of the species	**Likely.** There is no recognised national recovery plan for the subspecies, however one is required to stop decline and abate threats. The recently published Conservation Advice (Department of Agriculture Water and the Environment, 2022b) includes conservation and management priorities which are grouped into three key themes including habitat loss, climate change and invasive species (including threats from predation, grazing, trampling). Habitat loss is a recognised threat to the species. Whilst the final impact area on potential habitat may be smaller than the area currently represented in the Disturbance Footprint, the loss of hollow-bearing trees will still occur. The Project may interfere with the recovery of the subspecies by reducing the availability of habitat in the regional context, albeit to a limited extent.
Significant Residual Impact	**Likely to have a significant impact**

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FIGURE 8.25-1

Yellow-bellied Glider Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

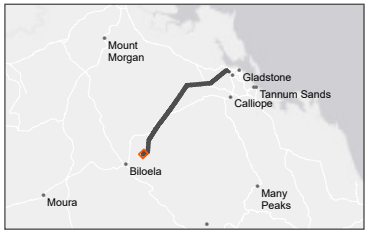
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Yellow-bellied Glider Habitat

- Denning, foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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Kilometres

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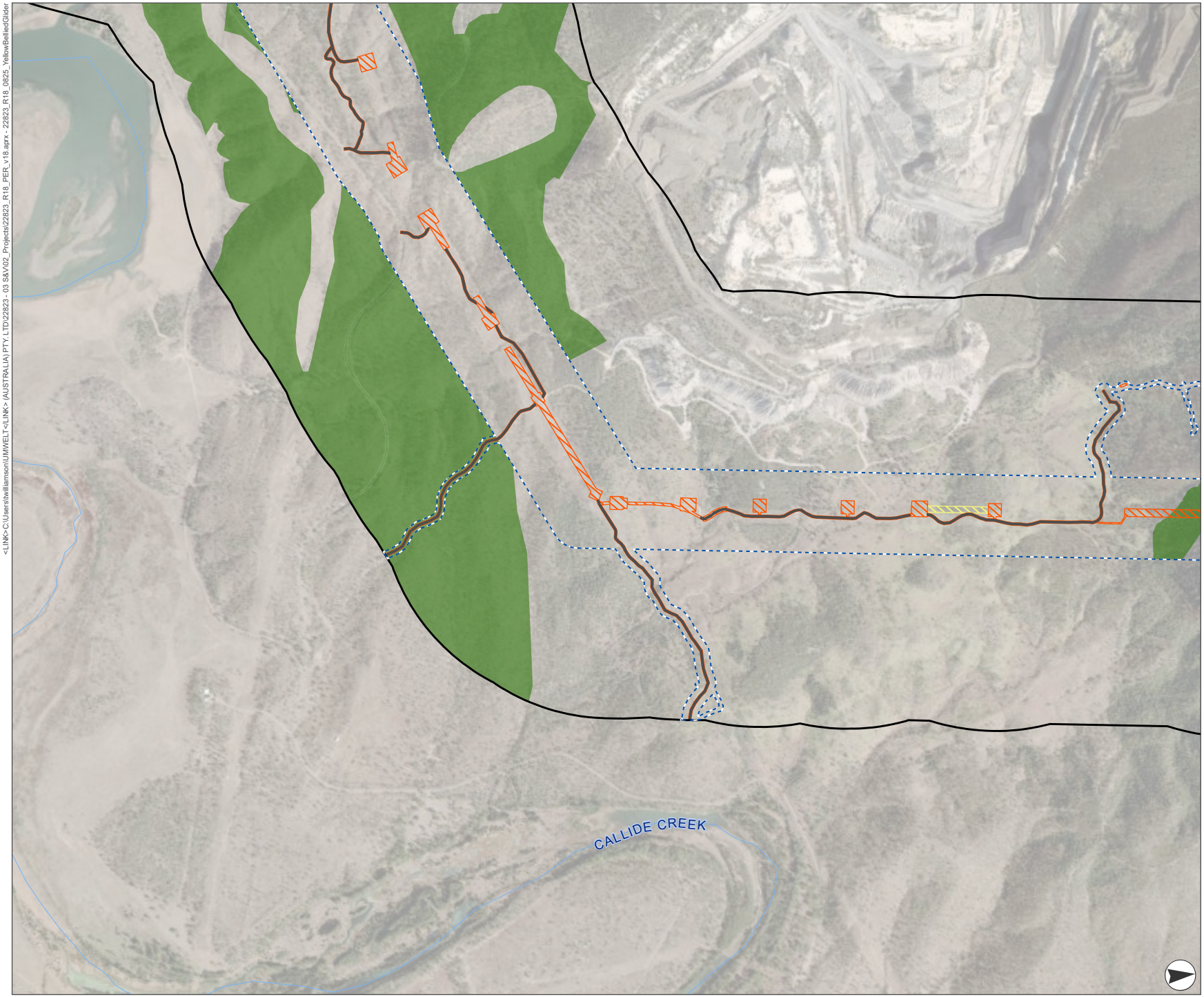


FIGURE 8.25-2

Yellow-bellied Glider Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

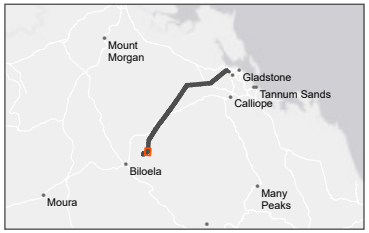
- Watercourse
- Field Survey Extent
- Project Area

Yellow-bellied Glider Habitat

- Denning, foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.25-3

Yellow-bellied Glider Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

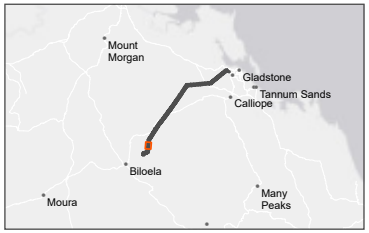
- Field Survey Extent
- Project Area

Yellow-bellied Glider Habitat

- Denning, foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.25-4

Yellow-bellied Glider Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

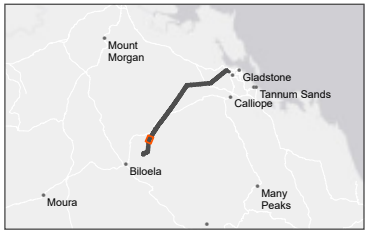
- Field Survey Extent
- Project Area

Yellow-bellied Glider Habitat

- Denning, foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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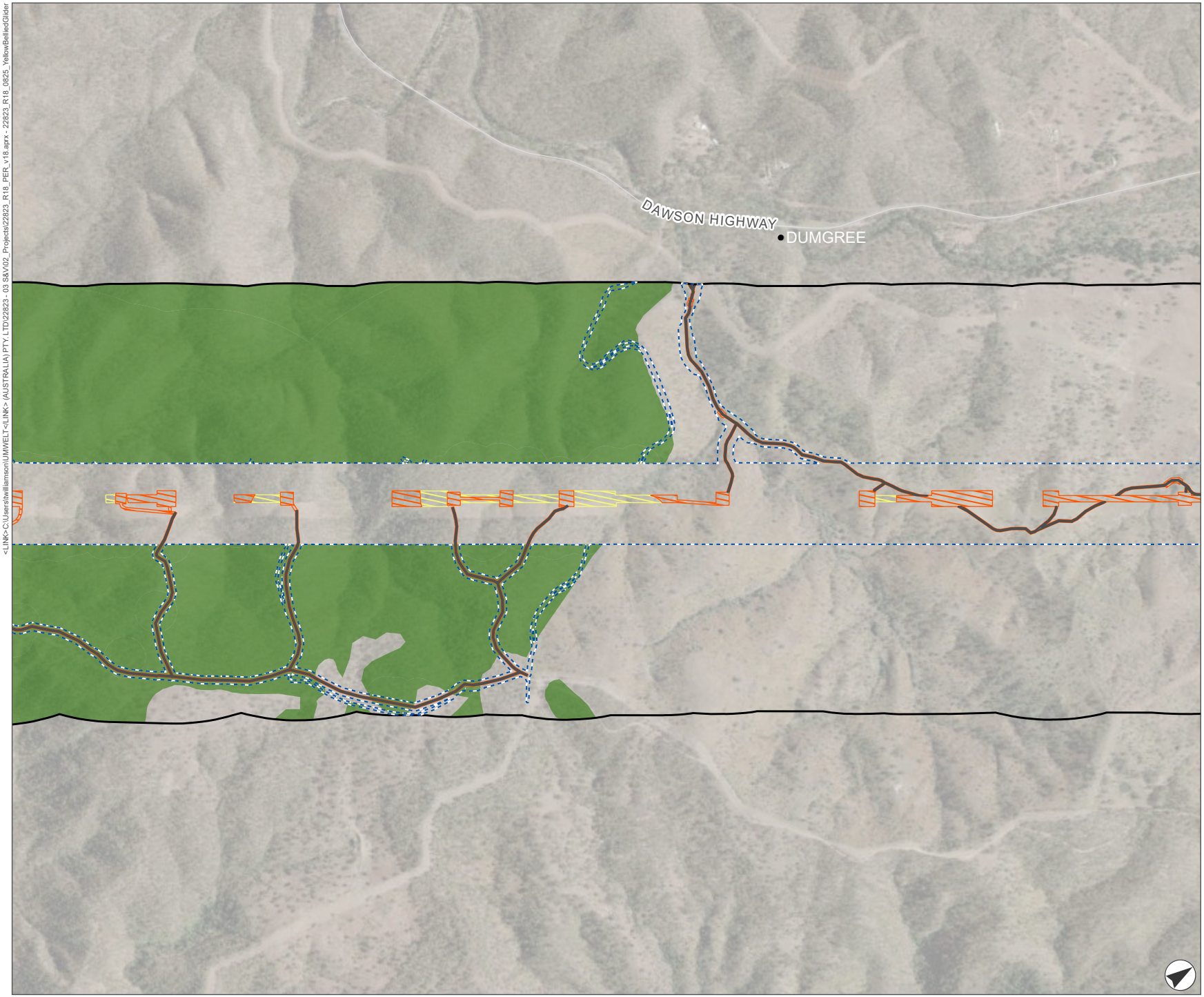


FIGURE 8.25-5

Yellow-bellied Glider Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

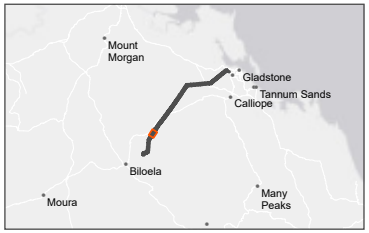
- Roads
- Field Survey Extent
- Project Area

Yellow-bellied Glider Habitat

- Denning, foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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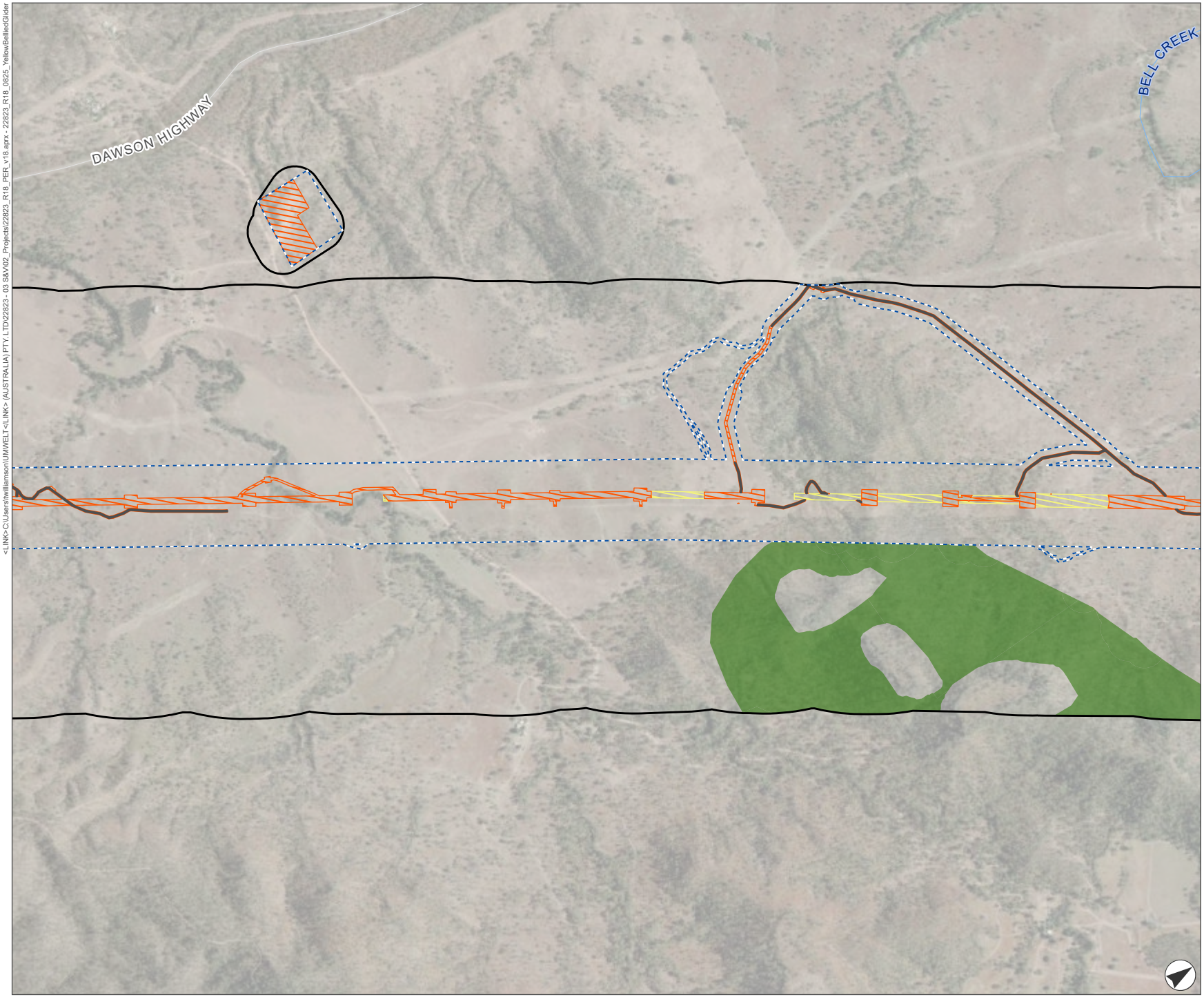


FIGURE 8.25-6

Yellow-bellied Glider Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

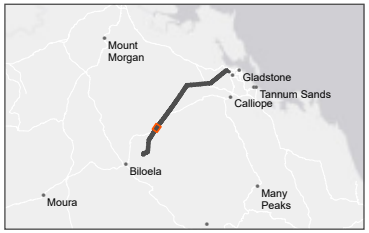
- Roads
- Watercourse
- Field Survey Extent
- Project Area

Yellow-bellied Glider Habitat

- Denning, foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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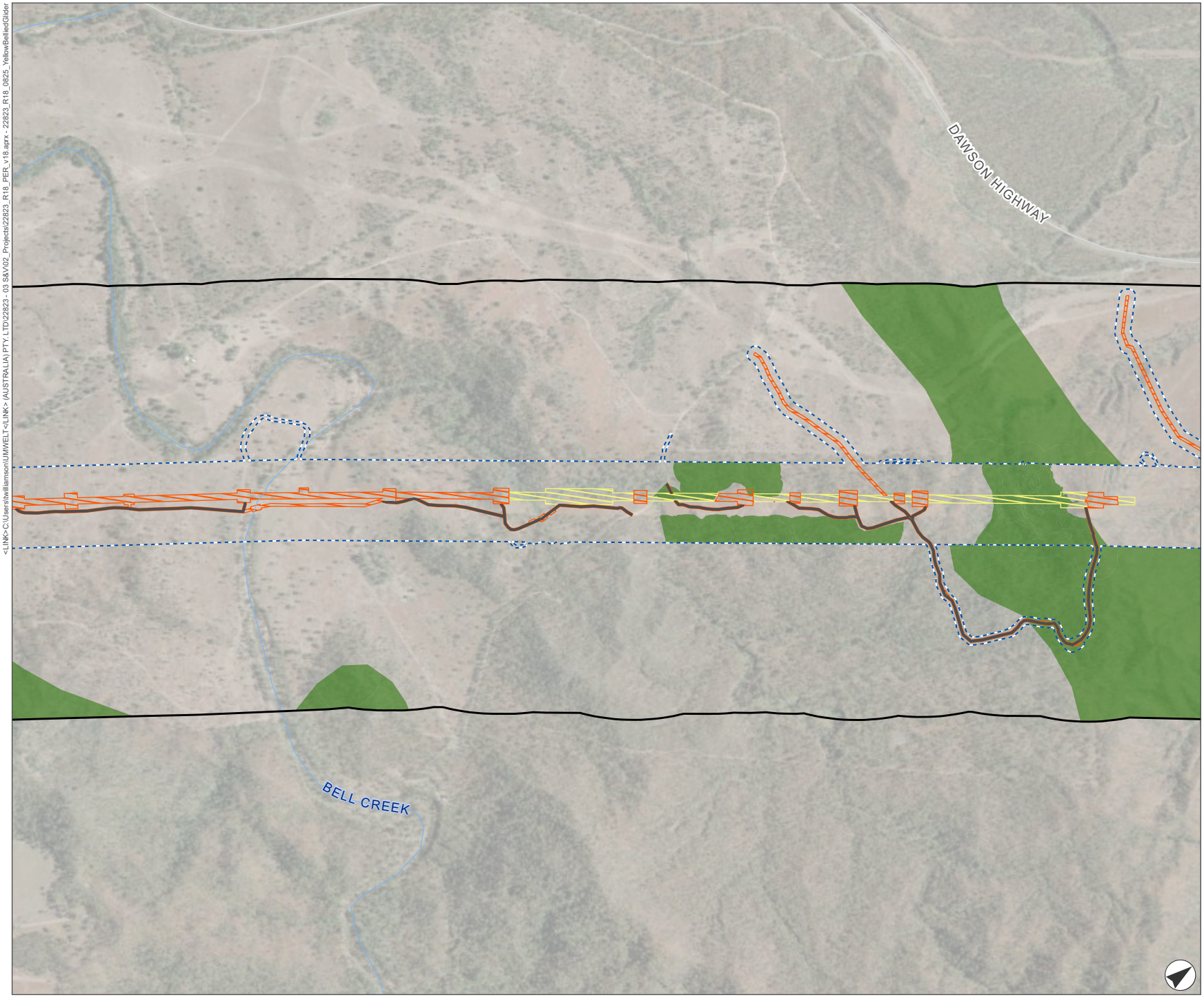


FIGURE 8.25-7

Yellow-bellied Glider Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

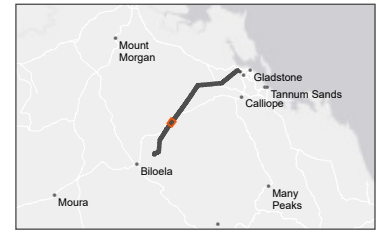
- Roads
- Watercourse
- Field Survey Extent
- Project Area

Yellow-bellied Glider Habitat

- Denning, foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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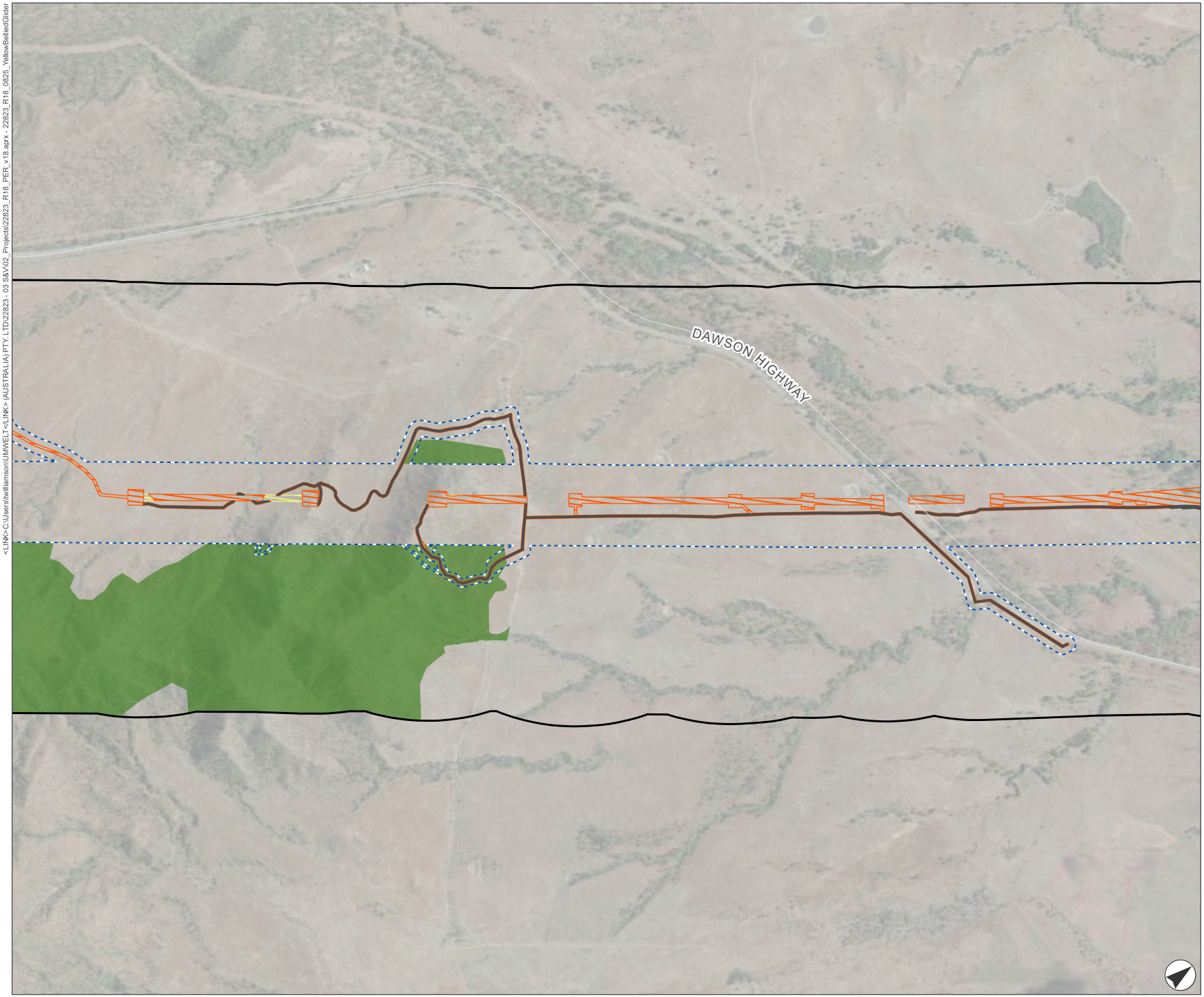


FIGURE 8.25-8

Yellow-bellied Glider Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

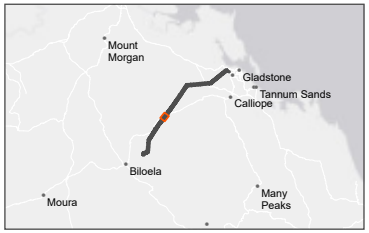
- Roads
- Field Survey Extent
- Project Area

Yellow-bellied Glider Habitat

- Denning, foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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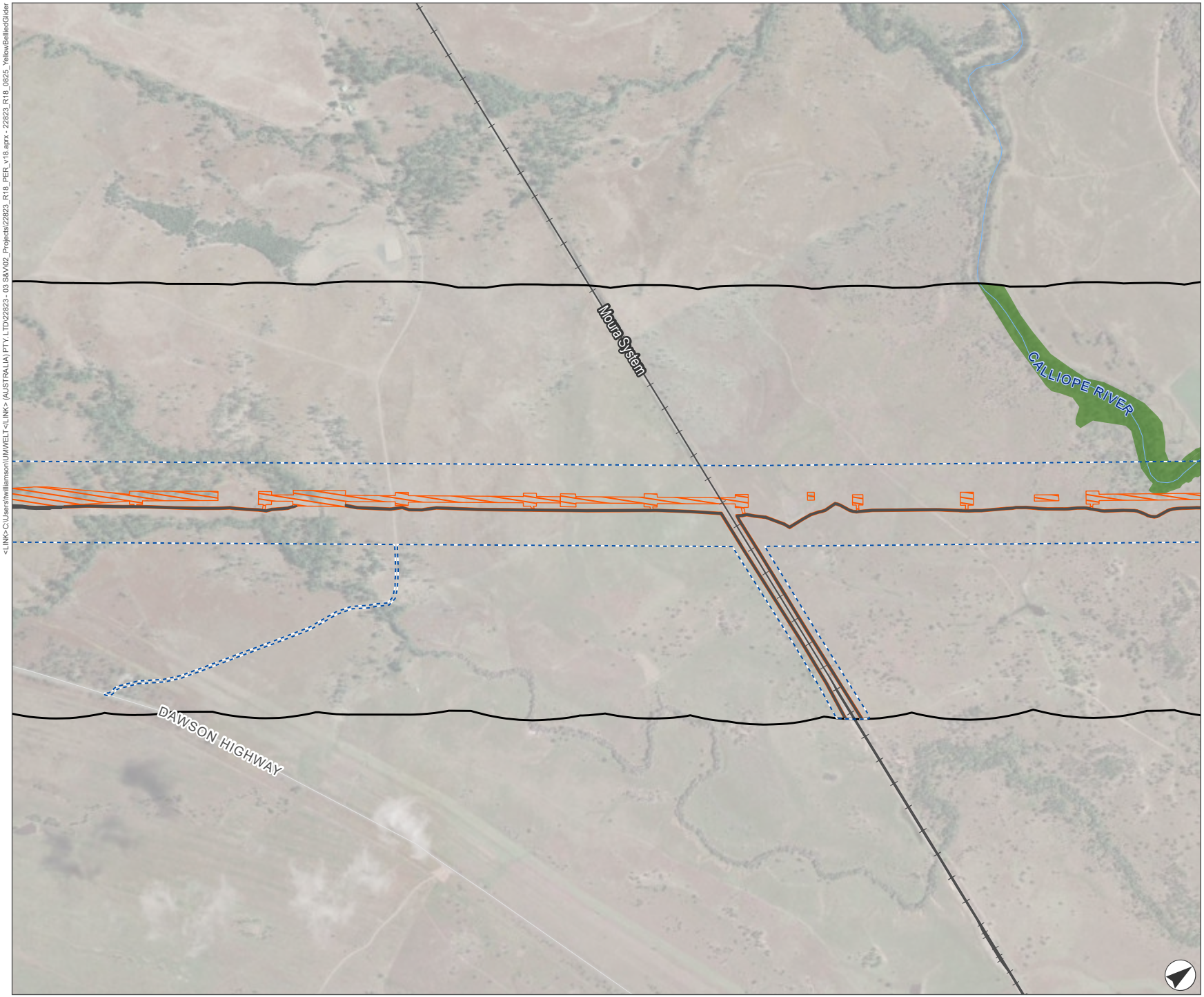


FIGURE 8.25-9

Yellow-bellied Glider Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

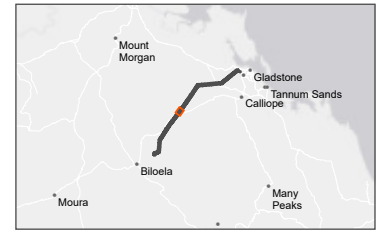
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Yellow-bellied Glider Habitat

- Denning, foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

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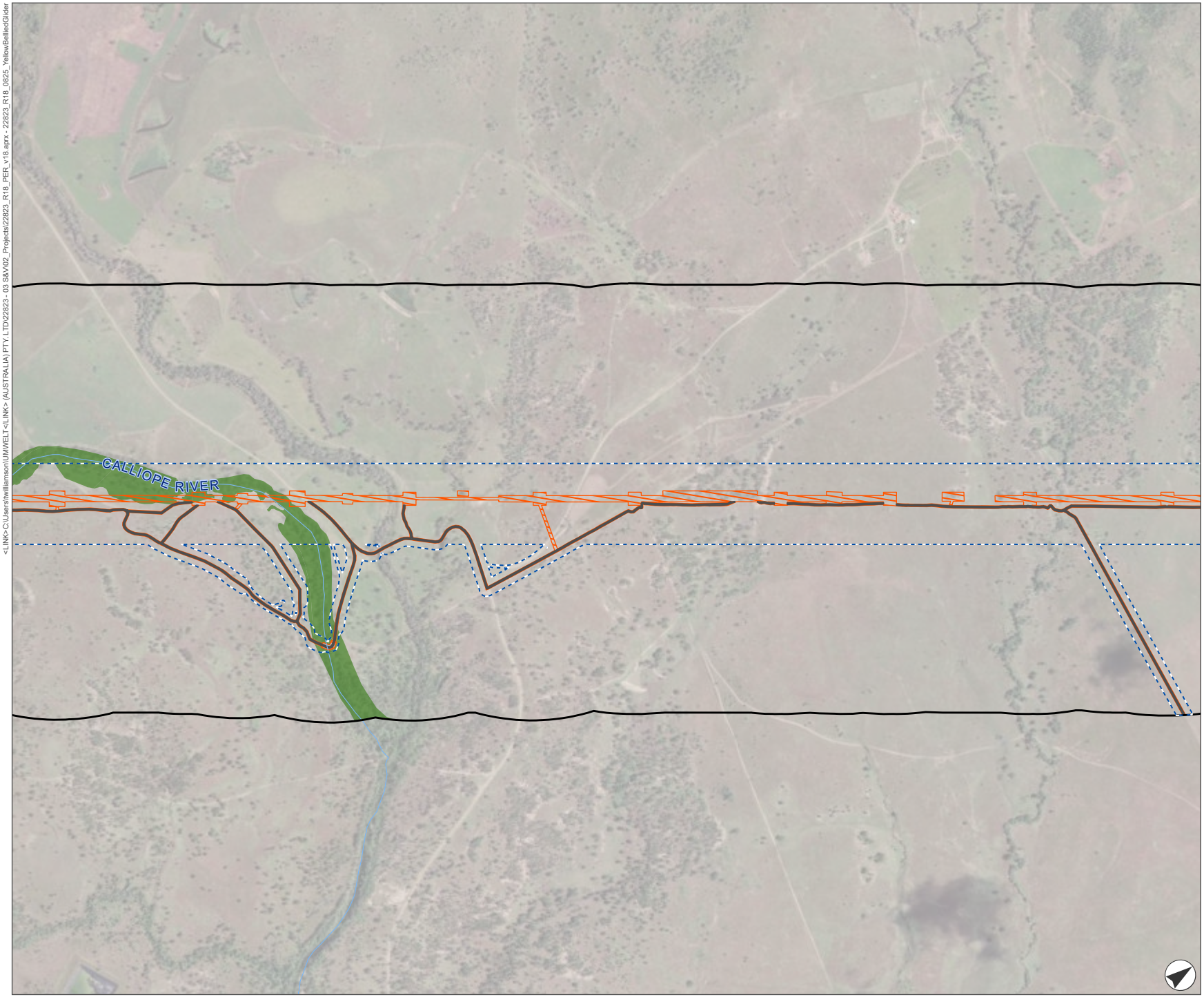


FIGURE 8.25-10

Yellow-bellied Glider Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

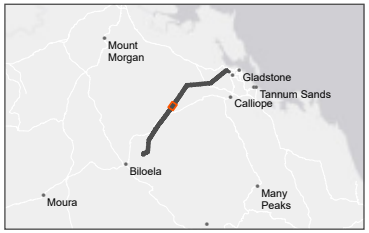
- Watercourse
- Field Survey Extent
- Project Area

Yellow-bellied Glider Habitat

- Denning, foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

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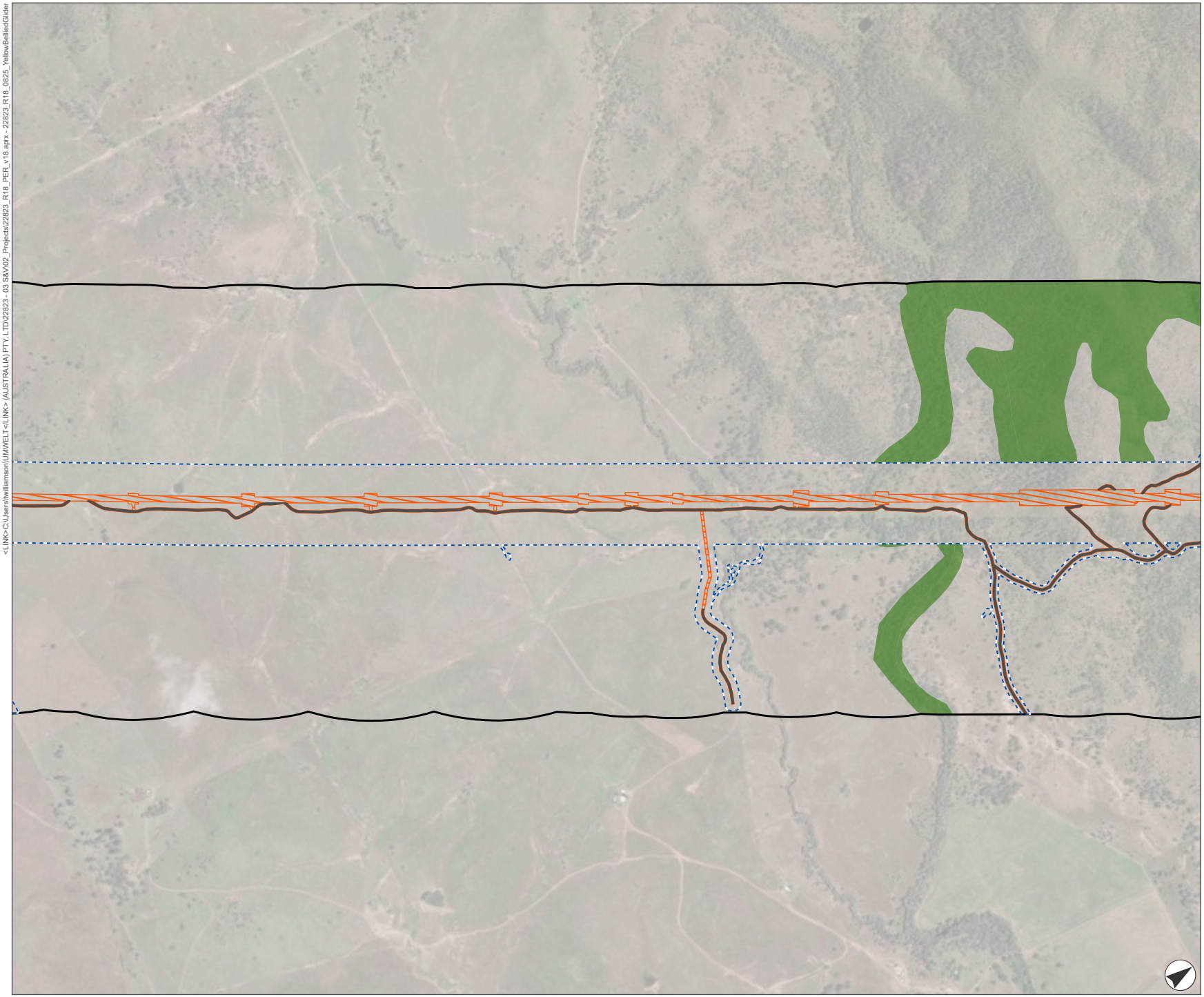


FIGURE 8.25-11

Yellow-bellied Glider Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

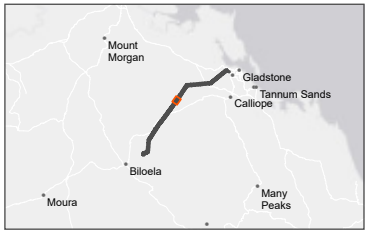
- Field Survey Extent
- Project Area

Yellow-bellied Glider Habitat

- Denning, foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.25-12

Yellow-bellied Glider Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

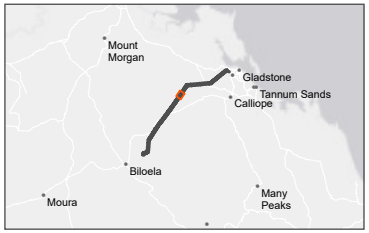
- Field Survey Extent
- Project Area

Yellow-bellied Glider Habitat

- Denning, foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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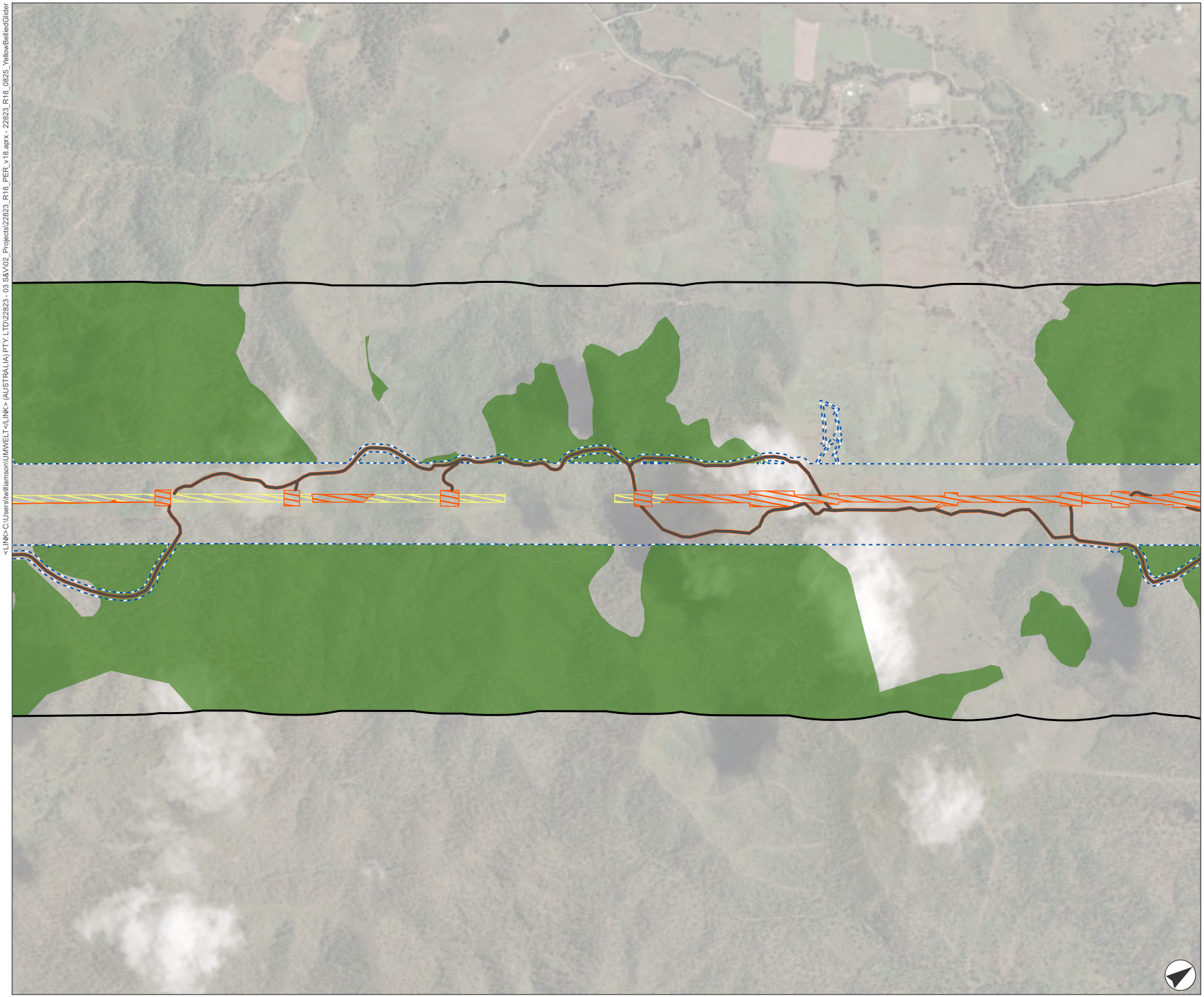


FIGURE 8.25-13

Yellow-bellied Glider Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

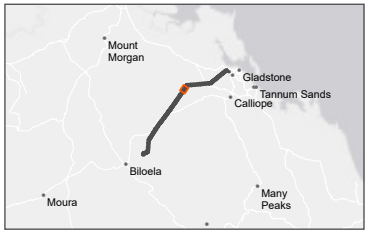
- Field Survey Extent
- Project Area

Yellow-bellied Glider Habitat

- Denning, foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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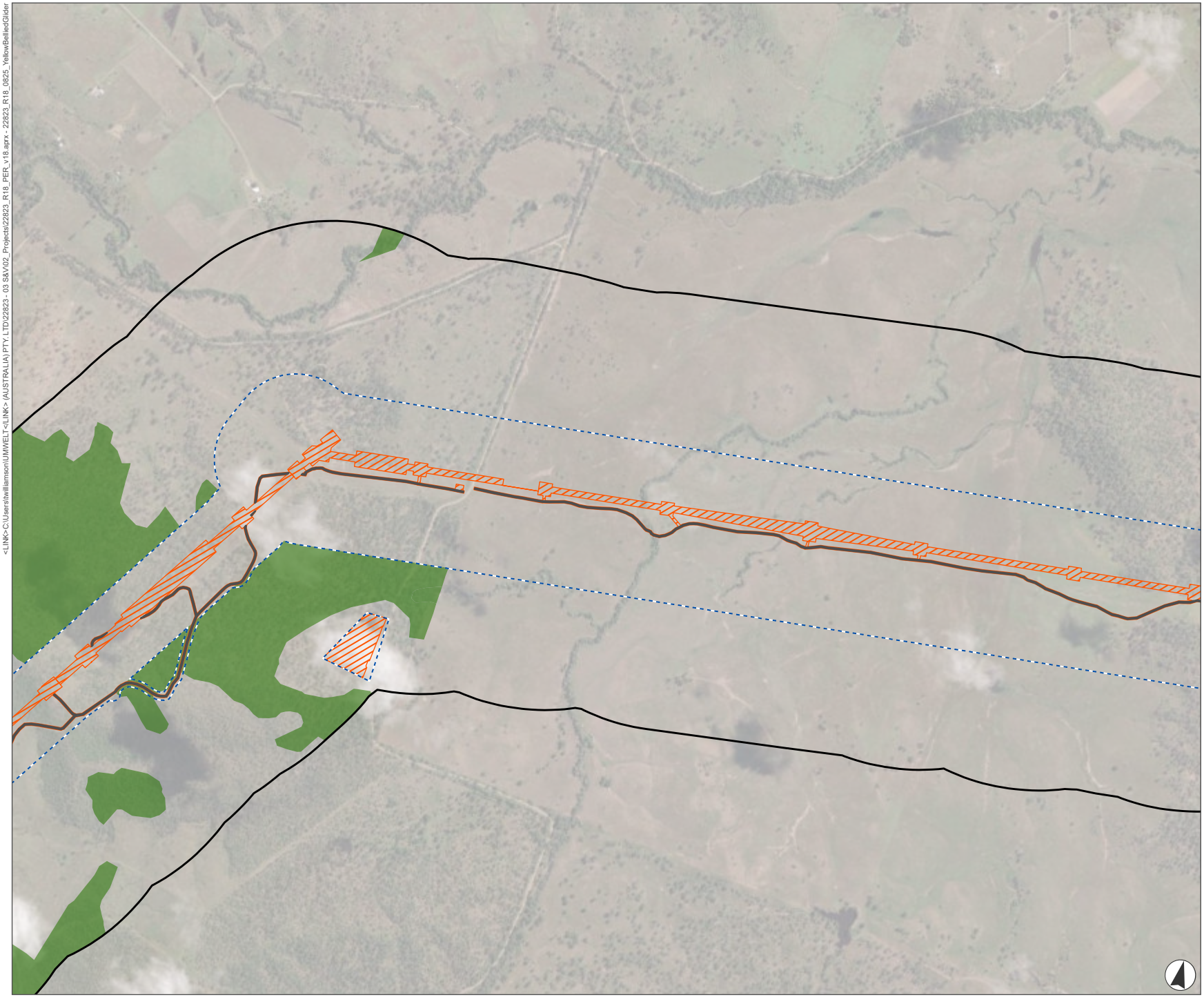


FIGURE 8.25-14

Yellow-bellied Glider Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

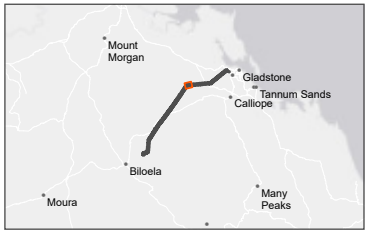
- Field Survey Extent
- Project Area

Yellow-bellied Glider Habitat

- Denning, foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.25-15

Yellow-bellied Glider Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

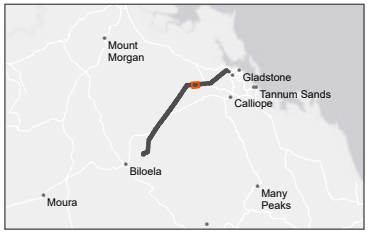
- Field Survey Extent
- Project Area

Yellow-bellied Glider Habitat

- Denning, foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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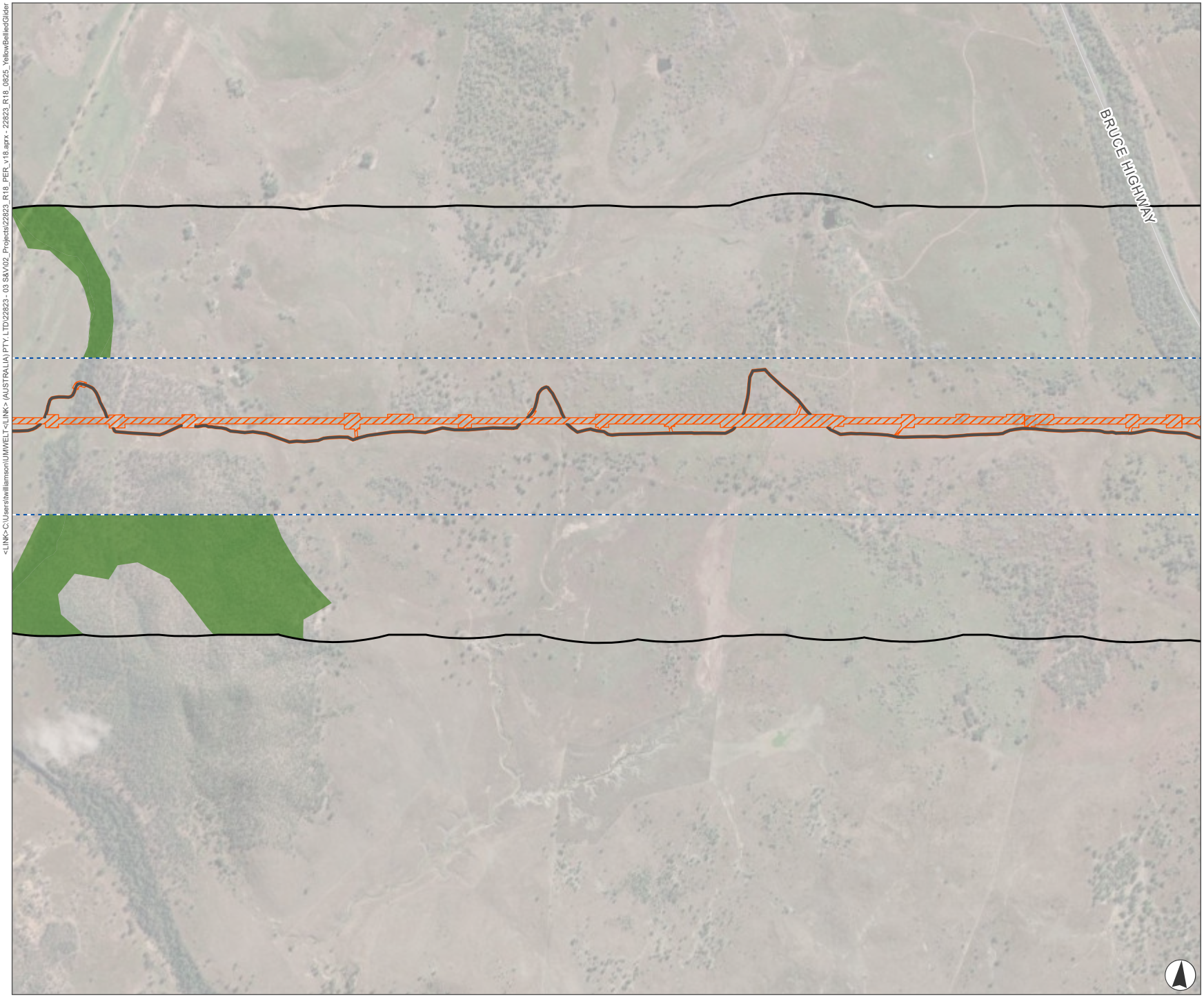


FIGURE 8.25-16

Yellow-bellied Glider Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

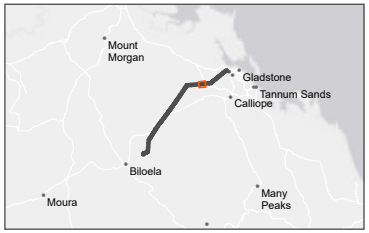
- Roads
- Field Survey Extent
- Project Area

Yellow-bellied Glider Habitat

- Denning, foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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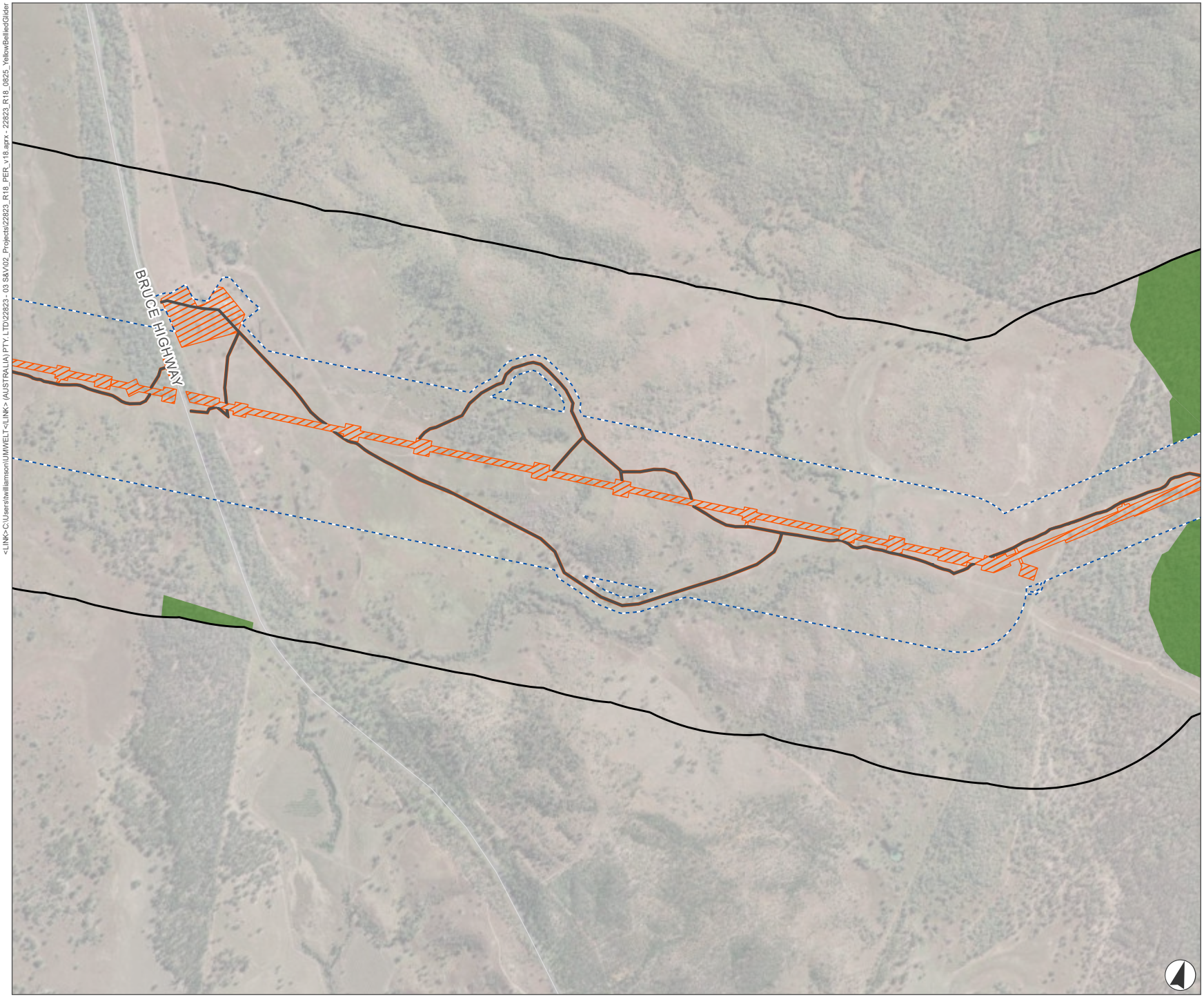


FIGURE 8.25-17

Yellow-bellied Glider Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

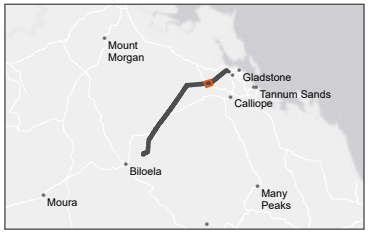
- Roads
- Field Survey Extent
- Project Area

Yellow-bellied Glider Habitat

- Denning, foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.25-18

Yellow-bellied Glider Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

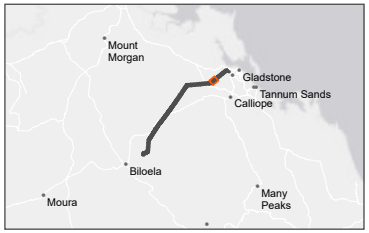
- Field Survey Extent
- Project Area
- Yellow-bellied Glider Records (ALA)

Yellow-bellied Glider Habitat

- Denning, foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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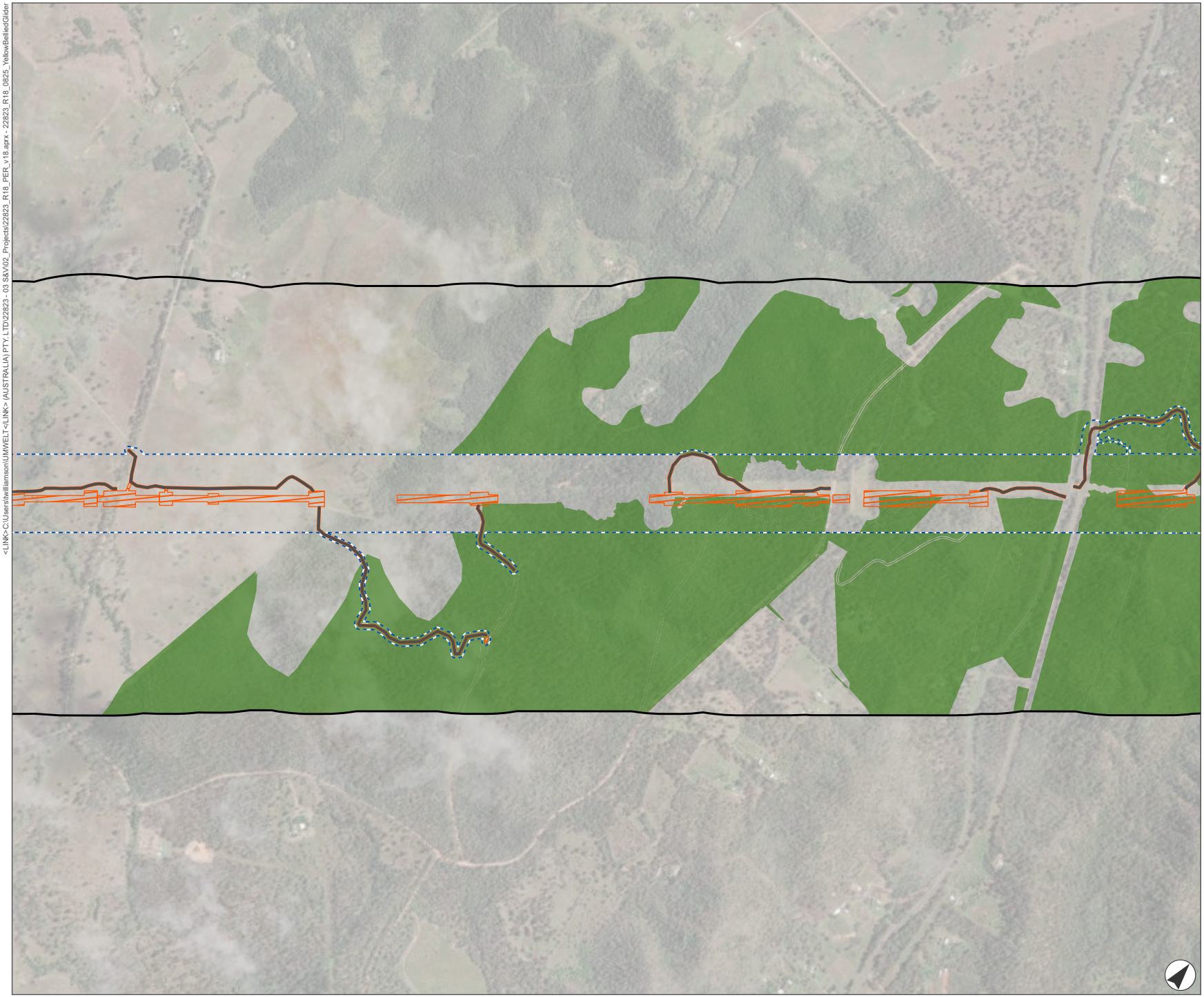


FIGURE 8.25-19

Yellow-bellied Glider Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

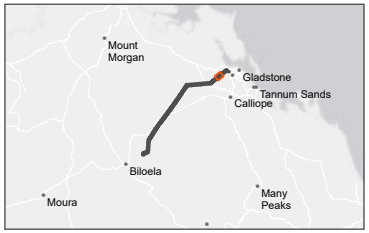
- Field Survey Extent
- Project Area

Yellow-bellied Glider Habitat

- Denning, foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.25-20

Yellow-bellied Glider Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

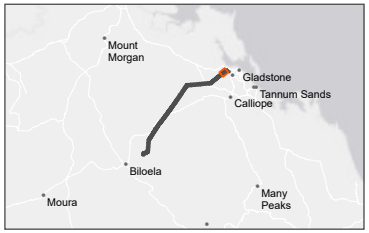
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Yellow-bellied Glider Habitat

- Denning, foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.25-21

Yellow-bellied Glider Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

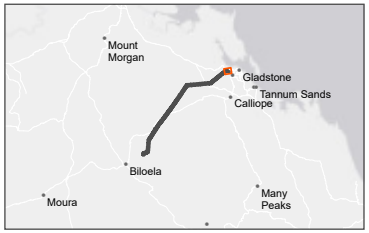
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Yellow-bellied Glider Habitat

- Denning, foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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8.2.8 Migratory Species

8.2.8.1 Eastern Osprey (*Pandion haliaetus*)

Table 8.80 Eastern Osprey: Ecology and Relevance to the Project Area

Osprey	
Profile	**Conservation status** Migratory **Distribution** The breeding range of the eastern osprey extends around the northern coast of Australia (including many offshore islands) from Albany in Western Australia to Lake Macquarie in New South Wales; with a second isolated breeding population on the coast of South Australia, extending from Head of Bight east to Cape Spencer and Kangaroo Island. The total range (breeding plus non-breeding) around the northern coast is more widespread, extending from Esperance in Western Australia to New South Wales, where records become scarcer towards the south, and into Victoria and Tasmania, where the species is a rare vagrant (Department of Climate Change, Energy, the Environment and Water 2025i). **Population** The eastern osprey is moderately common in Australia, with its highest densities in northern regions and lower numbers in southern Western Australia, South Australia, and New South Wales. The species occurs in at least two subpopulations: along the northern coast from southwestern Western Australia to south-eastern New South Wales, and an isolated population in South Australia. Populations in northern Australia are stable, while New South Wales populations have increased from around 45–50 pairs in 1991 to approximately 100 pairs by 1996, contributing to an overall recent increase in the Australian population. Eastern ospreys breed at coastal and near-coastal sites, though some historic South Australian sites have been vacant for over 50 years, and certain breeding locations remain vulnerable to human disturbance. The species does not exhibit extreme natural population fluctuations, does not crossbreed with other species, and has an estimated generation length of 10–15 years, though limited data prevents ranking populations by importance (Department of Climate Change, Energy, the Environment and Water 2025i). **Ecologically significant proportion of the population** The upper (1%) and lower (0.1%) thresholds for ecologically significant proportions of the eastern osprey population is 240 and 24, respectively (Department of the Environment, 2015b). The suitable habitat within and adjacent to the Project Area is not of suitable size or value to support an ecologically significant proportion of the population, and no significant numbers of the species has been recorded within or adjacent to the Project Area.

Osprey

Historical records within the desktop search extent

No WildNet records occur within the desktop search extent. However, ALA records are known from the area, with the majority situated around Gladstone (ALA, 2025).

Habitat

Eastern ospreys occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. They are mostly found in coastal areas but occasionally travel inland along major rivers, particularly in northern Australia. They require extensive areas of open fresh, brackish or saline water for foraging. They frequent a variety of wetland habitats including inshore waters, reefs, bays, coastal cliffs, beaches, estuaries, mangrove swamps, broad rivers, reservoirs and large lakes and waterholes.

Important habitat

Important habitat for the eastern osprey has been identified in the Draft referral guidelines for 14 birds listed as migratory species under the EPBC Act (Department of the Environment, 2015b) as:

- Bays, estuaries, along tidal stretches of large coastal rivers, mangrove swamps, coral and rock reefs, terrestrial wetlands and coastal lands of tropical and temperate Australia and offshore islands. They feed primarily in the sea or nearby estuarine waters and nest in trees (often dead or with dead tops), rocky coastlines and on artificial structures such as telecommunication towers. Ospreys are generally found on or near the coast but also range inland along large rivers, mainly in northern Australia.

Based on this definition, the Calliope River can be considered as important habitat for the eastern osprey.

Based on the referral guidelines, the area thresholds for important habitat likely to result in a significant impact are 840 km of coastline (1%) and 84 km of coastline (0.1%).

Current threats to the species

The primary threat to the eastern osprey in Australia is loss, degradation or alteration of habitat for urban or tourism development. In the Chain of Bays region of the Eyre Peninsula, South Australia, where ospreys nest on the ground due to the lack of trees, human disturbance is an increasing threat.

Recovery plan

There is no adopted or made Recovery Plan for this species.

In the Project Area

Surveys

422 habitat assessments were conducted during the field survey program. Diurnal bird surveys undertaken throughout all field surveys. Bird species were recorded incidentally throughout the survey program both visually and aurally.

Species occurrence

In March 2023, a single eastern osprey was recorded at the mouth of the Calliope River approximately 1 km from the Project Area. No nests were identified within or adjacent to the Project Area during the survey.

Habitat within the Project Area

Osprey

Habitat type	Habitat modelling criteria	Area (ha)	
		Project Area	Disturbance Footprint
Breeding and dispersal	Littoral and coastal habitats in association with terrestrial wetlands and offshore islands of tropical and temperate Australia. Typically associated with coastal regions but also includes inland areas with large rivers. Large perennial watercourses (stream order 5 and greater) buffered by 50 m to all tree canopy dominated vegetation types in remnant condition to capture potential nesting opportunities.	1.8	0.2
Foraging	This species requires large areas of open water for foraging. Calliope River or large perennial watercourses (stream order 5 and greater).	8.2	-

Table 8.81 Assessment of Potential Project Impacts and Mitigation and Management Commitments for Eastern Osprey

Potential Impact	Assessment	Mitigation Commitments
Direct		
Vegetation clearing causing habitat loss and fragmentation	Vegetation clearing is unlikely to directly impact this species, as much of the Project sits within already disturbed areas or alongside the existing transmission line. However, removal of tall trees may reduce availability of natural nesting sites in some areas. Additionally, the species is known to utilise artificial structures for nesting.	• Identify MNES fauna habitat and individuals through pre-clearance surveys • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Disturbance activities must be contained to Disturbance Footprint subject to minor micro-siting within the Field Survey Extent • Refer to Table 5.1 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Injury or direct mortality	The risk of direct injury or mortality is low but possible during construction activities, particularly if works occur near active nests or involve tall structures such as transmission towers.	• Appropriately qualified fauna spotter catcher to undertake pre-clearance habitat assessment and be present during clearing and disturbance to habitat features • lushing surveys to be completed during pre-clearance • Clearing must be staged, with non-habitat trees felled first • Tampering with an animal breeding place to be carried out in accordance with an approved Species Management Program • Clear delineation of habitat features to be retained • Refer to Table 5.3 of the MNES Management Plan for further details on mitigation measures.
Changes to habitat quality (degradation)	Habitat quality could be affected if water quality is reduced, limiting prey availability, or if disturbance near nesting sites reduces breeding success. However, the overall risk is expected to be low with appropriate management.	• Soil sampling and testing to inform both erosion and sediment control (ESC) and rehabilitation • Develop Erosion and Sediment Control Plan (ESCP) in accordance with the IECA Best Practice Erosion and Sediment Control Guidelines 2008 • Extent and duration of soil exposure will be minimised • Disturbed areas will be promptly stabilised. • Site is monitored and controls adjusted to maintain required performance standard • Minimum personnel requirements will apply for ESCP development and verification • Hazardous materials must be stored and handled appropriately • An Emergency Response Plan will be developed • Spill kits will be available during construction • Hazardous materials locations will be bunded • All waste disposed of in accordance with legislative requirements • No refuelling within 50 m of a watercourse • Application of herbicides in accordance with legislative requirements • A Water Quality Monitoring Plan must be developed by an appropriately qualified person • Dewatering Management Plan will be developed • Acid Sulphate Soil Management Plan will be developed • Awareness training for identification and management of ASS will be undertaken
Loss of key habitat resources	The primary resource requirement is access to elevated nesting sites and productive fishing grounds. Loss of suitable nesting trees or degradation of waterways could impact the species locally.	

Potential Impact	Assessment	Mitigation Commitments
		• Water extraction activities will be strictly controlled and monitored to ensure no waterbodies are completed drained • Erosion and sediment control measures in accordance with IECA 2008 • Refer to Table 5.4 and Table 5.12 of the MNES Management Plan for further details on mitigation measures.
Indirect		
Noise, activity and vibration generated during construction and operation interrupting foraging, breeding or dispersal behaviours	Disturbance from construction noise, human presence, or vibration near active nests may cause temporary avoidance of the area or, in breeding season, potential nest abandonment.	• Plant and equipment to be fitted with appropriate noise attenuation and maintained • Deliveries and removal of material and equipment to and from site within approved hours for construction • Plant to be turned off when not in use • No unnecessary use of horns or other audible signals on mobile plant or equipment • Machinery and equipment will be maintained in good working condition • Refer to Table 5.10 of the MNES Management Plan for further details on mitigation measures.

Table 8.82 Significant Impact Assessment: Eastern Osprey

Impact Criteria	Assessment
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for the migratory species	**Unlikely.** This species is considered to be common and the population stable. Modelled potential habitat within the Disturbance Footprint has already been modified through historical clearing, weeds and pests. Nonetheless, potential habitat is considered to comprise important habitat. A maximum of 0.2 ha of breeding and dispersal habitat will be cleared as part of the Project. Table 4 of the *Draft referral guidelines for 14 birds listed as migratory species under the EPBC Act* lists area thresholds of important habitat for each species that is likely to result in a significant impact if affected. The Project will not meet or exceed the upper or lower thresholds. The Project will not impact the species or limit its mobility given the species capacity to move large distances. While construction work will be undertaken within areas that may support foraging activities for the species, these works will be short-term and are unlikely to functionally affect the foraging resources or the species ability to hunt in the area. Due to the implementation of the MNES Management Plan, the Project will not lead to the further degradation of retained habitat. Furthermore, suitable habitat is likely to occur extensively in the wider area. Based on the above, the Project is

Impact Criteria	Assessment
	unlikely to substantially modify, destroy or isolate an area of important habitat for any of the migratory terrestrial bird species.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	**Unlikely.** The referral guidelines note that "any species that greatly reduces fish abundance" is considered to be harmful to the eastern osprey. The Project will employ best practice control methods for weeds and pests and is unlikely to introduce or exacerbate weeds or pests beyond existing levels. The ESCP and WQMP will also be used to monitor for changes to this species habitat.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of the migratory species	**Unlikely.** As described in the above sections, mapped habitat is unlikely to support an ecologically significant proportion of the upper or lower thresholds of a population. This is supported by only a single individual recorded throughout the field survey program. While nesting may occur in the woodlands adjacent to the Calliope River and the transmission towers, this habitat will not be significantly affected. Similarly, impacts foraging and dispersal habitat associated with the Calliope River and surrounding woodland will be short-term during construction and are unlikely to functionally disrupt these behaviours for the species given the availability of habitat in the area and the species tolerance to disturbance and use of infrastructure. Given the predicted size and wide-ranging distribution of the population, it is considered unlikely that the Project will seriously disrupt the lifecycle of an ecologically significant proportion of the population.
Significant Residual Impact	**Unlikely to have a significant impact**



FIGURE 8.26-21

Eastern Osprey Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

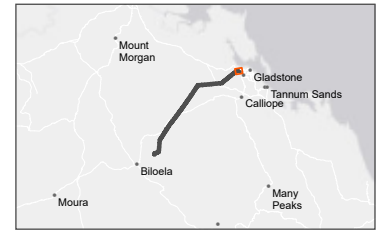
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area
- Eastern Osprey Records (ALA)
- Eastern Osprey Record (Umwelt)

Eastern Osprey Habitat

- Breeding and dispersal
- Foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



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Kilometres

Scale 1:20,000 at A4
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8.2.8.2 Fork-tailed Swift (*Apus pacificus*)

Table 8.83 Fork-tailed Swift: Ecology and Relevance to the Project Area

Fork-tailed Swift	
Profile	**Conservation status** Migratory **Distribution** The fork-tailed swift is found in south Siberia, north Mongolia, north China and Japan, and migrates to south-east Asia and Australia. It arrives in Australia (its non-breeding range) around October and departs in April; it is widespread throughout the country during this time. **Ecologically significant proportion of the population** The upper (1%) and lower (0.1%) thresholds for ecologically significant proportions of the population of this species are estimated at 1,000 and 100 respectively. The species is likely to be a seasonal visitor to the Project Area when in transit from breeding grounds in south-east Asia. The Project Area does not support breeding habitat for this species and where foraging and dispersal habitat is present, the species is exclusively aerial. The species is known to feed in flocks of up to 1,000 birds (Higgins, 1999) and as such, if foraging conditions are suitable and birds are utilising the region, there is a potential for an ecologically significant proportion of the population to use the air space above the Project Area. **Historical records within the desktop search extent** WildNet records occur within the desktop search extent, numerous ALA records are scattered around the Project Area. **Habitat** Fork-tailed swifts are almost exclusively aerial and mostly occur over inland plains, but sometimes also above foothills, over cliffs, or in coastal areas. More specifically, they mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. The species spends most of the year at high altitudes, feeding on invertebrates carried aloft in the air column known as aerial plankton (Birdlife International, 2024). The fork-tailed swift comes down near to the ground during bad weather. **Important habitat** Important habitat for fork-tailed swift is defined in the Draft referral guideline for 14 birds listed as migratory species under the EPBC Act (Department of the Environment, 2015b) as a range of habitat, from inland open plains to wooded areas. This broadly includes all habitat within the Project Area, although utilisation of this habitat by the fork-tailed swift is limited to the airspace above the Project Area due to its exclusively aerial nature in Australia. There are no defined area thresholds for important habitat which may constitute a significant impact to the species in the referral guidelines (Department of the Environment, 2015b). **Current threats to the species** In Australia, there are no significant threats to the fork-tailed swift. Potential threats may include habitat destruction and predation by feral animals; however, these threats are likely negligible due to the wide range of the species.

Fork-tailed Swift

Recovery Plan

There is no adopted or made Recovery Plan for this species.

In the Project Area

Surveys

422 habitat assessments were conducted. Diurnal bird surveys were undertaken throughout all field surveys. Bird species were recorded incidentally throughout the survey program both visually and aurally.

Species occurrence

Across the field survey program, fork-tailed swifts have been recorded overflying the Project Area on three separate occasions. The largest flock was estimated at 1,000 individuals in March 2023, with 15 individuals recorded in a similar location on the same day, and a further five individuals recorded the following day at a second nearby location. The air space above remnant, regrowth and non-remnant woody vegetation has the potential to be used by this species for foraging and dispersal within the Project Area.

Habitat within the Project Area

Habitat type	Habitat modelling rules	Area (ha)	
		Project Area	Disturbance Footprint
Foraging and dispersal	All vegetation communities. Remnant, regrowth and non-remnant All remnant and non-remnant vegetation communities included. Suitable habitat is present in all sections of the Project Area. This species is a non-breeding migrant to Australia.	14,315.2	417.6

Table 8.84 Assessment of Potential Project Impacts and Mitigation and Management Commitments for Fork-tailed Swift

Potential Impact	Assessment	Mitigation Commitments
Direct		
Injury or direct mortality	Risk of injury or collision during construction is negligible.	• No specific mitigation required beyond standard fauna management procedures, as outlined in Table 5.3 of the MNES Management Plan.
Habitat loss or degradation	The species relies minimally on terrestrial habitats within the Project Area and no breeding or roosting habitat occurs locally.	• No specific mitigation required beyond standard fauna management procedures outlined in Table 5.7 and Table 5.8 of the MNES Management Plan.

Potential Impact	Assessment	Mitigation Commitments
Indirect		
Increased pest levels which may predate upon individuals.	The species' aerial lifestyle makes it largely unaffected by ground-based predators.	• All waste to be secured • Biosecurity Instrument Permit to be obtained for moving materials out of or within different biosecurity zones • Educate workforce in the identification of pest fauna species • Avoid inclusion of any water retaining voids or pits • Refer to Table 5.6 of the MNES Management Plan for further details on mitigation measures.

Table 8.85 Significant Impact Assessment: Fork-tailed Swift

Impact Criteria	Assessment
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for the migratory species	**Unlikely.** The species is a non-breeding migrant to Australia which may persist within the Disturbance Footprint (and the Project Area) as transient populations. Its movements are often influenced by prevailing weather conditions and the presence of foraging resources. Potential habitat within the Disturbance Footprint has already been modified through historical clearing, weeds and pests. Nonetheless, potential habitat is considered to comprise important habitat. Impact area thresholds for the species are not outlined in the *Draft referral guidelines for 14 birds listed as migratory species under the EPBC Act*. Up to 417.6 ha of foraging and dispersal habitat will be directly impacted through clearing for the Project. There are no anticipated impacts from fragmentation as the species is highly mobile. The Project will not lead to the further degradation of retained habitat, as potential indirect impacts such as altered fire regimes, weeds and pests will be actively managed through the MNES Management Plan. On this basis, the Project is unlikely to substantially modify, destroy or isolate an area of important habitat.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	**Unlikely.** There are currently no significant threats identified for the fork-tailed swift in Australia; however, potential threats include habitat destruction and predation by feral animals. Feral animals including cats (*Felis catus**) and foxes (*Vulpes vulpes**) were recorded throughout the Project Area, though their direct impact to the species is likely to be negligeable as this species is predominantly aerial. Throughout the Project Area, existing cleared areas created for fences, tracks, roads or for grazing purposes likely act as conduits for pest movement. As clearing for the Project is collocated and existing tracks will continue to be utilised, it is therefore unlikely that the Project will further facilitate and increase movement of any pest species.

Impact Criteria	Assessment
	Appropriate biosecurity controls and weed washdown procedures will be adhered to, to mitigate the introduction or proliferation of pest and weed species in accordance with Table 5.5 and 5.6 of the MNES Management Plan Based on this, it is unlikely the Project will result in the exacerbation of invasive species that are harmful to this species becoming established.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of the migratory species	**Unlikely.** As described above, it is possible an ecologically significant proportion of the national population may occur within the Project Area during the life of the Project. However, based on the species aerial nature and broad habitat requirements, it is unlikely the population will rely on the potential habitat within the Project Area for any part of its lifecycle. Utilisation will be limited to the migratory period (October to April), while flocks are completing local movements and/or foraging. Given the predicted size and wide-ranging distribution of the global population and implementation of the MNES Management Plan, it is considered unlikely that the Project will seriously disrupt the lifecycle of an ecologically significant proportion of the population.
Significant Residual Impact	**Unlikely to have a significant impact**

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FIGURE 8.27-1

Fork-tailed Swift Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

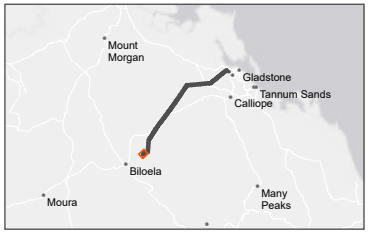
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Fork-tailed Swift Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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Kilometres

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FIGURE 8.27-2

Fork-tailed Swift Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

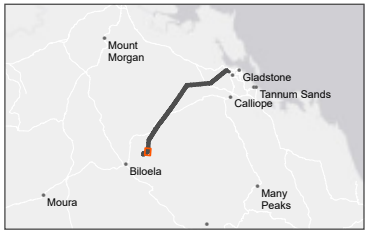
- Watercourse
- Field Survey Extent
- Project Area

Fork-tailed Swift Habitat

- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.27-3

Fork-tailed Swift Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

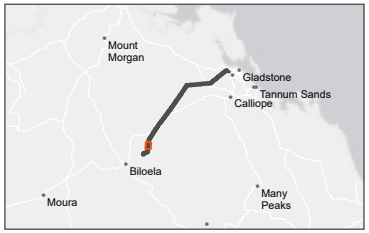
- Field Survey Extent
- Project Area

Fork-tailed Swift Habitat

- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.27-4

Fork-tailed Swift Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

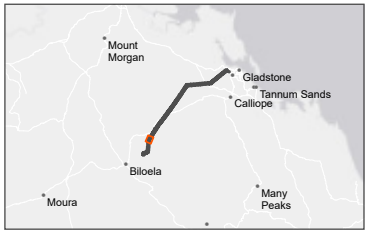
- Field Survey Extent
- Project Area

Fork-tailed Swift Habitat

- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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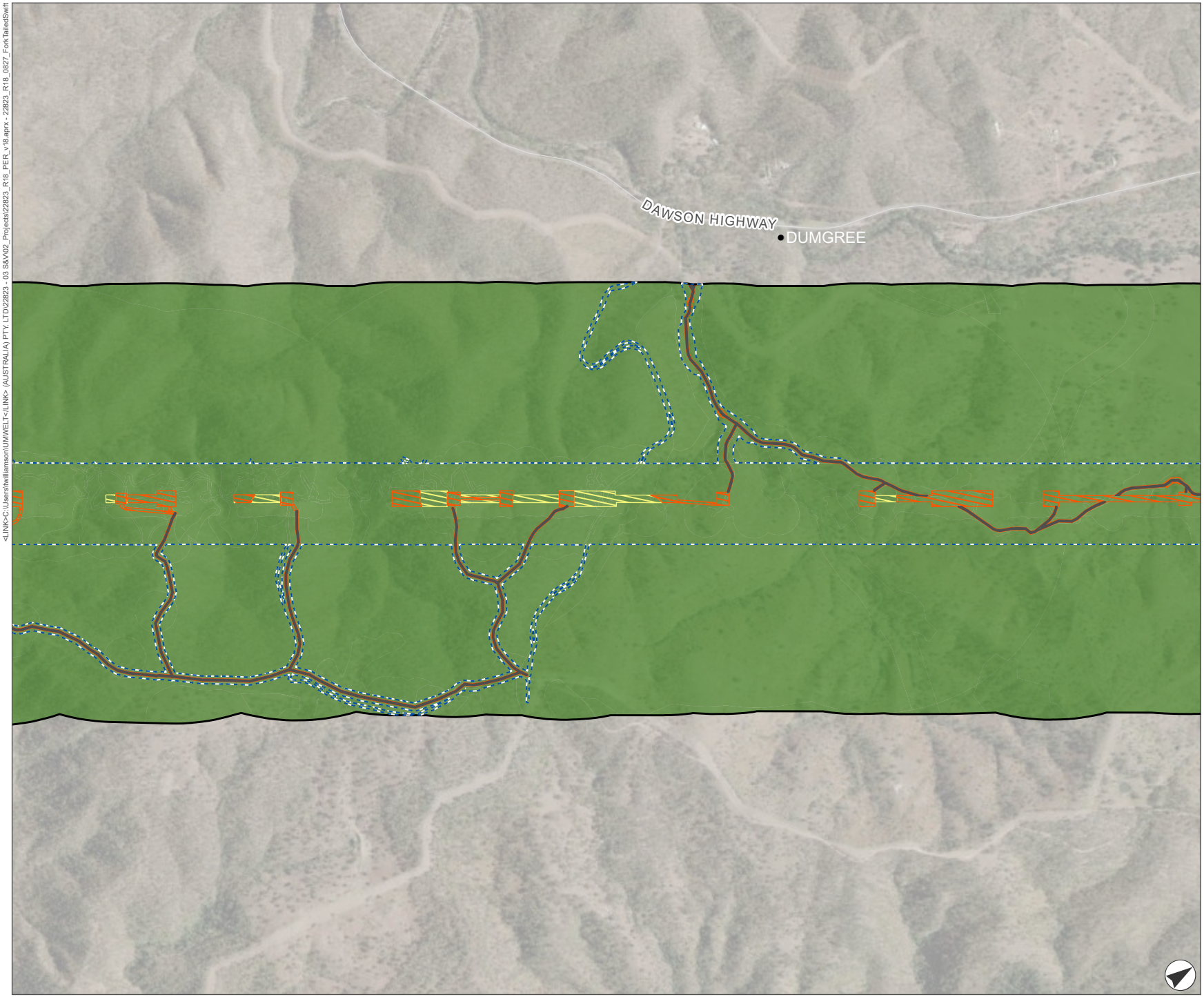


FIGURE 8.27-5

Fork-tailed Swift Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

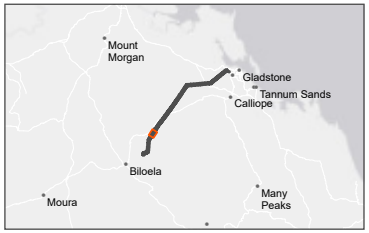
- Roads
- Field Survey Extent
- Project Area

Fork-tailed Swift Habitat

- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.27-6

Fork-tailed Swift Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

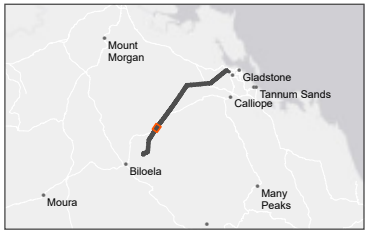
- Roads
- Watercourse
- Field Survey Extent
- Project Area

Fork-tailed Swift Habitat

- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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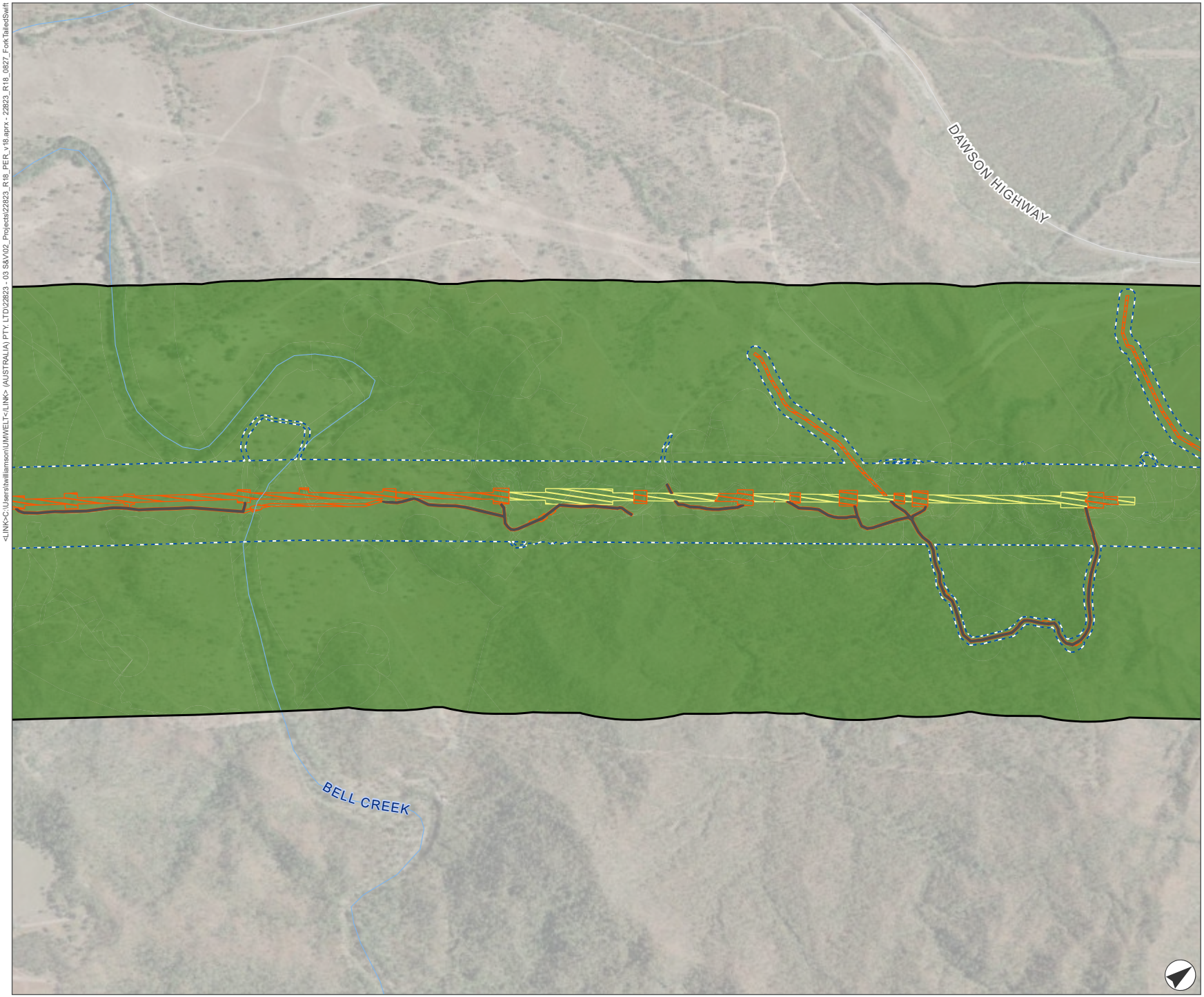


FIGURE 8.27-7

Fork-tailed Swift Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

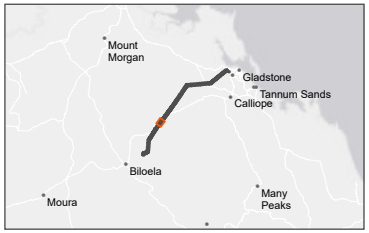
- Roads
- Watercourse
- Field Survey Extent
- Project Area

Fork-tailed Swift Habitat

- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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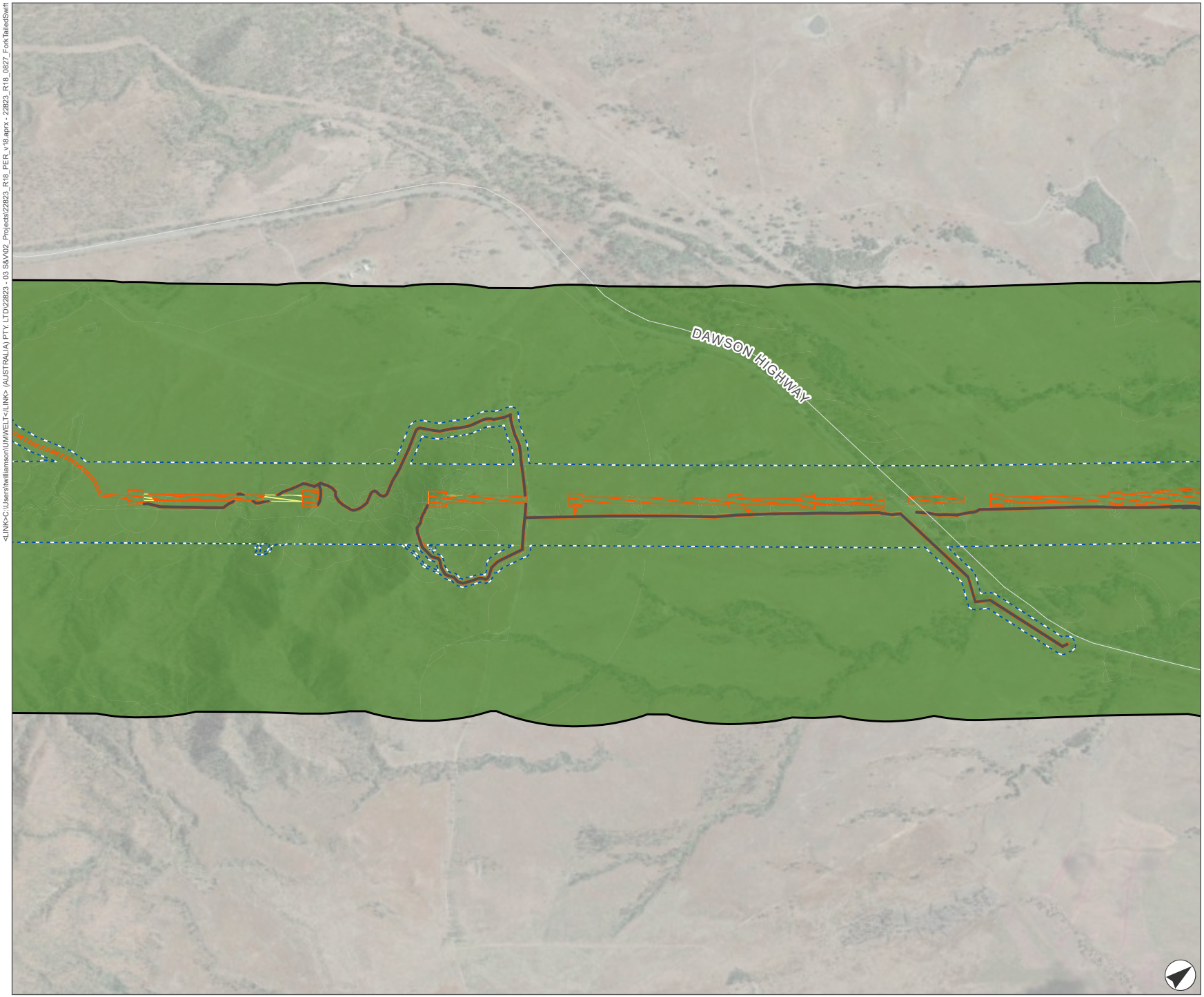


FIGURE 8.27-8

Fork-tailed Swift Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

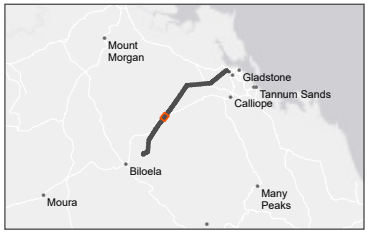
- Roads
- Field Survey Extent
- Project Area

Fork-tailed Swift Habitat

- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
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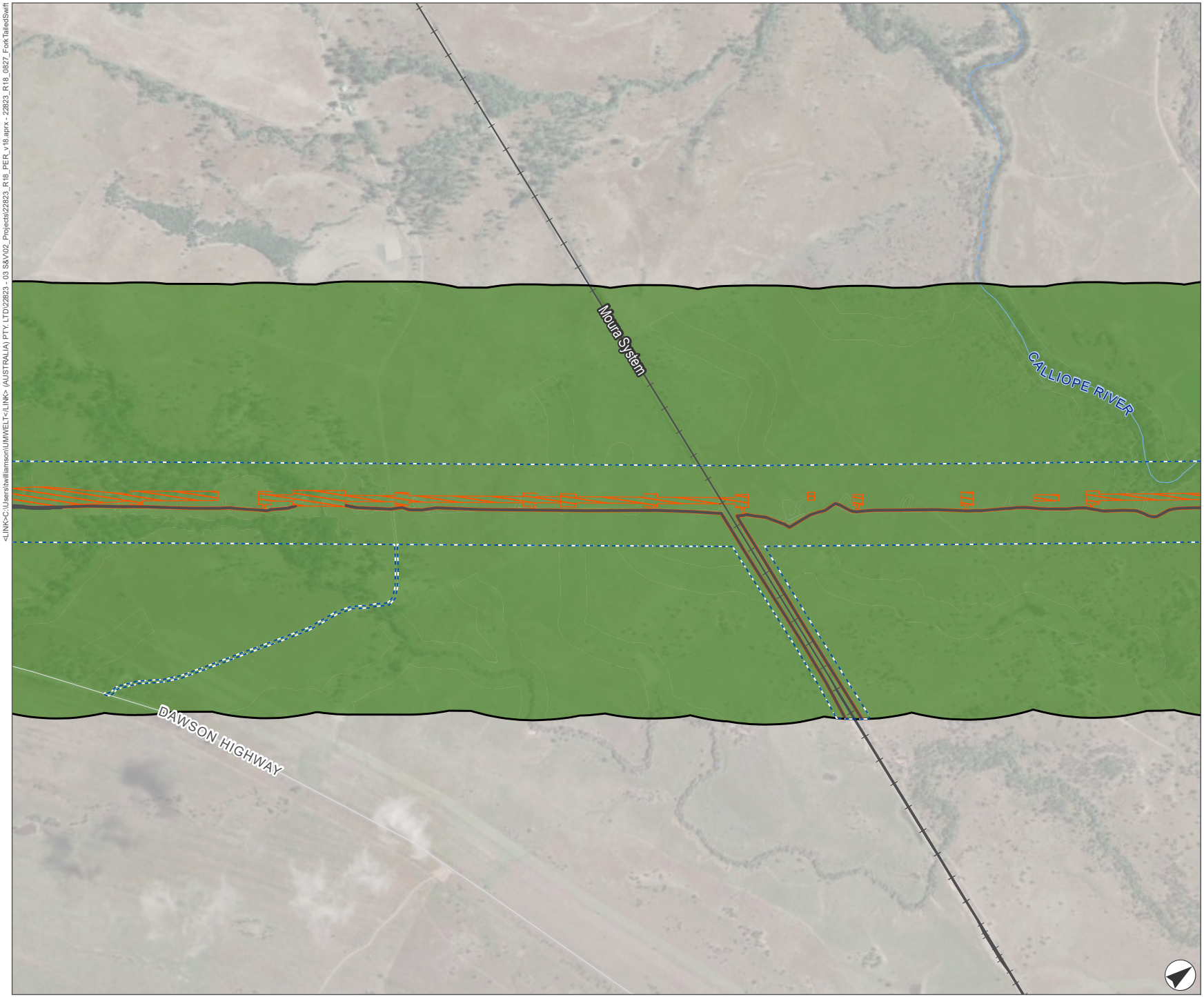


FIGURE 8.27-9

Fork-tailed Swift Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

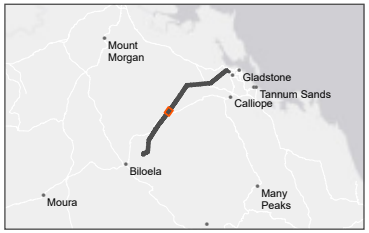
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Fork-tailed Swift Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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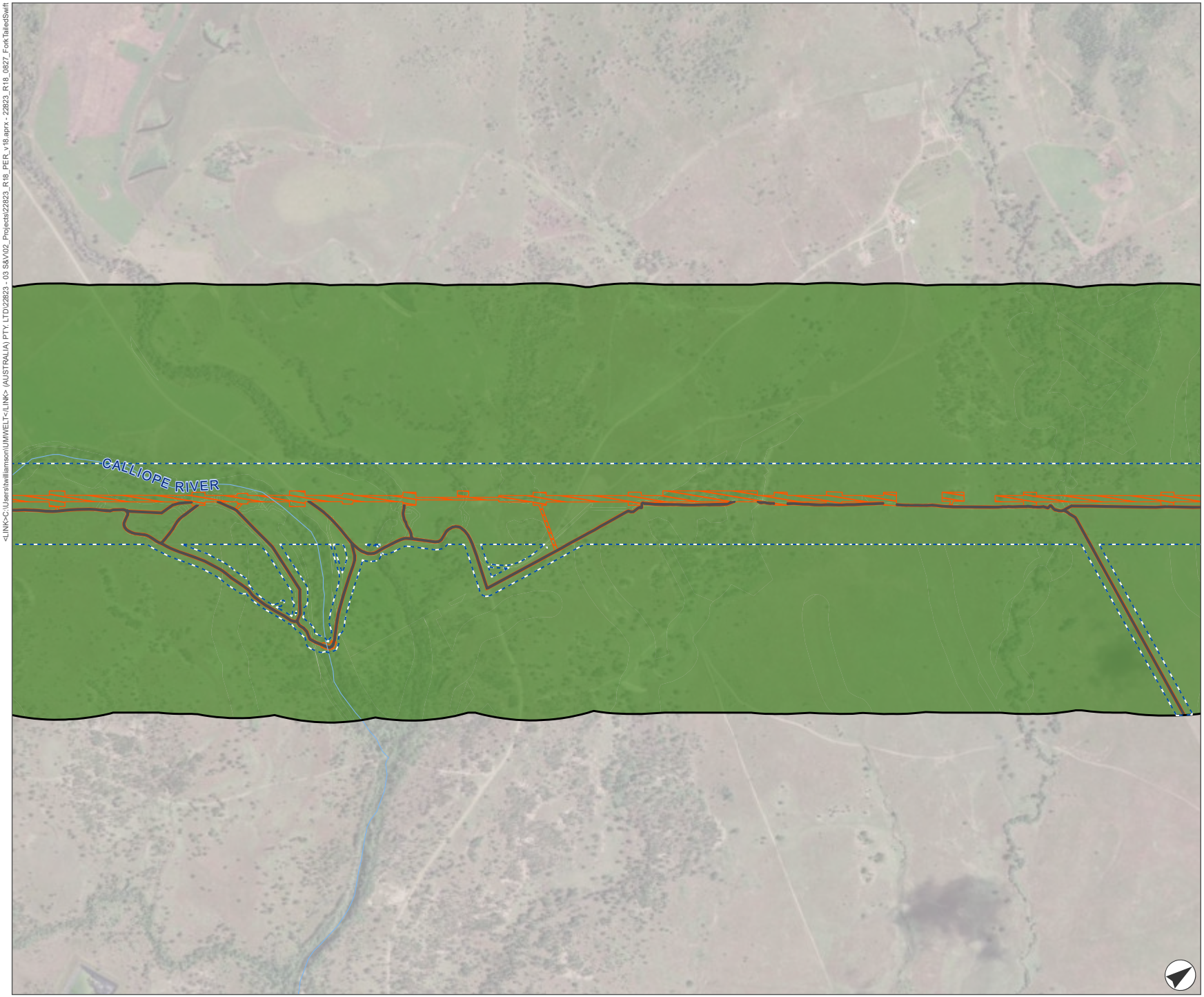


FIGURE 8.27-10

Fork-tailed Swift Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

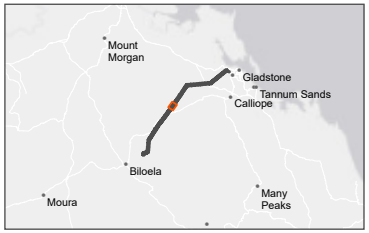
- Watercourse
- Field Survey Extent
- Project Area

Fork-tailed Swift Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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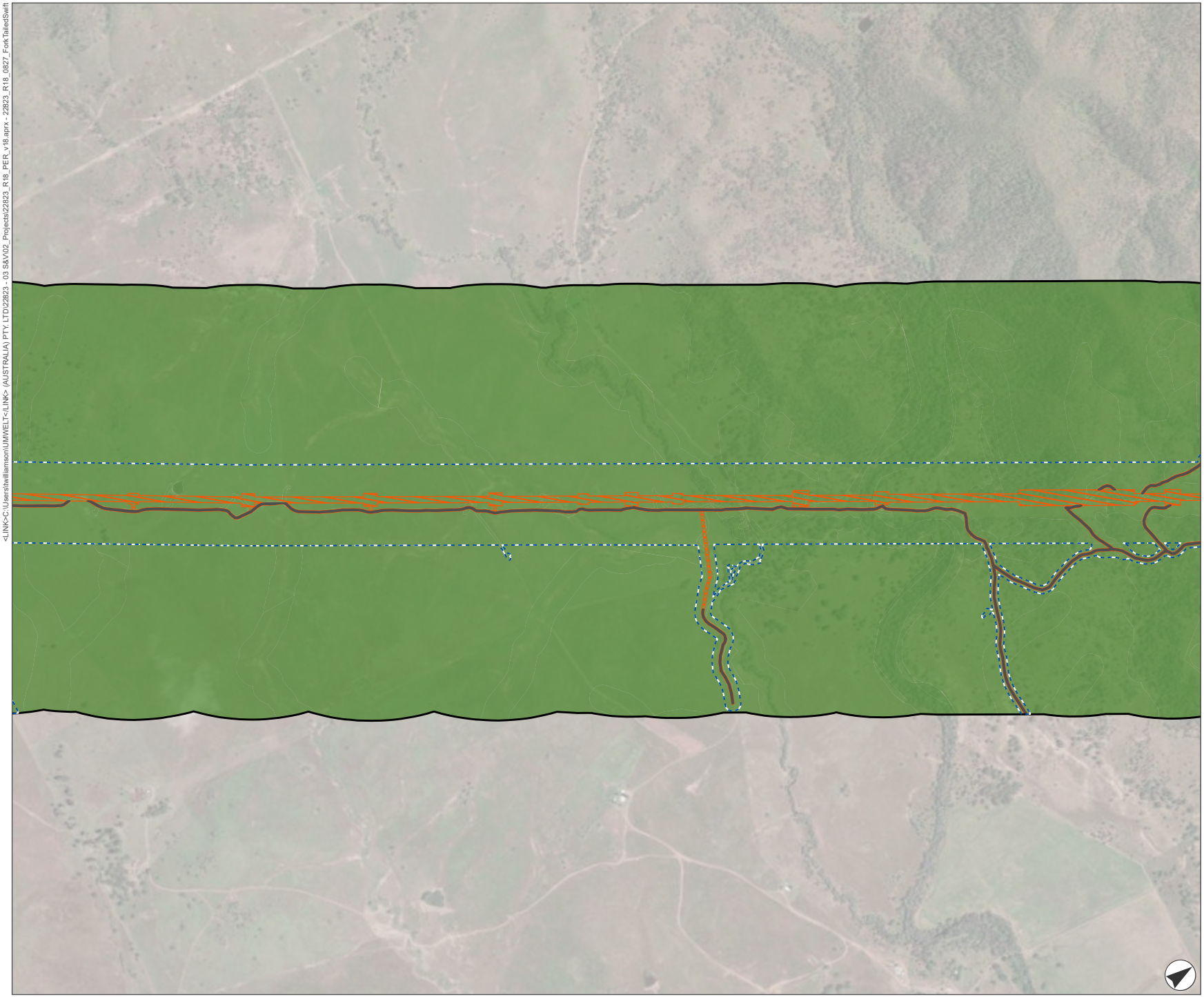


FIGURE 8.27-11

Fork-tailed Swift Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

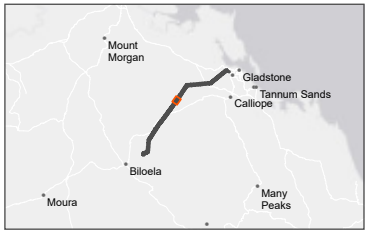
- Field Survey Extent
- Project Area

Fork-tailed Swift Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.27-12

Fork-tailed Swift Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

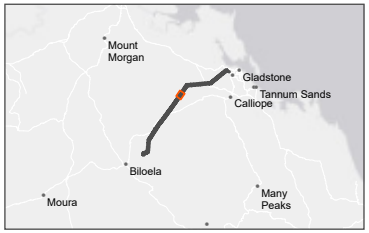
- Field Survey Extent
- Project Area

Fork-tailed Swift Habitat

- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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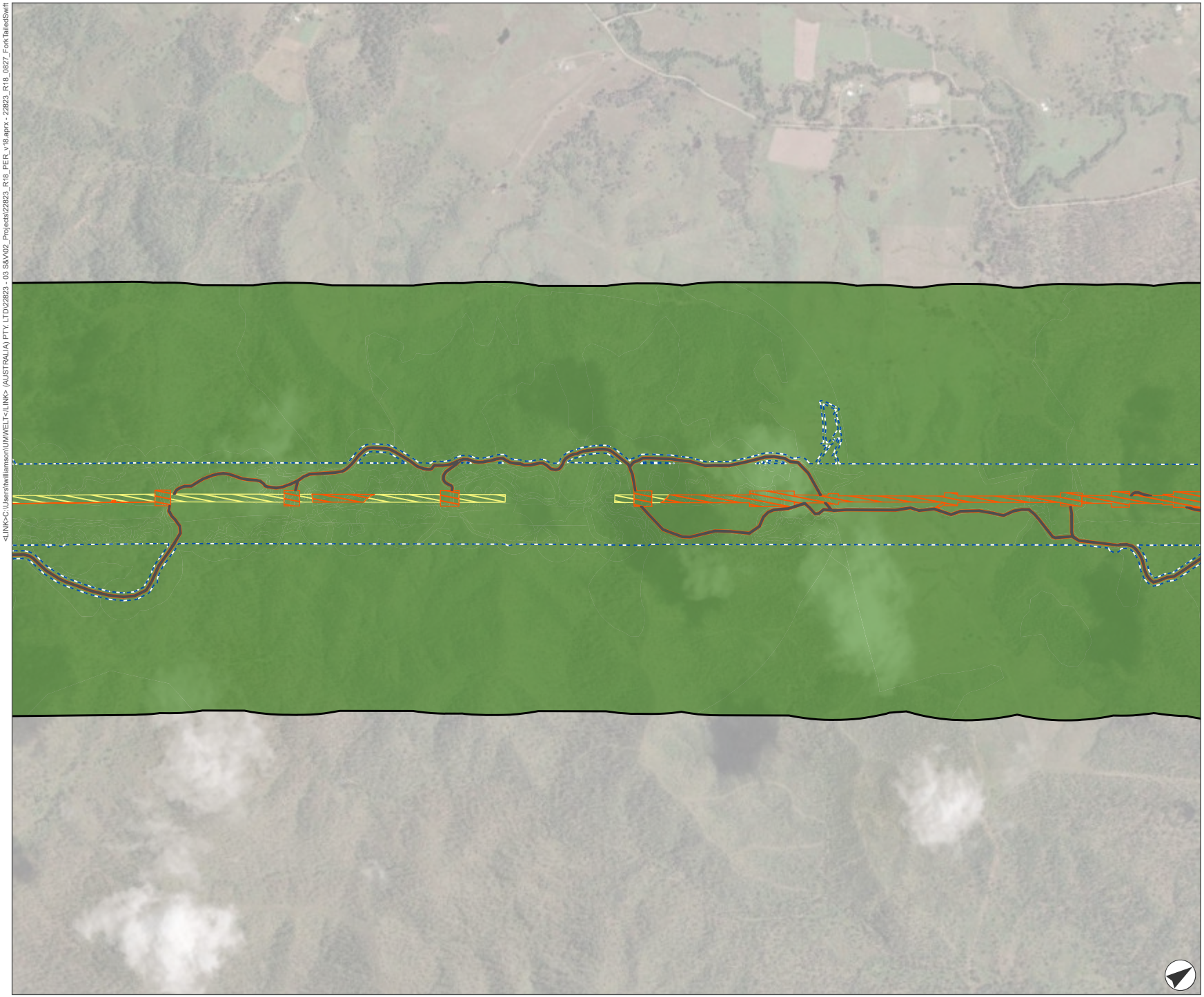


FIGURE 8.27-13

Fork-tailed Swift Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

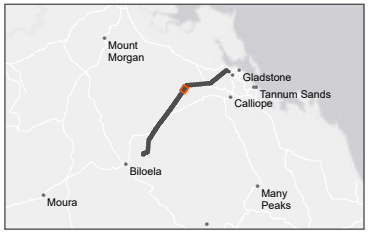
- Field Survey Extent
- Project Area

Fork-tailed Swift Habitat

- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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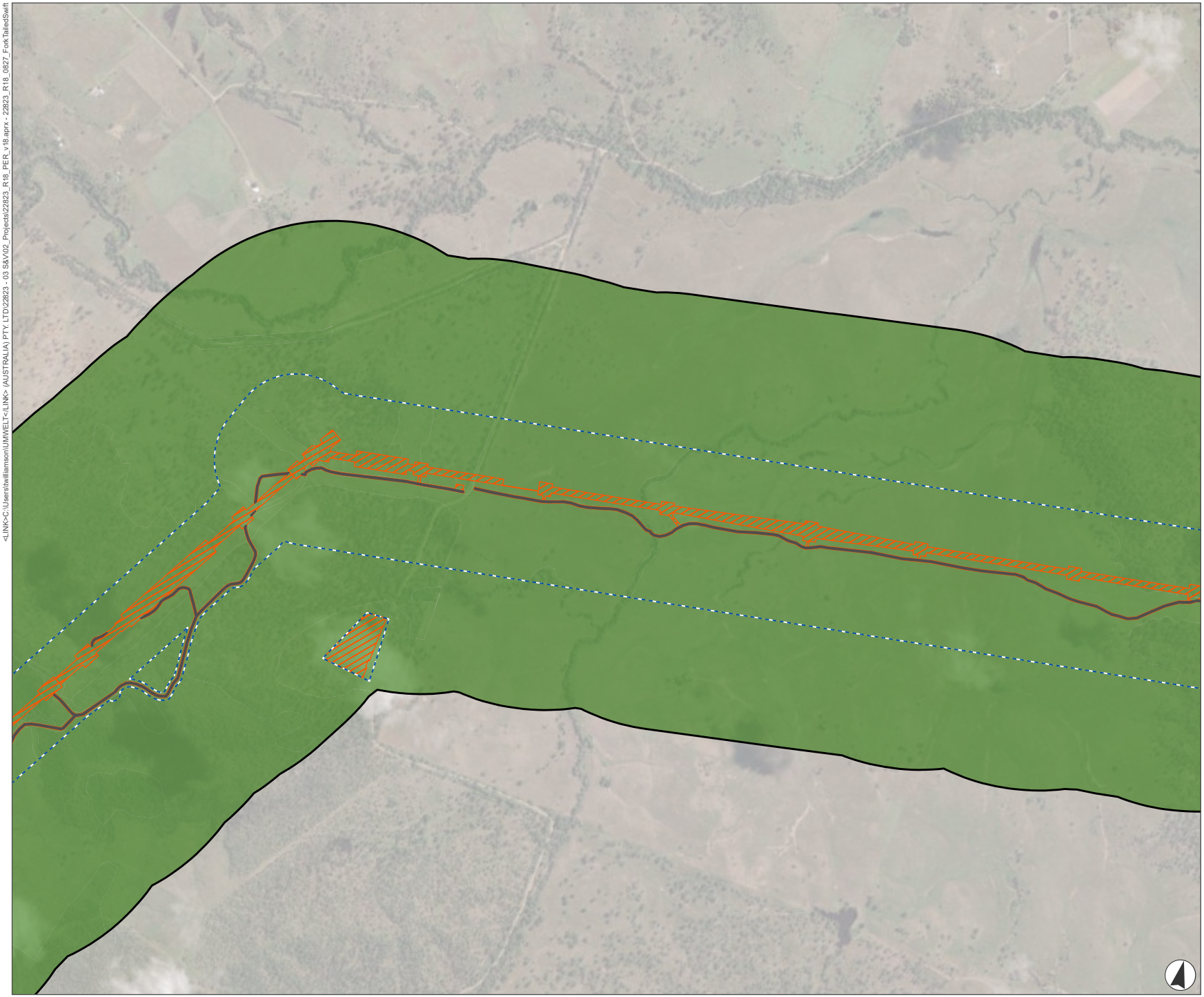


FIGURE 8.27-14

Fork-tailed Swift Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

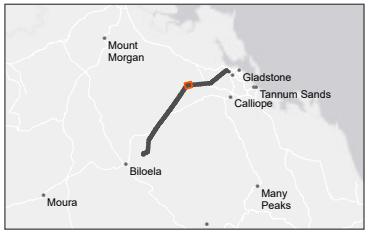
- Field Survey Extent
- Project Area

Fork-tailed Swift Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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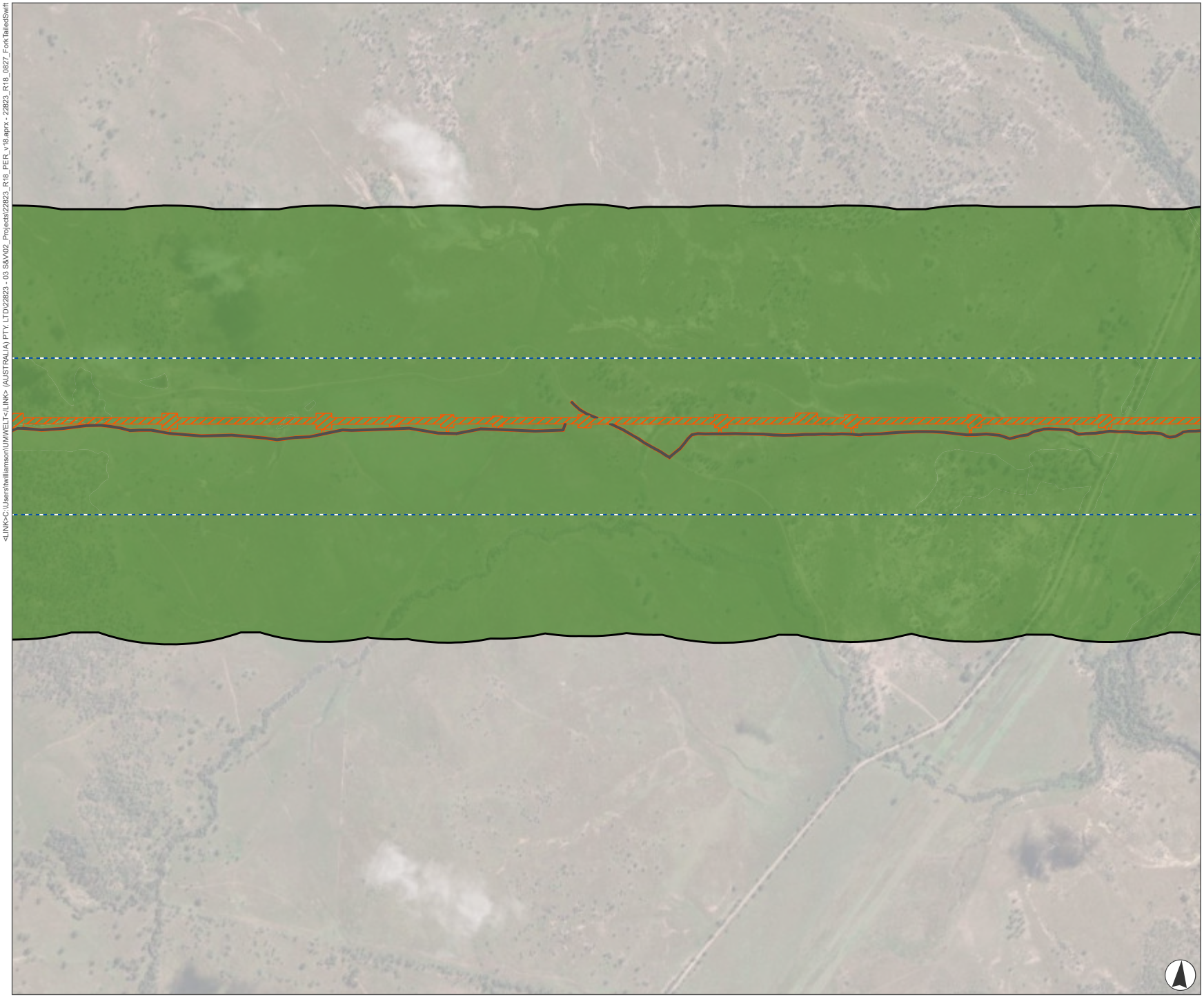


FIGURE 8.27-15

Fork-tailed Swift Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

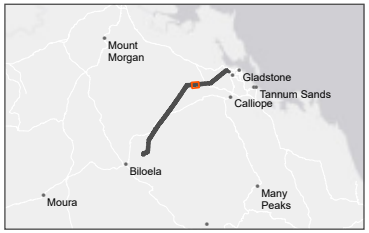
- Field Survey Extent
- Project Area

Fork-tailed Swift Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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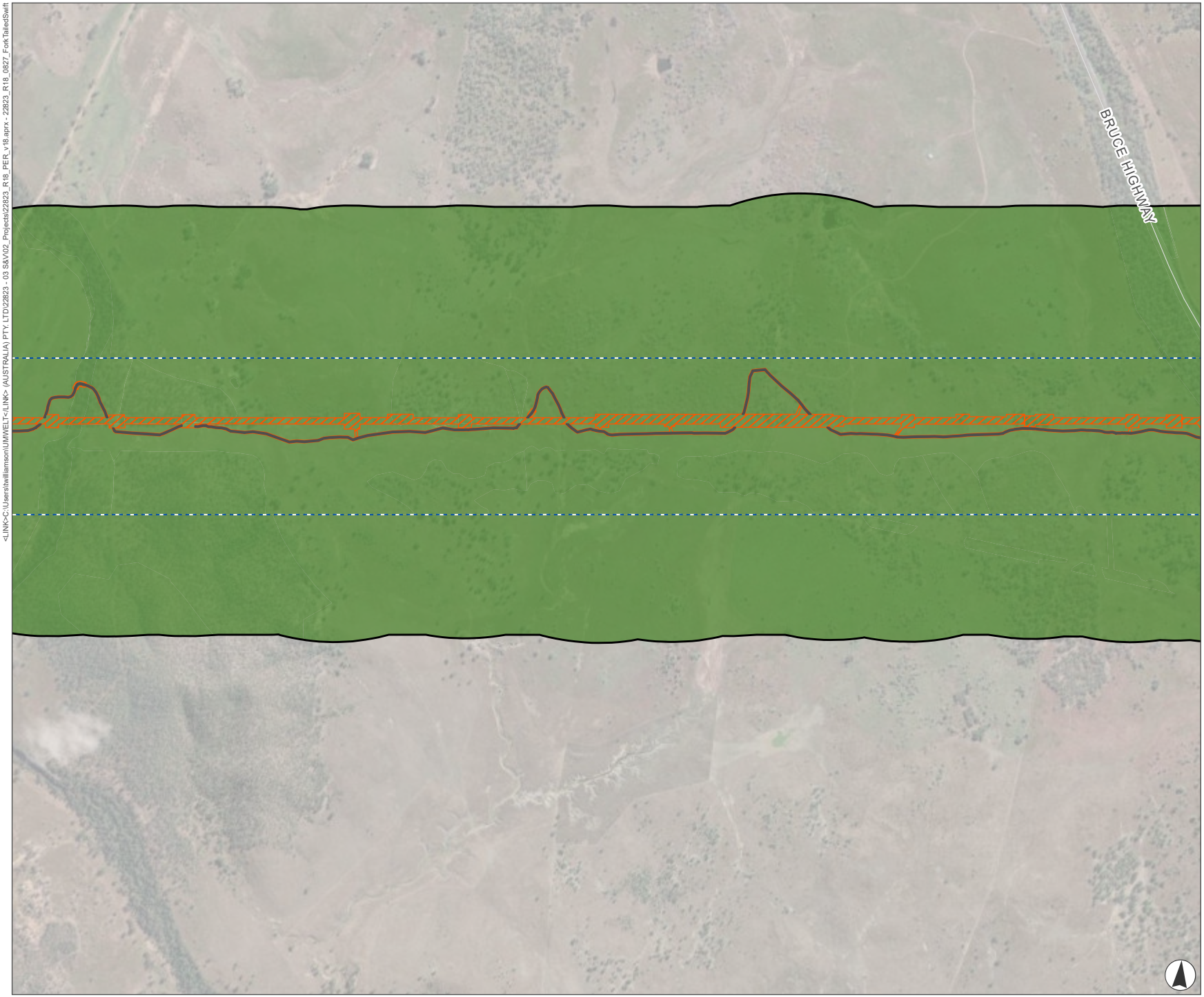


FIGURE 8.27-16

Fork-tailed Swift Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

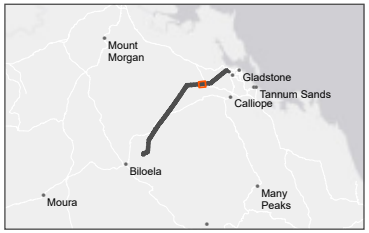
- Roads
- Field Survey Extent
- Project Area

Fork-tailed Swift Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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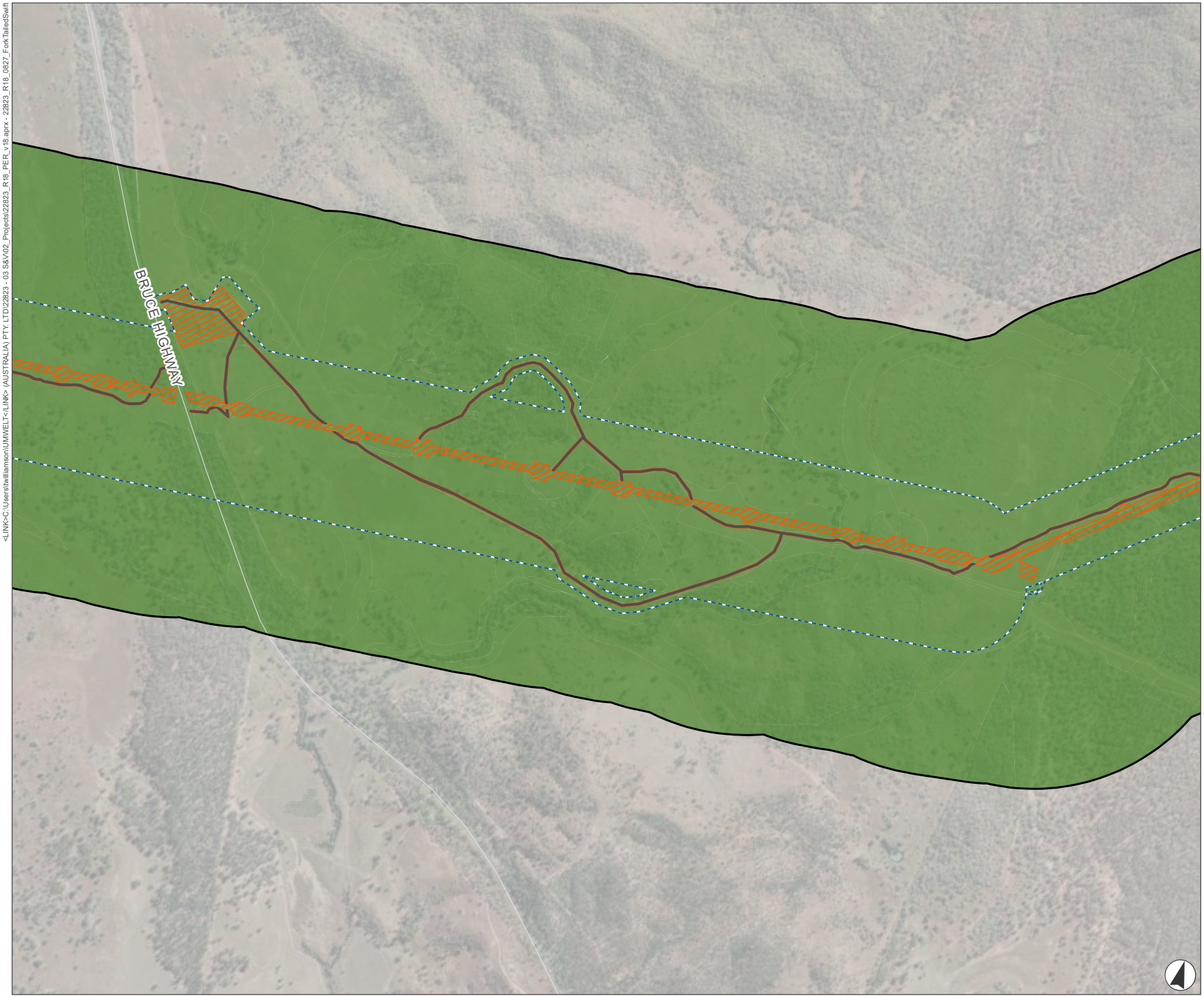


FIGURE 8.27-17

Fork-tailed Swift Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

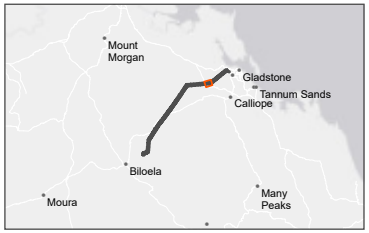
- Roads
- Field Survey Extent
- Project Area

Fork-tailed Swift Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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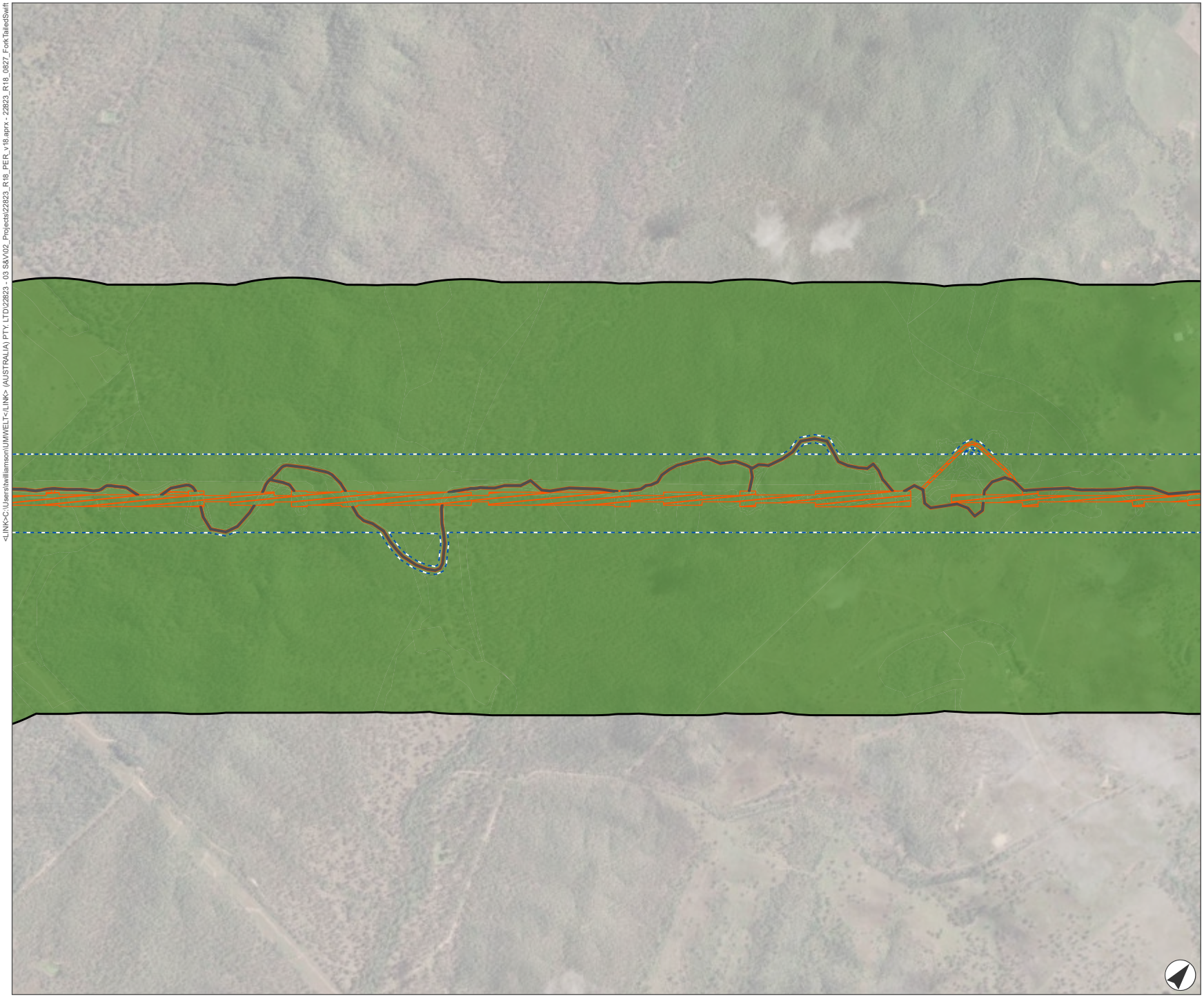


FIGURE 8.27-18

Fork-tailed Swift Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

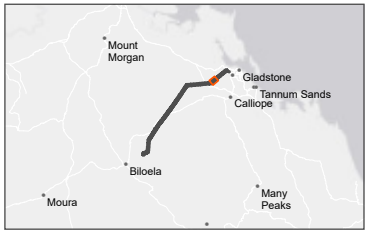
- Field Survey Extent
- Project Area

Fork-tailed Swift Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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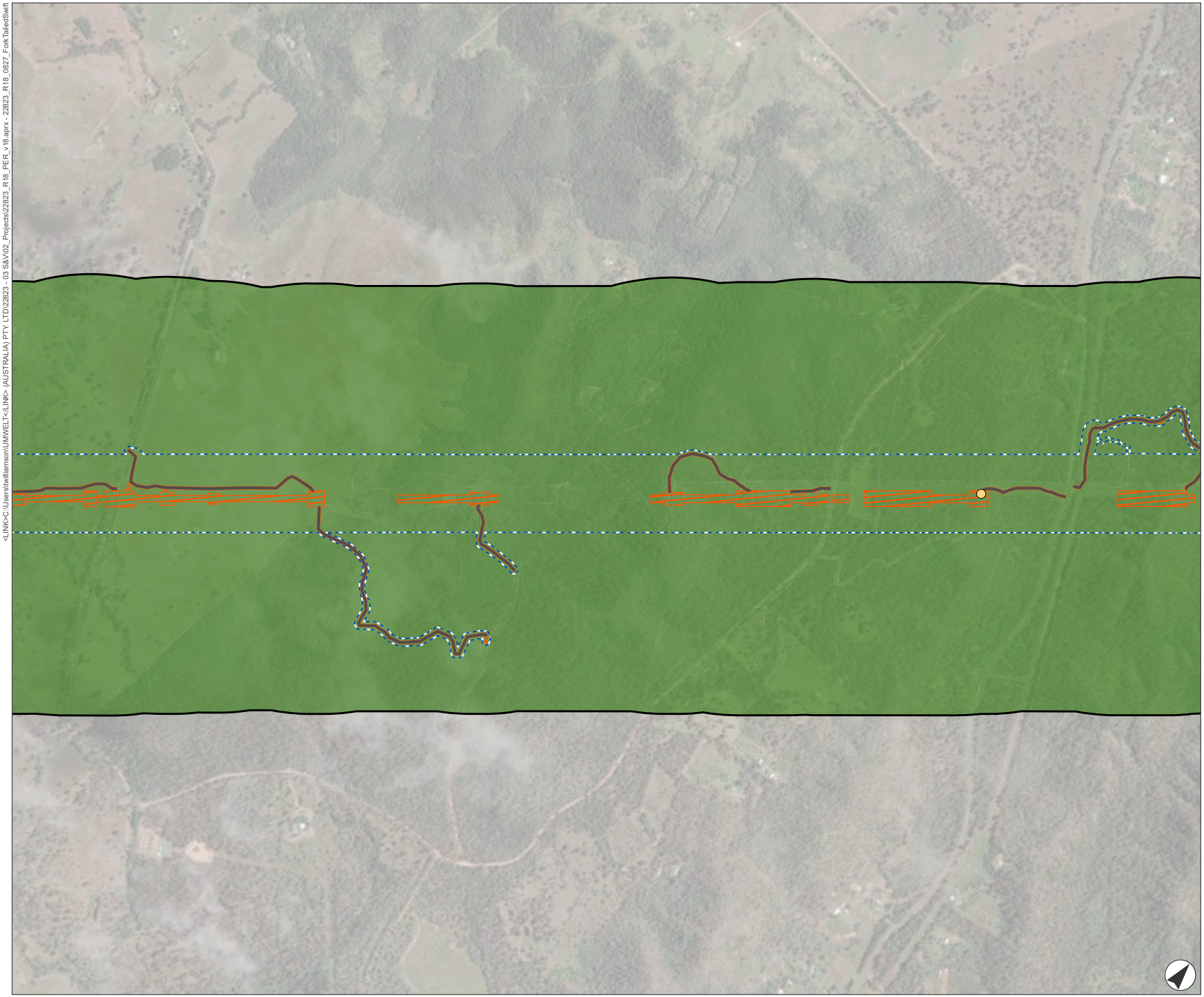


FIGURE 8.27-19

Fork-tailed Swift Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

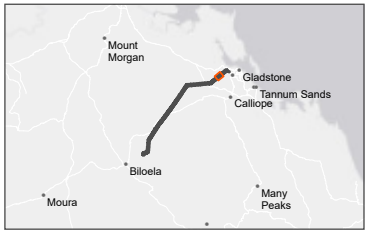
- Field Survey Extent
- Project Area
- Fork-tailed Swift (Umwelt)

Fork-tailed Swift Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.27-20

Fork-tailed Swift Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

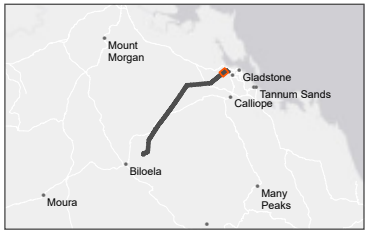
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Fork-tailed Swift Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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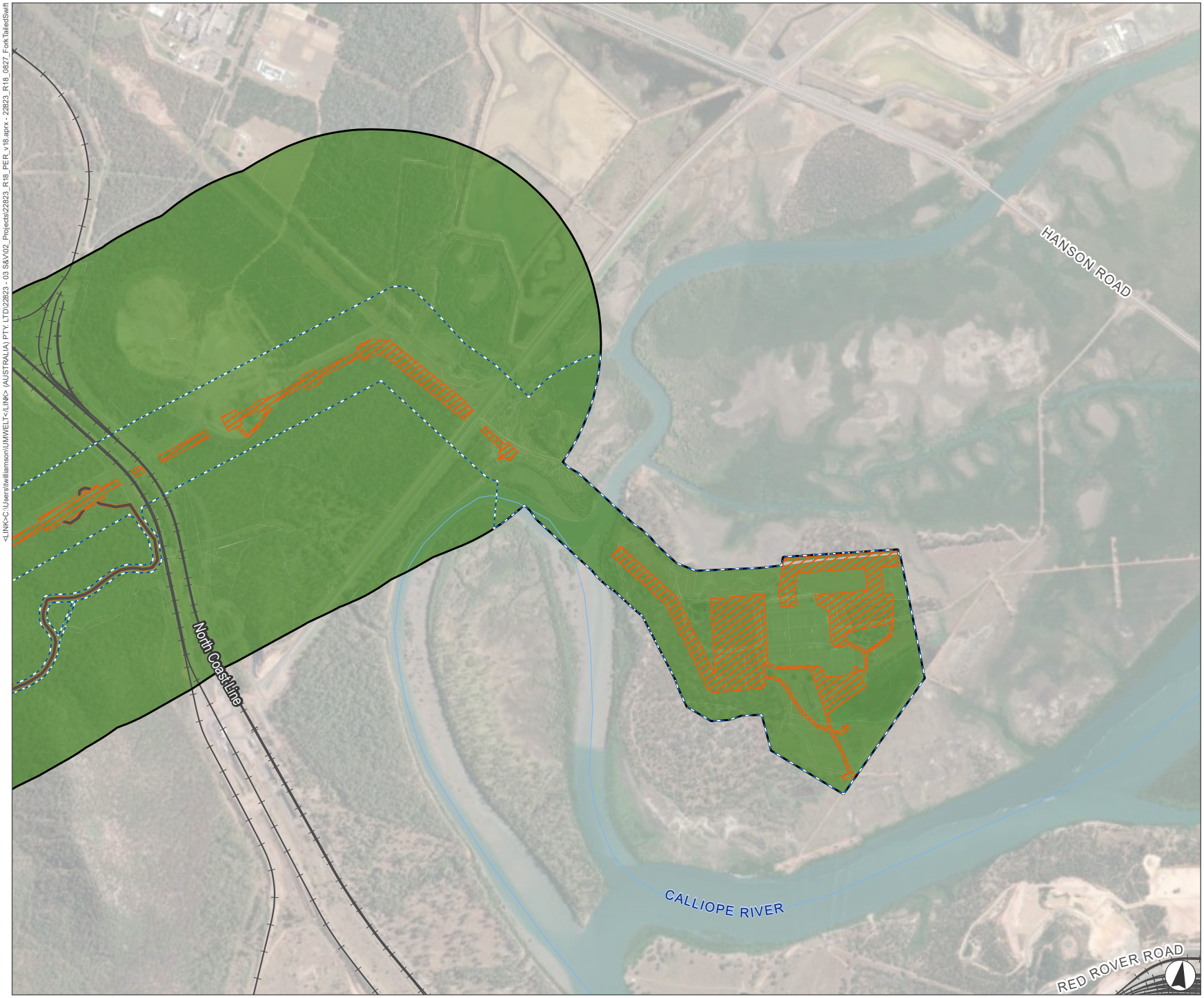


FIGURE 8.27-21

Fork-tailed Swift Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

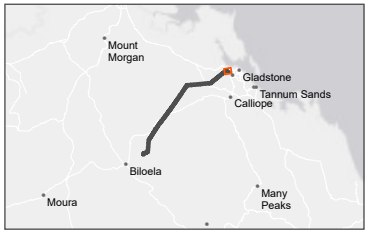
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Fork-tailed Swift Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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8.2.8.3 Oriental Cuckoo (*Cuculus optatus*)

Table 8.86 Oriental Cuckoo: Ecology and Relevance to the Project Area

Oriental Cuckoo	
Profile	**Conservation status** Migratory **Distribution** A non-breeding migrant to Australia, oriental cuckoo transits to northern and eastern Australia in summer reaching as far south on the east coast as Bega, New South Wales (BirdLife International, 2024). **Ecologically significant proportion of the population** The upper (1%) and lower (0.1%) thresholds for ecologically significant proportions of the population of this species are estimated at 10,000 and 1,000 respectively. The species is likely to be a seasonal visitor to the Project Area when in transit between its northern hemisphere breeding habitat and northern and eastern Australia. This species may transit through the Project Area in low densities, utilising available foraging and dispersal habitat, given this, it is unlikely that it would support the ecological requirements of an ecologically significant proportion of the population. **Historical records within the desktop search extent** No WildNet records occur within the desktop search extent, however, recent ALA records occur from Gladstone in 2019, (ALA, 2025). **Habitat** Oriental cuckoo is found in a range of vegetation types including rainforest, vine-thicket and wet sclerophyll forests. It also inhabits open communities such as *Casuarina*, *Acacia* and *Eucalyptus* woodland, favouring edges or ecotones between forest types (Department of the Environment, 2015a). While on passage, this species has been recorded occupying plantations, cleared areas and gardens, typically at lower elevations. **Important Habitat** Important habitat for oriental cuckoo is defined in the *Draft referral guideline for 14 birds listed as migratory species under the EPBC Act* (Department of the Environment, 2015a) as: • Monsoonal rainforest • Vine thickets • Wet sclerophyll forest • Open Casuarina, Acacia or Eucalyptus woodlands. Edges or ecotones between habitat types. All potential foraging and dispersal habitat in the Project Area meets this broad definition. Based on the referral guidelines, the area thresholds for important habitat likely to result in a significant impact are 250,000 ha (1%) and 25,000 ha (0.1%).

Oriental Cuckoo

Current threats to the species

The main threat to this species is likely fragmentation and loss of core breeding habitat through land clearing and urbanisation, especially forest remnants and corridors along the species' migration routes.

Recovery plan

A recovery plan has not been adopted for this species.

In the Project Area

Surveys

Four hundred and seventeen (417) habitat assessments were conducted. Diurnal bird surveys were undertaken throughout all field surveys. Bird species were recorded incidentally throughout the survey program both visually and aurally.

Species occurrence

Recent ALA records occur from Gladstone in 2019, however no WildNet records occur within the desktop search extent (ALA, 2025). The species was not detected during the field survey program despite considerable survey effort.

Habitat within the Project Area

Habitat type	Habitat modelling criteria	Area (ha)	
		Project Area	Disturbance Footprint
Foraging and dispersal	All REs except REs 12.1.2 and 12.1.3. Remnant and regrowth. All vegetation communities are likely to be suitable for foraging and dispersal during this species' winter migration with the exception of marine grasslands and shrublands. This species is a non-breeding migrant to Australia.	6,662.9	155.0

Table 8.87 Assessment of Potential Project Impacts and Mitigation and Management Commitments for Oriental Cuckoo

Potential Impact	Assessment	Mitigation Commitments
Direct		
Vegetation clearing causing habitat loss and fragmentation	The Project has been strategically designed to minimise clearing and fragmentation of habitat by collocating alongside and existing transmission line	• Identify MNES fauna habitat and individuals through pre-clearance surveys • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Disturbance activities must be contained to Disturbance Footprint subject to minor micro-siting within the Field Survey Extent • Habitat features to be relocated to adjacent areas

Potential Impact	Assessment	Mitigation Commitments
	corridor. Despite this, up to 155.0 ha of foraging and dispersal habitat may be cleared for the Project, which would result in a loss of habitat for the species, though this habitat is considered of limited importance for the species compared to more suitable higher quality habitat in nearby state forests.	• During the pre-clearance survey, the fauna spotter-catcher will locate, record and mark the habitat features (including those to be retained in situ) • Install tree protection to habitat trees immediately adjacent to areas of earthworks • Refer to Table 5.1 and Table 5.8 of the MNES Management Plan for further details on mitigation measures.
Injury or direct mortality	Construction works will involve the modification, disruption or removal of habitat for the species; therefore, injury or mortality is a risk associated with clearing activities.	• Appropriately qualified fauna spotter catcher to undertake pre-clearance habitat assessment and be present during clearing and disturbance to habitat features • Flushing surveys • Clearing must be staged, with non-habitat trees felled first • Tampering with an animal breeding place to be carried out in accordance with an approved Species Management Program • Clear delineation of habitat features to be retained • Restrict vehicles to approved access tracks • Vehicle travelling speed restricted to <40 km/hr • Excavations must be secured (e.g. covered) • Refer to Table 5.3 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Changes to habitat quality (degradation) and loss of key habitat resources	The Project is not expected to largely reduce the quality of habitat within the Project Area, given that this habitat is already highly fragmented and lower quality than adjacent habitat within state forest which would be more favourable to the species.	• Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • Dust suppression measures including vehicles restricted to approved tracks, cover all loose loads and set speed limits (<40 km/hr) • Application of dust suppressants as required • Dust generating activities will be limited on days with strong winds blowing towards sensitive receptors or dust sensitive locations • Regular monitoring and visual surveillance to trigger management actions will be undertaken • Refer to Table 5.4 and Table 5.5 of the MNES Management Plan for further details on mitigation measures.
Vehicle strike	Vehicle collision has potential to cause injury or fatalities. The risk is greatest when high volumes of vehicle activity (including light and heavy vehicles) is occurring during the construction phase. During operation, traffic will be reduced so the risk is also comparatively reduced.	• Restrict vehicles to approved access tracks • Vehicle travelling speed restricted to <40 km/hr • Refer to Table 5.3 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Indirect		
Alterations to fire regimes including uncontrolled fires	Fire is not a listed direct threat to oriental cuckoo, although is a potential indirect threat related to changs in fire frequency and intensity under climate change. Changes to fire frequency and intensity within the Project Area may lead to habitat degradation and loss of key resources (mistletoe). Although increased plant and vehicle presence during construction will result in an increased number of potential ignition sources, employment of standard construction protocols will ensure the risk of bushfire is actively managed.	• Bushfire Management Plan will be developed • Burning of vegetation strictly prohibited unless a permit is obtained • Designated parking areas for vehicles and machinery • During operation, vegetation within the Disturbance Footprint will be managed in accordance with Powerlink's vegetation specification • Baseline biosecurity surveys and ongoing inspections and management will be undertaken • Areas containing weed infestations will be treated prior to undertaking the commencement of site disturbance • Land access biosecurity requirements to be adhered to • Project specific biosecurity inductions will be undertaken • A biosecurity inspection and clean down of vehicles, machinery and plant must be completed • Clean downs must be undertaken in accordance with the Queensland Government's biosecurity clean down requirements • Biosecurity Declarations must be accompanied with all high-risk materials (e.g. sand, soil, mulch) • Use only native or certified weed free seeds in all rehabilitation works • Refer to Table 5.5 and Table 5.9 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Increased incidence of predators	Increased competition with other species, particularly the noisy miner (*Manorina melanocephala*) is a possible consequence of clearing and fragmentation of habitat as a result of the Project. Populations of black rat have potential to increase as a result of the project, especially in relation to increased rubbish and food scraps. Black rat are a recognised threat to this species.	• All waste to be secured • Biosecurity Instrument Permit to be obtained for moving materials out of or within different biosecurity zones • Educate workforce in the identification of pest fauna species • Avoid inclusion of any water retaining voids or pits • Refer to Table 5.6 of the MNES Management Plan for further details on mitigation measures.
Noise, activity, artificial light and vibration generated during construction and operation interrupting foraging, breeding or dispersal behaviours	Construction activities will mostly occur during daylight hours (6.30 am to 6.30 pm), so as not to disturb potential roosting. As clearing will be staged, noise and vibration will be limited to discrete locations at the clearing front. Construction noise and vibration will primarily occur around infrastructure (not intact habitat). Artificial light could interfere with roosting and increase visibility of roosting birds to predators. Construction will mostly occur at night; therefore, artificial light is not likely to	• Plant and equipment to be fitted with appropriate noise attenuation and maintained • Deliveries and removal of material and equipment to and from site within approved hours for construction • Plant to be turned off when not in use • No unnecessary use of horns or other audible signals on mobile plant or equipment • Machinery and equipment will be maintained in good working condition • Refer to Table 5.10 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
	impact roosting birds. Noise, activity, artificial light and vibration impact in relation to operation would be negligible.	

Table 8.88 Significant Impact Assessment: Oriental Cuckoo

Impact Criteria	Assessment
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for the migratory species	**Unlikely.** It is considered unlikely that the Project will substantially modify, destroy or isolate an area of important habitat for the oriental cuckoo. This species is considered common and stable, and while modelled potential habitat occurs within the Disturbance Footprint, much of this has already been modified by historical clearing, weed invasion and pest activity. Nonetheless, the remaining foraging and dispersal habitat is considered important habitat. The Project will clear up to 155.0 ha of foraging and dispersal habitat. Table 4 of the *Draft referral guidelines for 14 birds listed as migratory species under the EPBC Act* identifies habitat area thresholds above which a significant impact is likely. These guidelines note that actions constituting substantial loss or modification of important habitat are those that meet or exceed the upper threshold (1%). The extent of clearing associated with the Project does not approach either the upper (250,000 ha) or lower (25,000 ha) threshold values for the oriental cuckoo. Habitat fragmentation impacts have been minimised through careful siting and design of the Disturbance Footprint, with clearing directed to previously disturbed areas wherever possible. The oriental cuckoo is a highly mobile species capable of moving large distances, and the Project will not impede its movement. Further degradation of retained habitat is also unlikely, as indirect impacts such as altered fire regimes, edge effects, weeds and pests will be actively managed through the MNES Management Plan. Suitable habitat is also widespread in the surrounding landscape. On this basis, the Project is unlikely to substantially modify, destroy or isolate an area of important habitat for the oriental cuckoo.

Impact Criteria	Assessment
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	**Unlikely.** This species is vulnerable to impacts associated with the black rat and invasive vine species such as rubber vine (Cryptostegia *grandiflora**). Invasive species, including black rat and rubber vine, were recorded within the Project Area. The Project will manage weeds and pests through mitigation measures outlined in Table 5.5 and 5.6 of the MNES Management Plan. On this basis, the Project is unlikely to introduce or exacerbate weeds or pests beyond existing levels.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of the migratory species	**Unlikely.** As described in the above sections, mapped habitat is unlikely to support an ecologically significant proportion of the national or international population. Additionally, no observations of the species were made throughout the field survey program. This species is only likely to inhabit the Project Area temporarily while on passage. When on passage the species has broad habitat requirements and as such, it is likely that suitable habitat occurs extensively in the wider local area, including within adjacent State forests. It is unlikely that any population relies on the potential habitat within the Disturbance Footprint for any part of its lifecycle. Given the predicted size and wide-ranging distribution of the population, it is considered unlikely that the Project will seriously disrupt the lifecycle of an ecologically significant proportion of the population.
Significant Residual Impact	**Unlikely to have a significant impact**

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FIGURE 8.28-1

Oriental Cuckoo Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

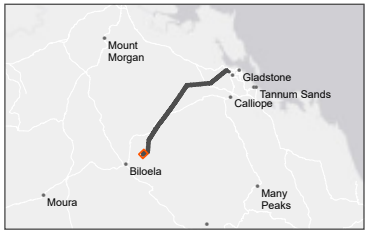
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Oriental Cuckoo Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
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FIGURE 8.28-2

Oriental Cuckoo Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

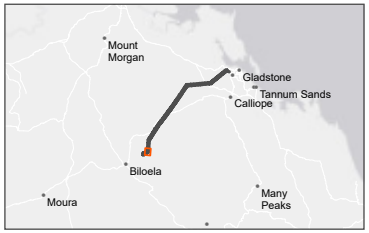
- Watercourse
- Field Survey Extent
- Project Area

Oriental Cuckoo Habitat

- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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Kilometres

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FIGURE 8.28-3

Oriental Cuckoo Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

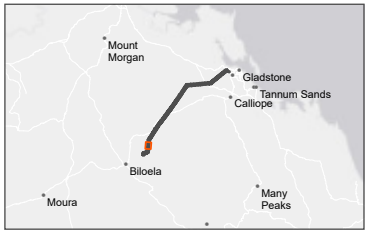
- Field Survey Extent
- Project Area

Oriental Cuckoo Habitat

- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.28-4

Oriental Cuckoo Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

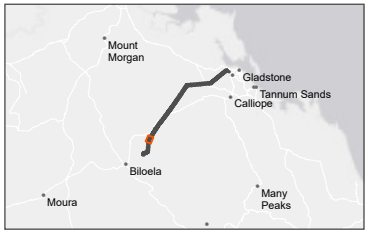
- Field Survey Extent
- Project Area

Oriental Cuckoo Habitat

- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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Kilometres

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FIGURE 8.28-5

Oriental Cuckoo Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

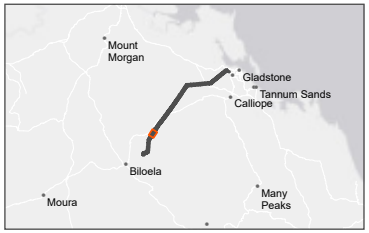
- Roads
- Field Survey Extent
- Project Area

Oriental Cuckoo Habitat

- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.28-6

Oriental Cuckoo Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

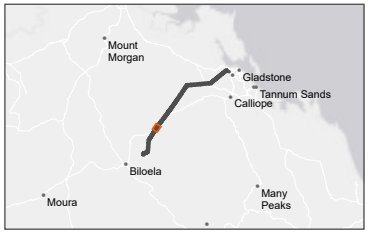
- Roads
- Watercourse
- Field Survey Extent
- Project Area

Oriental Cuckoo Habitat

- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.28-7

Oriental Cuckoo Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

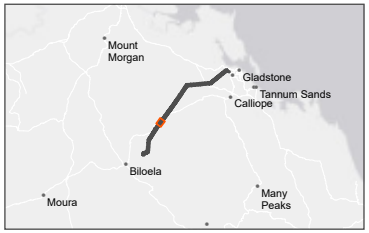
- Roads
- Watercourse
- Field Survey Extent
- Project Area

Oriental Cuckoo Habitat

- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.28-8

Oriental Cuckoo Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

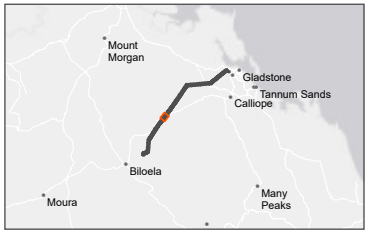
- Roads
- Field Survey Extent
- Project Area

Oriental Cuckoo Habitat

- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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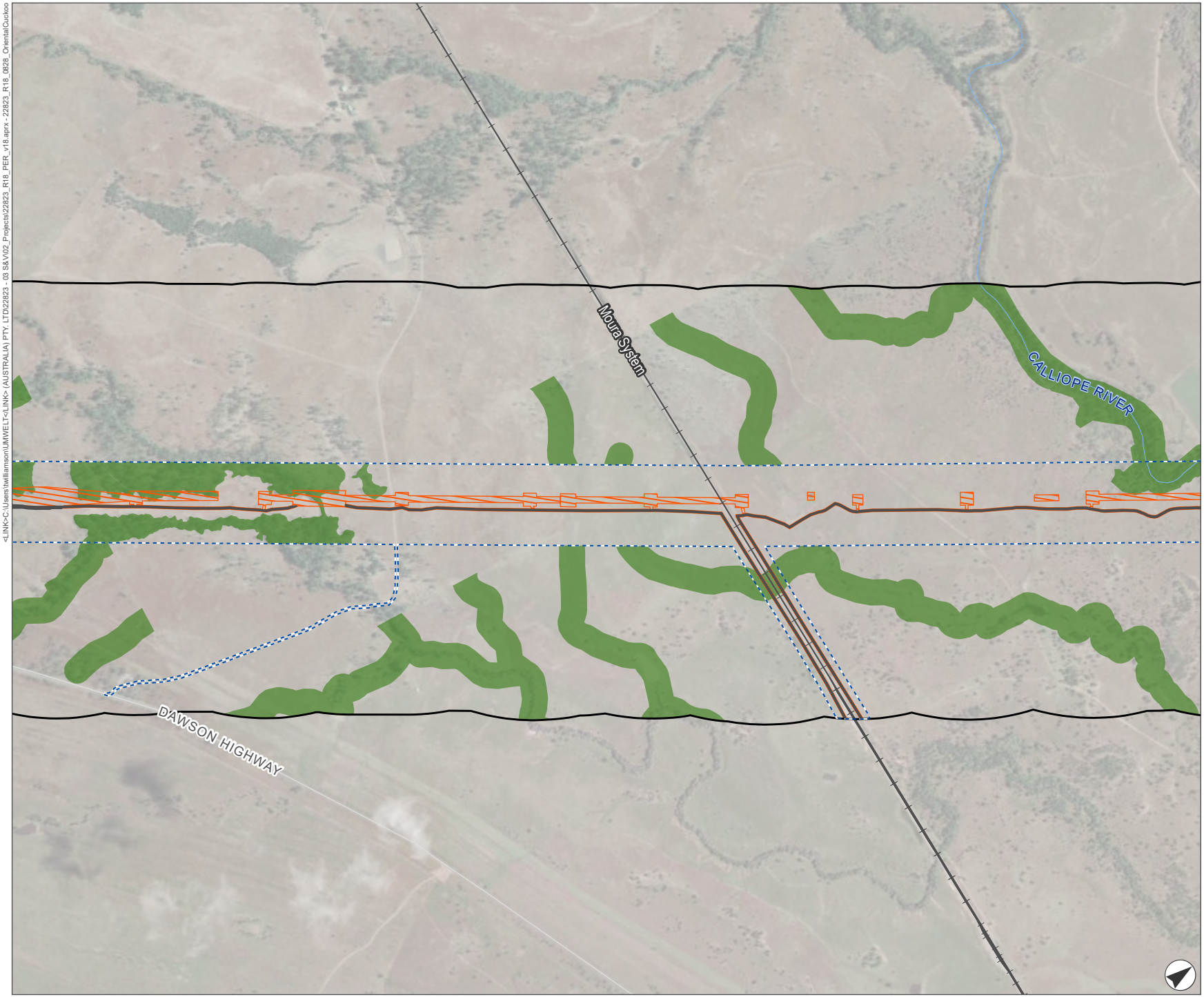


FIGURE 8.28-9

Oriental Cuckoo Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

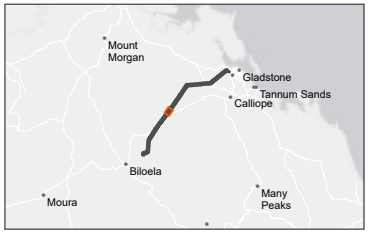
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Oriental Cuckoo Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
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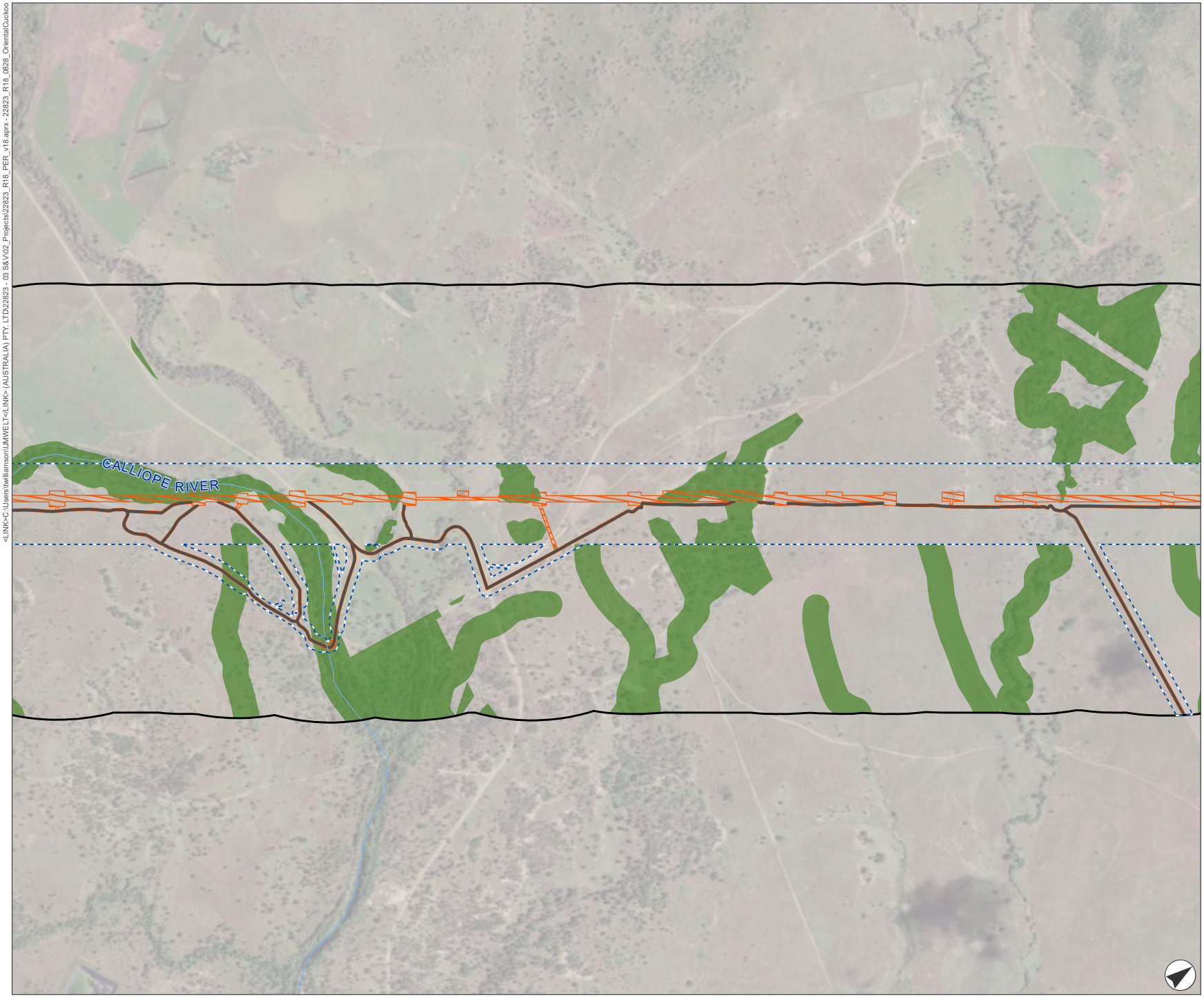


FIGURE 8.28-10

Oriental Cuckoo Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

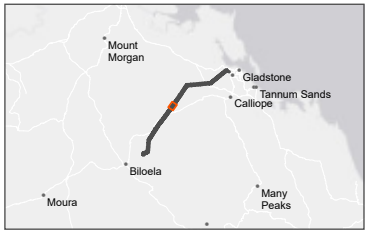
- Watercourse
- Field Survey Extent
- Project Area

Oriental Cuckoo Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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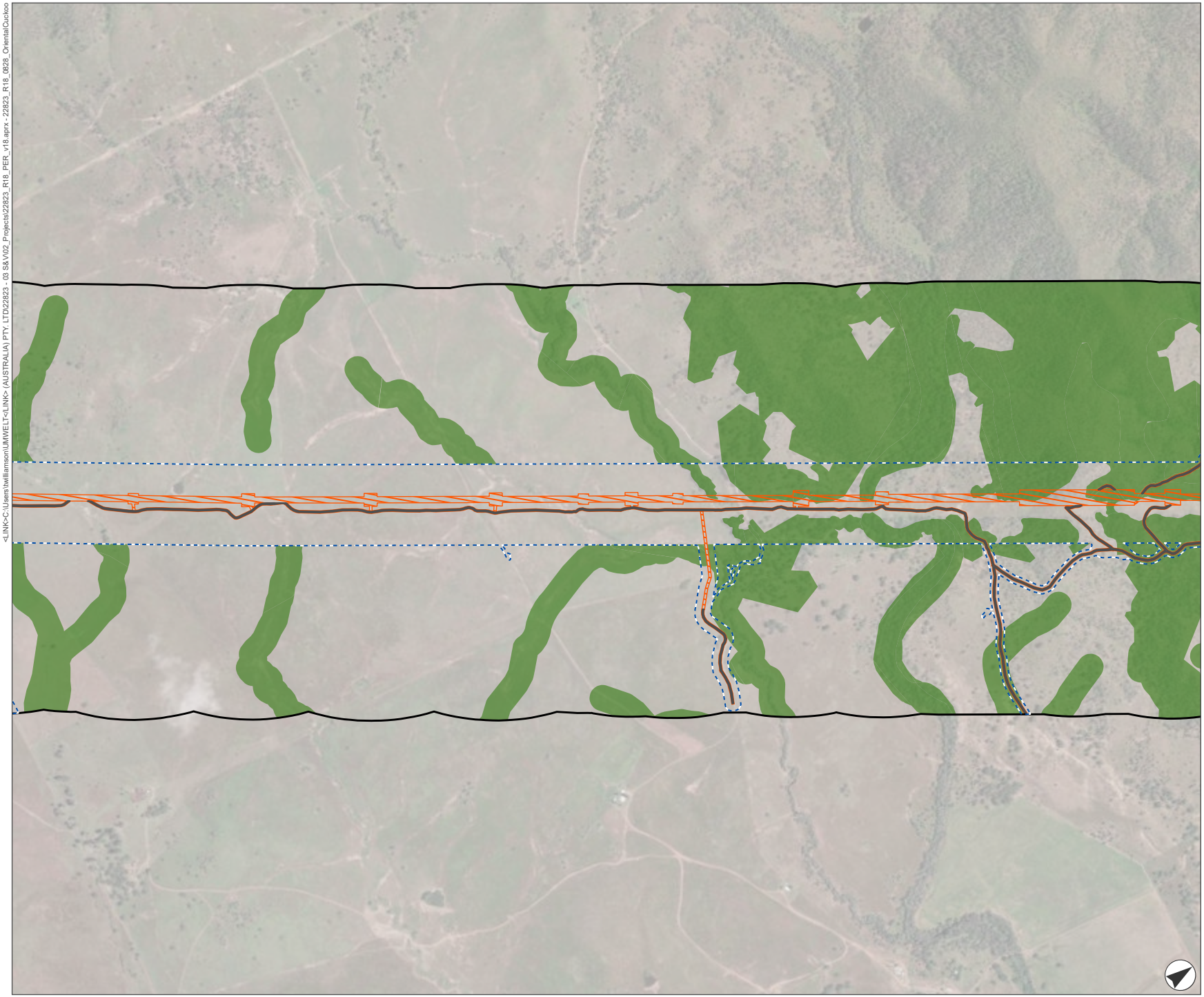


FIGURE 8.28-11

Oriental Cuckoo Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

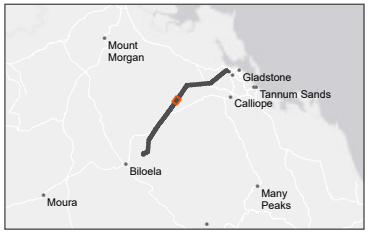
- Field Survey Extent
- Project Area

Oriental Cuckoo Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.28-12

Oriental Cuckoo Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

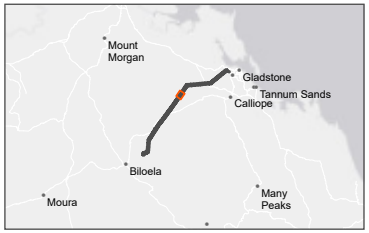
- Field Survey Extent
- Project Area

Oriental Cuckoo Habitat

- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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FIGURE 8.28-13

Oriental Cuckoo Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

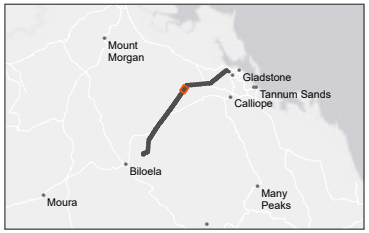
- Field Survey Extent
- Project Area

Oriental Cuckoo Habitat

- Foraging and dispersal

Disturbance Footprint

- Selective Clearing
- Full Clearing
- Existing Clearance



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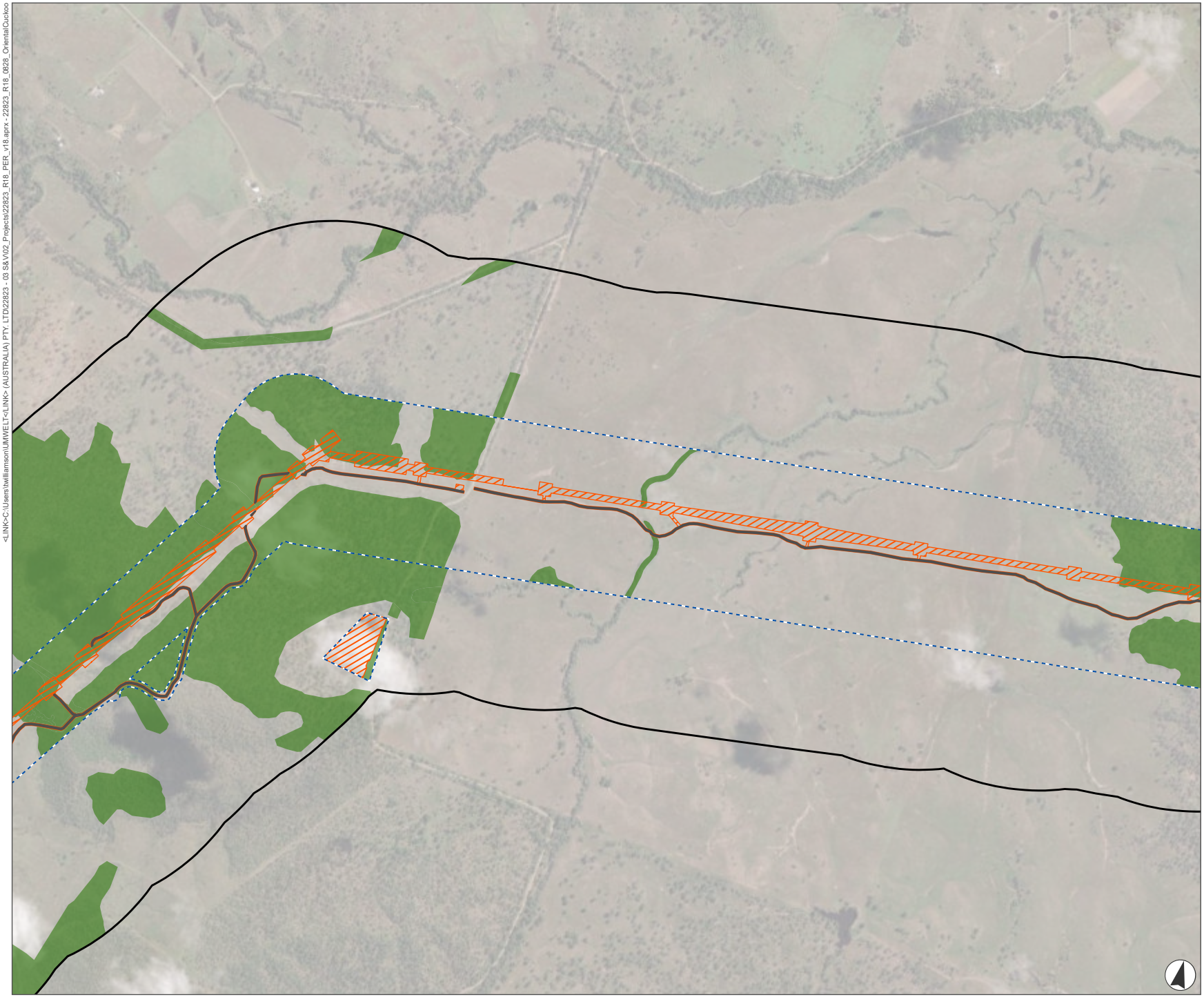


FIGURE 8.28-14

Oriental Cuckoo Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

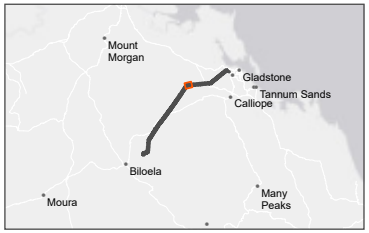
- Field Survey Extent
- Project Area

Oriental Cuckoo Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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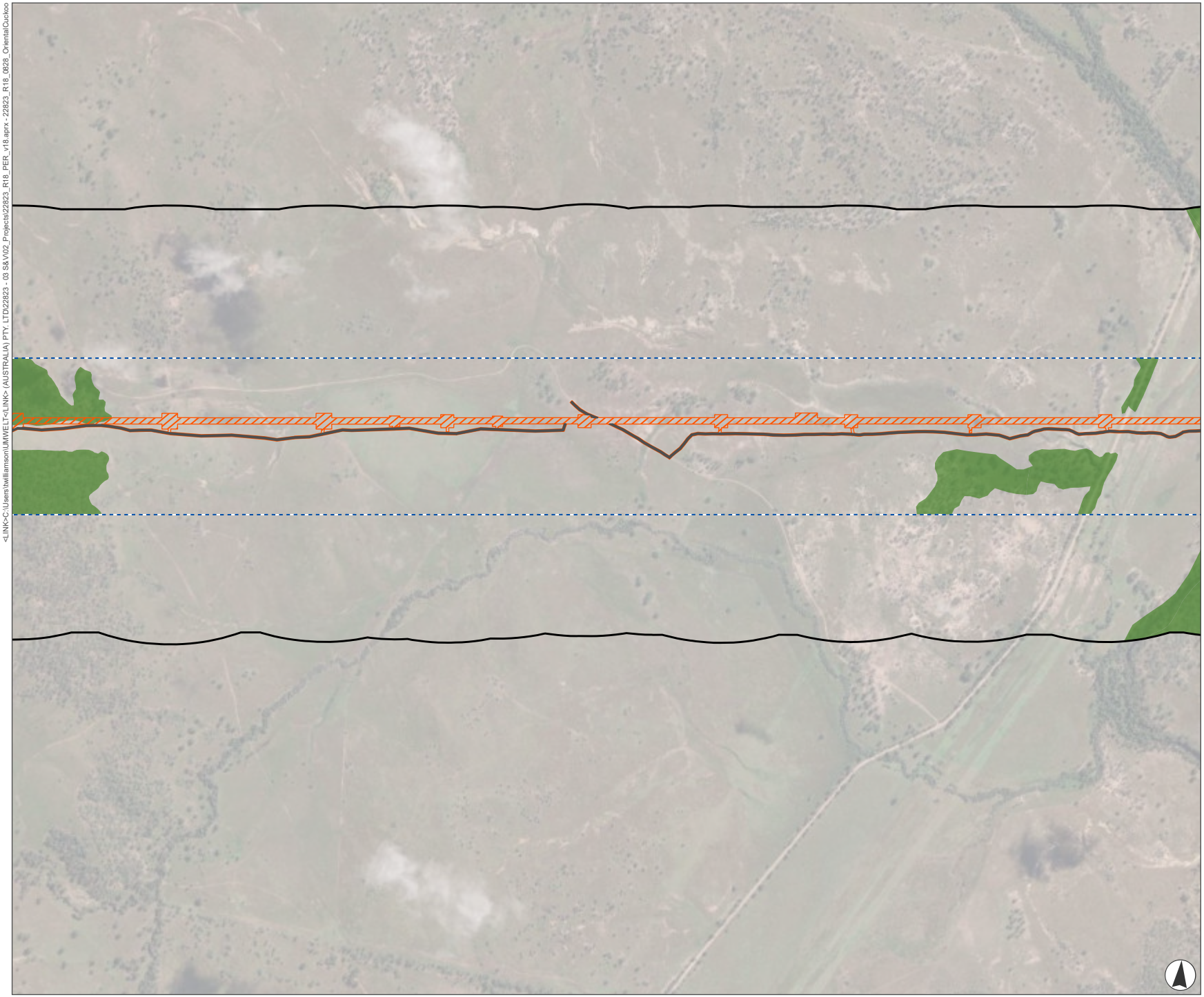


FIGURE 8.28-15

Oriental Cuckoo Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

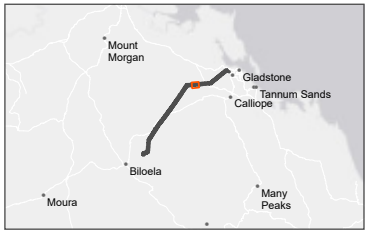
- Field Survey Extent
- Project Area

Oriental Cuckoo Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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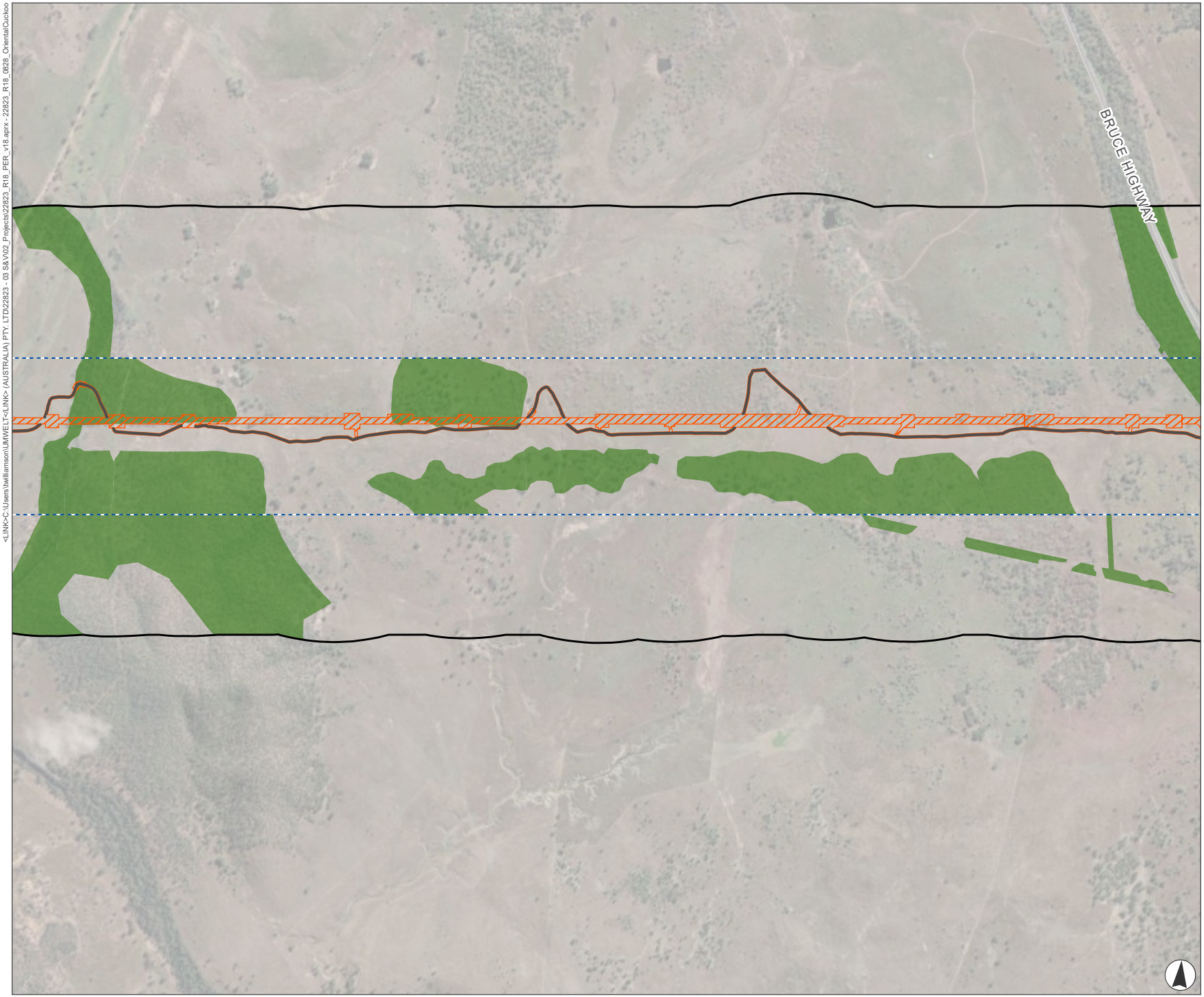


FIGURE 8.28-16

Oriental Cuckoo Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

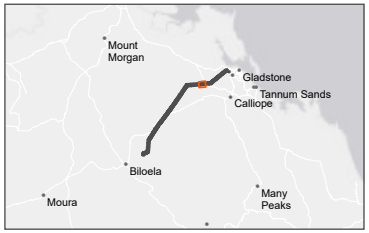
- Roads
- Field Survey Extent
- Project Area

Oriental Cuckoo Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.28-17

Oriental Cuckoo Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

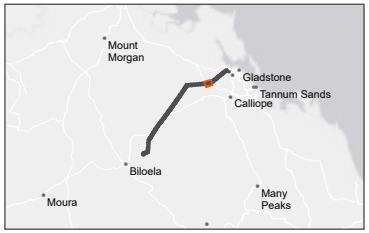
- Roads
- Field Survey Extent
- Project Area

Oriental Cuckoo Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.28-18

Oriental Cuckoo Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

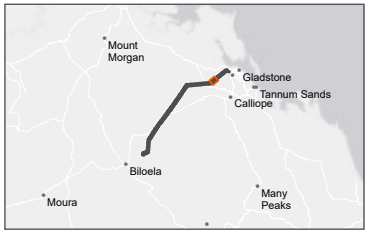
- Field Survey Extent
- Project Area

Oriental Cuckoo Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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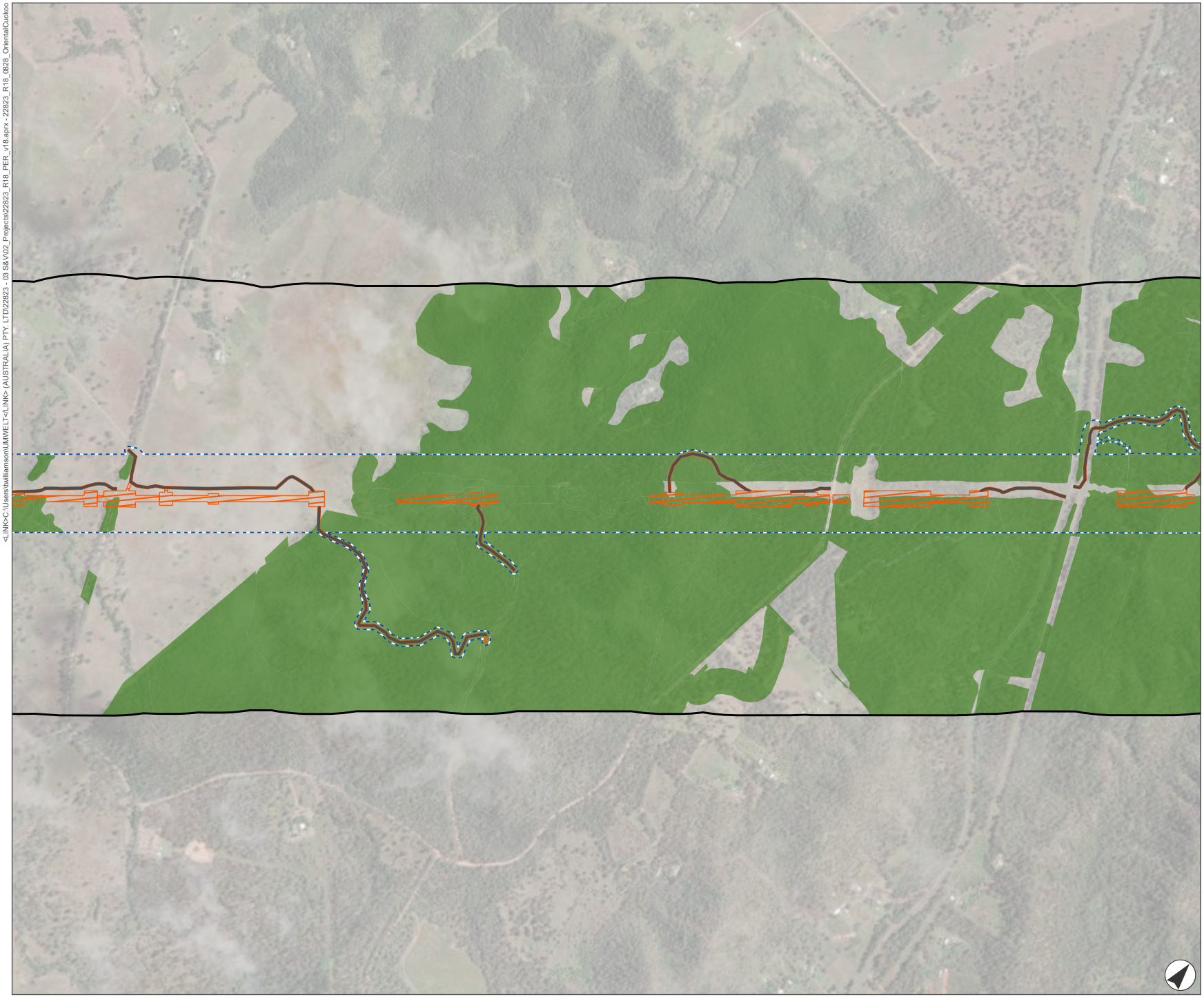


FIGURE 8.28-19

Oriental Cuckoo Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

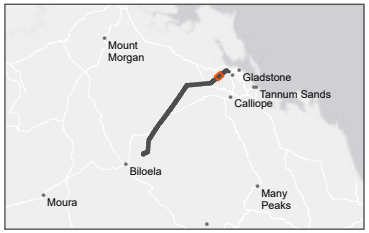
- Field Survey Extent
- Project Area

Oriental Cuckoo Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.28-20

Oriental Cuckoo Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

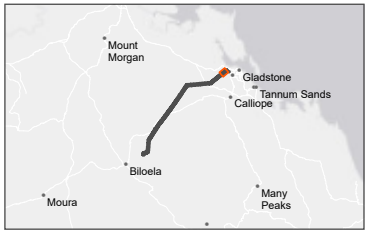
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Oriental Cuckoo Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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FIGURE 8.28-21

Oriental Cuckoo Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

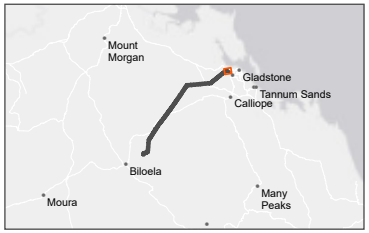
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Oriental Cuckoo Habitat

- Foraging and dispersal

Disturbance Footprint

- Full Clearing
- Existing Clearance



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8.2.8.4 Migratory Shorebirds

The following migratory shorebirds are listed as 'migratory' under the EPBC Act and therefore require assessment utilising the significant impact criteria for 'migratory' species

- common sandpiper (*Actitis hypoleucos*)
- bar-tailed godwit (*Limosa lapponica*)
- whimbrel (*Numenius phaeopus*)
- Pacific golden plover (*Pluvialis fulva*)
- grey-tailed tattler (*Tringa brevipes*)
- marsh sandpiper (*Tringa stagnatilis*).

Table 8.89 Migratory Shorebirds: Ecology and Relevance to the Project Area

Migratory Birds	
Profile	**Conservation status** Migratory **Distribution** Shorebirds undergo amongst the most spectacular feats of migration seen in the animal kingdom, with some species travelling more than 20,000 km a year during a life span that may exceed 20 years. Migration enables them to breed in highly productive wetlands at high (Arctic) latitudes of the northern hemisphere during the brief northern summer and then disperse widely to the south (including to Australia) for the rest of the year. Migratory shorebird species are mostly present in Australia from as early as August to as late as April/May each year (excluding the double-banded plover, which is generally present from March to September) (Department of the Environment and Energy, 2017a). **Ecologically significant proportion of the population** The upper (1%) and lower (0.1%) thresholds for ecologically significant proportions of the migratory populations are listed in *Referral guideline for 14 birds listed as migratory species under the EPBC Act* (Department of the Environment, 2015b) are: • bar-tailed godwit–Flyway population: 3,250; 1% threshold: 325 • common sandpiper–Flyway population: 1,900; 1% threshold: 190 • grey-tailed tattler–Flyway population: 700; 1% threshold: 70 • marsh sandpiper–Flyway population: 1,300; 1% threshold: 130 • Pacific golden plover–Flyway population: 1,200; 1% threshold: 120

- whimbrel–Flyway population: 650; 1% threshold: 65.

The suitable habitat within and adjacent to the Project Area is not of suitable size or value to support an ecologically significant proportion of migratory bird species, and no significant numbers of any migratory species have been recorded within or immediately adjacent to the Project Area.

The Gladstone Harbour and its surrounds have been extensively surveyed by shorebird/wader groups over time. The area is not known to support a national or international population or any species. If roosting and foraging was to occur within the Project Area, this would only be from vagrant individuals, rather than significant population numbers. No records of these species in significant numbers have been recorded in or near the Project Area and the existing human disturbances are likely to impact on these species' likelihood within the site.

Historical records within the desktop search extent

No WildNet records for any of these species were identified within the desktop search area. However, recent ALA records (ALA, 2025) indicate the presence of all six of these species in the broader region, with the most recent observations ranging from 2019 to 2023:

- common sandpiper–recent ALA records in Gladstone from 2020
- bar-tailed godwit–some ALA records from Gladstone, most recent 2019
- whimbrel–some ALA records from Gladstone, most recent 2019, ~3 km east of the Project Area
- Pacific golden plover–some ALA records from Gladstone, most recent 2019
- grey-tailed tattler–ALA records from Gladstone, most recent 2019, ~2 km north-east of the Project Area
- marsh sandpiper–some ALA records from Gladstone (most recent 2021, ~1 km north of the Project Area) and near Biloela (most recent 2005). Recent Gladstone records range from 2021 to 2023.

Habitat

Migratory shorebird species use a variety of different wetland habitats for foraging, typically in or near water, wading up to a depth of around 15 cm for long-legged species. Shorebirds occur in marine habitats including ocean beaches, rocky coastlines and intertidal mudflats. They also occur in coastal wetland habitats and river estuaries, including saltmarsh and mangroves, and in freshwater wetland habitats such as marshes, the margins of lagoons and along creeks (Department of the Environment, 2015b).

Habitat critical to the survival of the species

The EPBC Act Policy Statement 3.21: Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species (Department of the Environment and Energy, 2017a) identifies 'important habitat' in Australia for migratory shorebirds as the following:

- Internationally important habitat is considered to regularly support:
  - 1 per cent of the individuals in a population of one species or subspecies of waterbird OR
  - a total abundance of at least 20,000 waterbirds.
- Nationally important habitat is considered to regularly support:

Migratory Birds	
	○ 0.1 per cent of the flyway population of a single species of migratory shorebird OR ○ 2,000 migratory shorebirds OR ○ 15 migratory shorebird species. The Revision of the East Asian-Australasian Flyway Population Estimates for 37 listed Migratory Shorebird Species (Hansen et al., 2016) provides an update of population estimates for the 37 species of migratory shorebirds in the East Asian - Australasian Flyway (EAAF) that regularly visit Australia. The above listed shorebird species do not breed in Australia, and they are typically found in large numbers along the coastline in what is known as 'important sites'. No known important sites for any listed shorebird species occur within or adjacent to the Project Area. A detailed shorebird surveys undertaken by Wildlife Unlimited throughout the summer of 2019 included multiple surveys at the mouth of the Calliope River, adjacent to the Project Area. While low numbers of shorebird species were recorded at the sites adjacent to the Project Area, the surveys found no important shorebird roosts or sites of national significance along the Calliope River or at the mouth of the Calliope River (Wildlife Unlimited, 2020). All publicly available records of shorebirds in the Project Area (eBird and ALA) are of single individuals only. It is therefore considered that the habitat within the Project Area does not meet the definition of important habitat as it does not support an ecologically significant proportion of the population and is therefore not considered to be important habitat. **Current threats to the species** Residential, agricultural and natural resource development across Australia can be a significant threat to migratory shorebirds and waterbirds, primarily from the loss and degradation of foraging and roosting habitat and through interference during important lifecycle stages (Department of the Environment and Energy, 2017a). Shorebirds are susceptible to disturbance during daytime roosting and foraging periods. As an example, disturbance of shorebirds in Australia is known to result from aircraft over-flights, industrial operations and construction, artificial lighting, and recreational activities such as fishing, off-road driving on beaches, unleashed dogs and jet-skiing. Human presence has a negative effect on bird abundance at foraging and roosting sites (Department of the Environment, 2015b). **Recovery plan** There are currently no adopted or made Recovery Plans for any of these species.
In the Project Area	**Surveys** 28 habitat assessments were conducted, diurnal bird surveys were undertaken throughout all field surveys, and opportunistic surveys of wetlands were undertaken. Survey adequacy aligns with relevant guidelines for these species. Refer to **Section 4.5** for further details. **Species occurrence** These migratory shorebirds are considered to have a moderate likelihood of occurrence within the Project Area, with the presence of suitable habitat indicated by both State mapping and the findings of the field survey program.

Migratory Birds

Habitat within the Project Area

Habitat type	Habitat modelling rules	Area (ha)	
		Project Area	Disturbance Footprint
Roosting and foraging	All freshwater wetlands and farm dams. Intertidal areas, near-coastal wetlands and dams, tidal flats dominated by mangroves, sedges and grasses. Adjacent to and including REs 12.1.2 and 12.1.3. Where field data is not available, habitat conservatively includes all farm dams and waterbodies mapped as lacustrine or palustrine wetlands based on waterbody data in the Queensland wetland area mapping. Also includes areas mapped as intertidal wetlands on Queensland Globe. These species are non-breeding in Australia.	107.8	1.1

Table 8.90 Assessment of Potential Project Impacts and Mitigation and Management Commitments for Migratory Shorebirds

Potential Impact	Assessment	Mitigation Commitments
Direct		
Vegetation clearing causing habitat loss and fragmentation	Vegetation clearing is unlikely to directly impact these species, as much of the Project sits within already disturbed areas or alongside the existing transmission line.	• Identify MNES fauna habitat and individuals through pre-clearance surveys • Extent of vegetation clearing will be clearly delineated (EWP and onsite) • Disturbance activities must be contained to Disturbance Footprint subject to minor micro-siting within the Field Survey Extent • Refer to Table 5.1 of the MNES Management Plan for further details on mitigation measures.
Direct injury or mortality	The risk of direct injury or mortality is low but possible during construction activities. Minimal impact to shorebird habitat and	• Appropriately qualified fauna spotter catcher to undertake pre-clearance habitat assessment and be present during clearing and disturbance to habitat features • Flushing surveys to be undertaken during pre-clearance • Clearing must be staged, with non-habitat trees felled first

Potential Impact	Assessment	Mitigation Commitments
	flushing surveys prior to works will minimise these risks.	• Tampering with an animal breeding place to be carried out in accordance with an approved Species Management Program • Clear delineation of habitat features to be retained • Restrict vehicles to approved access tracks • Vehicle travelling speed restricted to <40 km/hr • Excavations must be secured (e.g. covered) • Refer to Table 5.3 of the MNES Management Plan for further details on mitigation measures.
Disturbance to foraging behaviours due to increased noise and activity during construction	Construction-related noise and activity may disturb shorebirds, causing them to flush from foraging areas, though these will be temporary and localised. Minimal shorebird habitat is expected to be disturbed.	• Plant and equipment to be fitted with appropriate noise attenuation and maintained • Deliveries and removal of material and equipment to and from site within approved hours for construction • Plant to be turned off when not in use • No unnecessary use of horns or other audible signals on mobile plant or equipment • Machinery and equipment will be maintained in good working condition • Refer to Table 5.10 of the MNES Management Plan for further details on mitigation measures.
Indirect		
Soil exposure resulting in an increased risk of erosion and sedimentation of water bodies, reducing water quality and degrading aquatic habitats	Construction of the transmission line will involve ground disturbance that may expose soils, increasing the risk of erosion and sedimentation of nearby water bodies. This could reduce water quality and degrade aquatic habitats. With Powerlink's erosion and sediment control measures in place, the impact is expected to be minor, localised, and temporary.	• Soil sampling and testing to inform both erosion and sediment control (ESC) and rehabilitation • Develop Erosion and Sediment Control Plan (ESCP) in accordance with the IECA Best Practice Erosion and Sediment Control Guidelines 2008 • Extent and duration of soil exposure will be minimised • Disturbed areas will be promptly stabilised • Site is monitored and controls adjusted to maintain required performance standard • Minimum personnel requirements will apply for ESCP development and verification • A Water Quality Monitoring Plan must be developed by an appropriately qualified person • Dewatering Management Plan will be developed • Acid Sulphate Soil Management Plan will be developed • Awareness training for identification and management of ASS will be undertaken

Potential Impact	Assessment	Mitigation Commitments
		• Water extraction activities will be strictly controlled and monitored to ensure no waterbodies are completed drained • Erosion and sediment control measures in accordance with IECA 2008 • Refer to Table 5.4 and Table 5.12 of the MNES Management Plan for further details on mitigation measures.
Increased risk of contamination associated with activities such as refuelling or storage of chemicals	Construction activities, including refuelling and chemical storage, present a risk of soil and water contamination. With appropriate handling, storage, and spill management procedures implemented, the impact is expected to be low and readily manageable.	• Hazardous materials must be stored and handled appropriately • An Emergency Response Plan will be developed • Spill kits will be available during construction • Hazardous materials locations will be bunded • All waste disposed of in accordance with legislative requirements • No refuelling within 50 m of a watercourse • Application of herbicides in accordance with legislative requirements • Refer to Table 5.4 of the MNES Management Plan for further details on mitigation measures.
Removal of water from existing constructed wetlands and farm dams leading to changes in hydrology / habitat extent and water quality. Increased activity at these locations resulting in avoidance and potentially altered foraging and breeding behaviour	Removal of water from constructed wetlands and farm dams may alter hydrology, habitat extent, and water quality. Increased activity around these sites could cause temporary disturbance, with potential avoidance and altered foraging or breeding behaviour. With disturbance and extraction activities minimised through mitigations, this is expected to have little impact.	• A Water Quality Monitoring Plan must be developed by an appropriately qualified person • Dewatering Management Plan will be developed • Acid Sulphate Soil Management Plan will be developed • Awareness training for identification and management of ASS will be undertaken • Water extraction activities will be strictly controlled and monitored to ensure no waterbodies are completed drained • Erosion and sediment control measures in accordance with IECA 2008 • Refer to Table 5.12 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Periodic burst of elevated noise levels may startle and disorientate individuals within proximity	Periodic bursts of elevated noise may temporarily startle or disorient individuals nearby, though impacts are expected to be minor and short-lived.	• Plant and equipment to be fitted with appropriate noise attenuation and maintained • Deliveries and removal of material and equipment to and from site within approved hours for construction • Plant to be turned off when not in use • No unnecessary use of horns or other audible signals on mobile plant or equipment • Machinery and equipment will be maintained in good working condition • Refer to Table 5.10 of the MNES Management Plan for further details on mitigation measures.
Increased pest levels, notably those which may predate upon individuals	The Project is not expected to increase pest levels within the Project Area beyond existing levels.	• All waste to be secured • Biosecurity Instrument Permit to be obtained for moving materials out of or within different biosecurity zones • Educate workforce in the identification of pest fauna species • Avoid inclusion of any water retaining voids or pits • Refer to Table 5.6 of the MNES Management Plan for further details on mitigation measures.
Minor increases in the noise and light levels at the Calliope River substation during the operational phase due to the substation upgrade	Given the substation's existing Disturbance Footprint and the fact that operational activities will not significantly exceed current baseline conditions, the additional noise and light are unlikely to result in measurable impacts to shorebirds. Potential disturbance will be localised to the immediate vicinity of the substation and is not expected to affect foraging or roosting habitat within the broader area.	• Plant and equipment to be fitted with appropriate noise attenuation and maintained • Deliveries and removal of material and equipment to and from site within approved hours for construction • Plant to be turned off when not in use • No unnecessary use of horns or other audible signals on mobile plant or equipment • Machinery and equipment will be maintained in good working condition • Refer to Table 5.10 of the MNES Management Plan for further details on mitigation measures.

Potential Impact	Assessment	Mitigation Commitments
Degradation of habitat adjacent to the Project Area	Degradation of intertidal or estuarine habitats through sedimentation, pollution, or human disturbance could reduce prey availability and limit foraging efficiency. This is expected to be minimal with appropriate management plans.	• Restrict vehicles to approved access tracks • Hazardous materials must be stored and handled appropriately • An Emergency Response Plan will be developed • Spill kits will be available during construction • Hazardous materials locations will be bunded • All waste disposed of in accordance with legislative requirements • No refuelling within 50 m of a watercourse • Application of herbicides in accordance with legislative requirements • Refer to Table 5.3 and Table 5.4 of the MNES Management Plan for further details on mitigation measures.

Table 8.91 Significant Impact Assessment: Migratory Shorebirds

Impact Criteria	Assessment
Will the action substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for the migratory species?	**Unlikely.** As aforementioned, all shorebird species are a non-breeding migrant to Australia which may persist within the Project Area as transient individuals. Modelled habitat within the Project Area may be suitable for foraging and dispersal, however, it has already been modified through historical clearing, weeds and pests. No important habitat is considered to occur within the Project Area. A maximum of 1.1 ha of roosting and foraging habitat will be cleared as part of the Project. Direct impacts to habitat have been minimised through considered siting and design of the Disturbance Footprint, ensuring the use of existing cleared areas has been maximised. No fragmentation impacts are anticipated due to the species high mobility capacity. The Project will not lead to the further degradation of retained habitat, as potential indirect impacts such as altered fire regimes, edge effects, weeds and pests will be actively managed in accordance with the MNES Management Plan. Based on the above, the Project is unlikely to substantially modify, destroy or isolate an area of important habitat.

Impact Criteria	Assessment
Will the action result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species?	**Unlikely.** The invasion of intertidal mudflats by weeds such as cord grass (*Spartina spp.*) and predation have been identified as threats to these species (Department of the Environment and Energy, 2017a). Historical clearing has occurred in discrete locations across the Project Area primarily for cattle grazing purposes, and ongoing maintenance currently occurs within the existing transmission line. It is considered likely that these areas already act as conduits for pest movement in the landscape. The Project will employ best practice control methods for weeds and pests including monitoring and adaptive management. Based on this, it is unlikely the Project will result in an invasive species that is harmful to the species.
Will the action seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of the migratory species?	**Unlikely.** As aforementioned, the Project Area is unlikely to support an ecologically significant proportion of the national population or international population at any time. It is unlikely that any population present will rely on the potential habitat within the Project Area for any part of its lifecycle. Home ranges and territories are not maintained while the birds are in Australia. Therefore, utilisation will be limited to short periods within the migratory season. Operational impacts within the mapped habitat will remain the same, as the existing substation at the Calliope River already supplies lighting, noise and human disturbances. Given the implementation of the MNES Management Plan to manage potential indirect impacts, it is considered unlikely that the Project will seriously disrupt the lifecycle of an ecologically significant proportion of a population.
Significant Residual Impact	**Unlikely to have a significant impact**

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FIGURE 8.29-1

Migratory Shorebirds Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

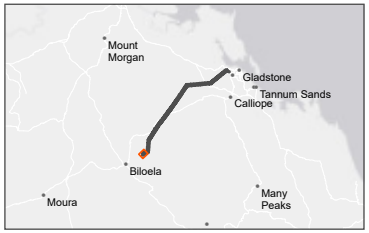
- Railway
- Watercourse
- Field Survey Extent
- Project Area

Migratory Shorebirds Habitat

- Roosting and foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



0 0.5 1

Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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FIGURE 8.29-21

Migratory Shorebirds Records and Habitat within the Field Survey Extent and Disturbance Footprint

Legend

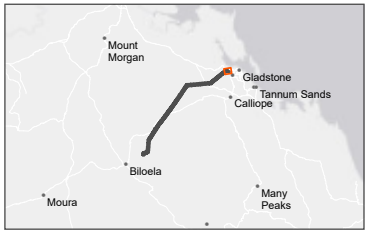
- Roads
- Railway
- Watercourse
- Field Survey Extent
- Project Area
- Grey-tailed Tattler
- Marsh Sandpiper Record (ALA)
- Pacific Golden Plover Record (ALA)
- Whimbrel Record (ALA)

Migratory Shorebirds Habitat

- Roosting and foraging

Disturbance Footprint

- Full Clearing
- Existing Clearance



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Kilometres

Scale 1:20,000 at A4
GDA 1994 MGA Zone 56

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9.0 Significant Impact Assessment–Great Barrier Reef

This chapter addresses section 6.3 of the PER Guidelines and provides a significant impact assessment of potential impacts to the Great Barrier Reef Marine Park, World Heritage Area (WHA), and National Heritage List (NHL) from the Project. Significant impact assessments have been undertaken in accordance with the *Significant Impact Guidelines 1.1–MNES* (Department of the Environment 2013). The precautionary principle has been applied when deciding whether or not the Project is likely to have a significant impact on a value.

This chapter should be read in conjunction with:

- **Section 5.0** which provides a description of the Great Barrier Reef related MNES values
- **Section 6.0** which identifies the potential impacts of this Project on relevant MNES values including a summary of the outcomes of the flooding modelling and assessment, and the water quality assessment of the Project. This chapter also addresses compliance with the water plans identified by the PER Guidelines. These assessments are supported by a MNES Management Plan (**Appendix J**), Surface Water Impact Assessment (**Appendix D**) and a Water Quality Management Plan (**Appendix G**).
- **Section 7.0** and Powerlink's EMP (**Appendix K**) which describe the mitigation measures identified for the Project relevant to the Great Barrier Reef MNES values.
- **Section 8.0** presents the significant impact assessments for ecological MNES values including ones that are associated with the Great Barrier Reef such as:
    - Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions (Eucalypt Floodplain Forest TEC)
    - Subtropical and Temperate Coastal Saltmarsh (Coastal Saltmarsh TEC)
    - Threatened Migratory Shorebirds
    - Marine turtles–Flatback turtle (Natator *depressus*), Green turtle (*Chelonia mydas*) and Loggerhead Turtle (*Caretta caretta*)
    - Water Mouse (*Xeromys myoides*).
- **Section 11.0** regarding Powerlink consultation and engagement with Indigenous peoples about Indigenous values.

9.1 Water Quality Assessment

The focus of the significant impacts assessment from the PER Guidelines is '…impacts to the water quality of the Great Barrier Reef from erosion and sedimentation or pollution, particularly during the project's construction and decommissioning'.

The assessment of potential impacts to water quality is required to consider the amount and types of sediment that will be disturbed or pollutants that will be introduced, and the quantities that will potentially be released into watercourses within and downstream of the Project Area, including the Great Barrier Reef.

Potential impacts to water quality, without mitigation, were identified to include:

- Risk of increased sediment and erosion run-off, due to disturbance to soils upstream, resulting in possible deterioration of water quality downstream.
- Risk on stream stability and riparian health, which could lead to higher flows and alter stream geomorphology and bank slumping and erosion.
- Risk to receiving water quality aspects, that may result in changes to water quality characteristics.
- Risk of increased sediment and erosion due to future climate scenarios.
- Risk of increased impacts on stream stability due to future climate scenarios.

The outcome of the Surface Water Impact Assessment (**Appendix D**) was that impacts of the Project on water quality would be rare with moderate consequences. This presented a low risk of occurrence of such impacts for the Project (**Section 6.0**), which could be mitigated through implementation of appropriate mitigation and management measures identified in **Section 7.0**, Powerlink's EMP (**Appendix K**) and Water Quality Management Plan (**Appendix G**).

9.2 The Location of the Project in Relation to the Great Barrier Reef MNES Values

The Project is located within the western boundary of the GBR WHA and within the western boundary of the GBR NHL (being Calliope River Island), and the Project Area lies approximately 16 km from the closest boundary of the Great Barrier Reef Marine Park (GBRMP), with the Gladstone Harbour lying in between (**Figure 9.1**).

While Calliope River Island already contains the Calliope River Substation, transmission lines and cleared lands from previous activities, large portions remain in a relatively natural coastal estuarine state, supporting mangrove and saltpan vegetation. Actions on Calliope River Island will comprise the construction of transmission towers, overhead spanning transmission lines, substation upgrade works and associated ground disturbances. The adjacent marine waterways will not be developed or used during construction activities, except for the overhead stringing of transmission lines across the waterway, aligned with existing infrastructure.

The Project involves construction activities upstream of the GBRMP, with the Project Area crossing waterways at several locations. The GBR WHA / NHL boundaries incorporate a portion of the Calliope River lower estuary and would be the receiving environment for any potential downstream effects of the Project. The lower estuary provides the most relevant location to detect and assess changes to water quality that could influence the GBR WHA / NHL and GBRMP.

Construction works upstream of the GBR WHA / NHL and GBRMP will apply industry standard erosion and sediment control measures to protect water quality as identified in Powerlink's EMP. Following construction, disturbed areas will be rehabilitated and stabilised to minimise long-term water quality impacts.



FIGURE 9.1

The Project Showing GBRMP and WHA / NHL Boundaries

Legend

- Roads
- Watercourse
- Railway
- Infrastructure BYDA TR
- Marine Park Boundary
- Disturbance Footprint
- Project Area

Protected Areas

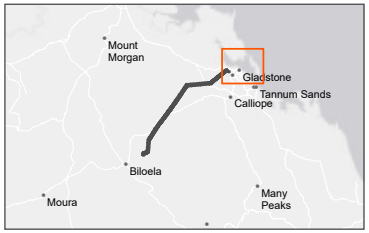
- Conservation Park
- National Park
- State Forest

GBRMP Boundary

- General use zone
- Habitat protection zone

National & World Heritage Areas

- Great Barrier Reef



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Kilometres

Scale 1:120,000 at A4
GDA 1994 MGA Zone 56

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9.3 Assessment Criteria

9.3.1 World Heritage Values

9.3.1.1 World Heritage Criteria

The GBR WHA is recognised as having Outstanding Universal Values (OUV) as described in **Section 5.0**.

9.3.1.2 World Heritage Management Considerations

The protection and management requirements specified by the GBR WHA in relation to Indigenous cultural heritage values note:

"Many Aboriginal and Torres Strait Island peoples undertake traditional use of marine resource activities to provide traditional food, practice their living maritime culture, and to educate younger generations about traditional and cultural rules and protocols. In the GBR these activities are managed under both Federal and Queensland legislation and policies including Traditional Use of Marine Resource Agreements (TUMRAs) and Indigenous Land Use Agreements (ILUAs). These currently cover some 30 per cent of the GBR inshore area and support Traditional Owners to maintain cultural connections with their sea country."

9.3.1.3 WHL Significant Impact Criteria

Impacts on a WHL property are significant where there is a real chance or possibility that impacts will cause (as identified in the Significant Impact Guidelines 1.1):

- One or more of the World Heritage values to be lost;
- One of more of the World Heritage values to be degraded or damaged; or
- One or more of the World Heritage values to be notably altered, modified, obscured or diminished.

9.3.2 National Heritage Values

The NHL contains places or groups of places with outstanding heritage value to Australia–whether natural, Indigenous or historic, or a combination of these. Criterion for entry in the NHL are defined in Section 10 of the Environment Protection and Biodiversity Conservation Regulations 2000 (EPBC Regulations). Any action occurring within, or outside, a place that has, will have, or is likely to have a significant impact on the values of an NHL place, requires approval under the EPBC Act.

The GBR is entered on the NHL.

9.3.2.1 NHL Criteria

The GBR has been recognised for the NHL criteria as described in Chapter 5 and assessed in **Section 9.4.1.2.**

9.3.2.2 National Heritage Management Principles

Schedule 7B of the EPBC Regulations set out the following management principles relevant to National Heritage places:

- The objective in managing National Heritage places is to identify, protect, conserve, present and transmit, to all generations, their National Heritage values.
- The management of National Heritage places should use the best available knowledge, skills and standards for those places, and include ongoing technical and community input to decisions and actions that may have a significant impact on their National Heritage values.
- The management of National Heritage places should respect all heritage values of the place and seek to integrate, where appropriate, any Commonwealth, State, Territory and local government responsibilities for those places.
- The management of National Heritage places should ensure that their use and presentation is consistent with the conservation of their National Heritage values.
- The management of National Heritage places should make timely and appropriate provision for community involvement, especially by people who: – have a particular interest in, or association with, the place; and – may be affected by the management of the place.
- Indigenous people are the primary source of information on the value of their heritage and the active participation of indigenous people in identification, assessment and management is integral to the effective protection of indigenous heritage values.
- The management of National Heritage places should provide for regular monitoring, review and reporting on the conservation of National Heritage values.

9.3.2.3 NHL Significant Impact Criteria

An action is likely to have a significant impact on the National Heritage values of an NHL place if there is a real chance or possibility that it will cause (as identified in the Significant Impact Guidelines 1.1):

- one or more of the National Heritage values to be lost
- one or more of the National Heritage values to be degraded or damaged, or
- one or more of the National Heritage values to be notably altered, modified, obscured or diminished.

9.3.3 GBRMP Values

An action will require approval if:

- the action is taken in the Great Barrier Reef Marine Park and the action has, will have, or is likely to have a significant impact on the environment, or
- the action is taken outside the Great Barrier Reef Marine Park and the action has, will have, or is likely to have a significant impact on the environment in the Great Barrier Reef Marine Park.

9.3.3.1 GBRMP Significant Impact Criteria

An action is likely to have a significant impact on the environment of the Great Barrier Reef Marine Park if there is a real chance or possibility that the action will (as identified in the Significant Impact Guidelines 1.1):

- Modify, destroy, fragment, isolate or disturb an important, substantial, sensitive or vulnerable area of habitat or ecosystem component such that an adverse impact on marine ecosystem health, functioning or integrity in the Great Barrier Reef Marine Park results.
- Have a substantial adverse effect on a population of a species or cetacean including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution.
- Result in a substantial change in air quality or water quality (including temperature) which may adversely impact on biodiversity, ecological health or integrity or social amenity or human health.
- Result in a known or potential pest species being introduced or becoming established in the Great Barrier Reef Marine Park.
- Result in persistent organic chemicals, heavy metals, or other potentially harmful chemicals accumulating in the marine environment such that biodiversity, ecological integrity, or social amenity or human health may be adversely affected.
- Have a substantial adverse impact on heritage values of the Great Barrier Reef Marine Park, including damage or destruction of an historic shipwreck.

9.4 Significant Impact Assessment

9.4.1 WHA and NHL Natural Heritage Values

9.4.1.1 Assessments Completed

The potential impacts to surface water for the GBR WHA /NHL are discussed in **Chapter 6.0** and the Surface Water Impact Assessment (**Appendix D**) and Water Quality Management Plan (**Appendix G**).

9.4.1.2 Assessment of Significant Impacts on Natural Heritage Values

An assessment for natural heritage impacts for both the World Heritage and National Heritage values following the Significant Impact Guidelines (DoE 2013) is presented in **Table 9.1, Table 9.2** and **Table 9.3**. The impact criteria are generally the same with minor differences shown in:

- *Italics* for different National Heritage criteria wording
- **Bold** for different World Heritage criteria wording.

Table 9.1 Values Associated with Geology or Landscape (WHA and NHL)

Impact Criteria	Assessment
Damage, modify, alter or obscure important geological formations in a World Heritage property (*National Heritage place*)	Unlikely No important geological formations are identified in this portion of the GBR WHA / NHL. Works will occur on Calliope River Island adjoining existing transmission and substation infrastructure. Erosion control measures will be implemented during construction and temporary construction areas will be rehabilitated. It is not expected the Project would damage, modify, alter or obscure any important geological formations.
Damage, modify, alter or obscure landforms or landscape features, for example, by (*clearing,*) excavation or infilling of the land surface in a World Heritage property (*National Heritage place*)	Unlikely While the Project will occur within the GBR WHA / NHL boundary on Calliope River Island, the works are limited to a small Disturbance Footprint associated with expansion of the Calliope River Substation, which may include components such as reactors, transformers, synchronous condensers, laydown areas, changes to access tracks, static synchronous compensation and the expansion of the existing 132 kV and 275 kV switching yards. No works will occur in tidal waters. Vegetation clearing will be undertaken during construction. Erosion control measures will be implemented during construction and temporary construction areas will be rehabilitated. It is not expected the Project would damage, modify, alter or obscure any significant landforms or landscape features.
Modify, alter or inhibit landscape processes, for example, by accelerating or increasing susceptibility to erosion, or stabilising mobile landforms, such as sand dunes in a World Heritage property (*National Heritage place*)	Unlikely No mobile landforms, such as sand dunes, are identified in this portion of the GBR WHA / NHL. Works will occur on Calliope River Island adjoining existing transmission and substation infrastructure. Erosion control measures will be implemented during construction and temporary construction areas will be rehabilitated. Water quality testing will be undertaken during construction to monitor the performance of erosion controls. It is not expected the Project would accelerate or increase susceptibility to erosion.
Divert, impound or channelise a river, wetland or other water body in a World Heritage property (*National Heritage place*), and	Unlikely Diversion, impounding or channelising of a river, wetland or other water body is not proposed as part of the Project, including within the GBR WHA / NHL.

Impact Criteria	Assessment
Substantially increase concentrations of suspended sediment, nutrients, heavy metals, hydrocarbons, or other pollutants or substances in a river, wetland or water body in a World Heritage property (*National Heritage place; permanently damage or obscure rock art or other cultural or ceremonial features with World Heritage values*)	Unlikely No rock art or other cultural or ceremonial features are identified in this portion of the GBR NHL. Refer to **Section 9.4.2** for discussion on Aboriginal Cultural Heritage values. Assessment of the potential impacts to surface water quality indicate that the Project would not result in water quality impacts to the GBR WHA / NHL through increases in sediments and pollutants. The Project will implement management plans to monitor and manage this risk including Powerlink's EMP, an Erosion and Sediment Control Plan and Water Quality Management Plan.

It is considered that the Project **is unlikely to have a significant impact** on the GBR WHA / NHL geology or landscape values.

Table 9.2 Biological and Ecological Values

Impact Criteria	Assessment
Modify or inhibit ecological processes in a National Heritage place	Unlikely The Project will occur within the GBR WHA / NHL boundary on Calliope River Island and surrounding tidal waterways, and is limited to a small Disturbance Footprint associated with expansion of the Calliope River Substation, which may include components such as reactors, transformers, synchronous condensers, laydown areas, changes to access tracks, statis synchronous compensation and the expansion of the existing 132 kV and 275 kV switching yards. No works are proposed in the tidal waterways. The existing infrastructure and cleared areas on Calliope River Island have modified ecological processes on the Island. The additional clearing for the Project will add to the extent of the modified environment. The impact of the additional clearing is not anticipated to create a significant impact on ecological processes of the GBR NHL.
Reduce the diversity or modify the composition of plant and animal species in all or part of a World Heritage property (*National Heritage place*)	Unlikely The Project will occur within the GBR WHA / NHL boundary on Calliope River Island and surrounding tidal waterways, and is limited to a small Disturbance Footprint associated with expansion of the Calliope River Substation, which may include components such as reactors, transformers, synchronous condensers, laydown areas, changes to access tracks, static synchronous compensation and the expansion of the existing 132 kV and 275 kV switching yards. No works are proposed in the tidal waterways. The existing infrastructure and cleared areas on Calliope River Island have modified the composition of plant and animal species on the

Impact Criteria	Assessment
	Island. The additional clearing for the Project will add to the extent of the modified environment. The impact of the additional clearing is not anticipated to of a scale to create a significant impact on the composition of plant and animal species in all or part of the GBR WHA. *Chapter 8 provides significant impact assessments for MNES that may occur within the World Heritage property / Natural Heritage place.*
Fragment, isolate or substantially damage habitat important for the conservation of biological diversity in World Heritage property (*National Heritage place*)	Unlikely The Project will occur within the GBR WHA / NHL boundary on Calliope River Island and surrounding tidal waterways, and is limited to a small Disturbance Footprint associated with expansion of the Calliope River Substation, which may include components such as reactors, transformers, synchronous condensers, laydown areas, changes to access tracks, static synchronous compensation and the expansion of the existing 132 kV and 275 kV switching yards. No works are proposed in the tidal waterways. The existing infrastructure and cleared areas on Calliope River Island have modified habitat on the Island. The additional clearing for the Project will add to the extent of modified environment including clearing of Eucalypt Floodplain Forest TEC as addressed in Chapter 8. The impact of the additional clearing on Calliope River Island is not anticipated to be of a scale to create a significant impact on habitat important for the conservation of biological diversity of the GBR WHA. *Chapter 8 provides significant impact assessments for MNES that may occur within the World Heritage property / Natural Heritage place.*
Cause a long-term reduction in rare, endemic or unique plant or animal populations or species in a World Heritage property (*National Heritage place)*, and	Unlikely The Project will occur within the GBR WHA / NHL boundary on Calliope River Island and surrounding tidal waterways, and is limited to a small Disturbance Footprint associated with expansion of the Calliope River Substation, which may include components such as reactors, transformers, synchronous condensers, laydown areas, changes to access tracks, static synchronous compensation and the expansion of the existing 132 kV and 275 kV switching yards. No works are proposed in the tidal waterways. The existing infrastructure and cleared areas on Calliope River Island have modified habitat on the Island. The additional clearing for the Project will add to the extent of modified environment including clearing of Eucalypt Floodplain Forest TEC (addressed in Chapter 8). The impact of the additional clearing is not anticipated to be of a scale to create a long-term reduction in rare, endemic or unique plant or animal populations or species of the GBR WHA. *Chapter 8 provides significant impact assessments for MNES that may occur within the World Heritage property / Natural Heritage place.*

Impact Criteria	Assessment
Fragment, isolate or substantially damage habitat for rare, endemic or unique animal populations or species in a World Heritage property (*National Heritage place*).	Unlikely The Project will occur within the GBR WHA / NHL boundary on Calliope River Island and surrounding tidal waterways, and is limited to a small Disturbance Footprint associated with expansion of the Calliope River Substation, which may include components such as reactors, transformers, synchronous condensers, laydown areas, changes to access tracks, static synchronous compensation and the expansion of the existing 132 kV and 275 kV switching yards. No works are proposed in the tidal waterways. The existing infrastructure and cleared areas on Calliope River Island have modified habitat on the Island. The additional clearing for the Project will add to this modified environment. The impact of the additional clearing is not anticipated to create a significant impact on habitat for rare, endemic or unique animal populations or species of the GBR WHA. *Chapter 8 provides significant impact assessments for individual animal MNES species that may occur within the World Heritage property / National Heritage place.*

It is considered that the Project **is unlikely to have a significant impact** on the GBR WHA / NHL biological and ecological values.

Table 9.3 Wilderness, Natural Beauty or Other Rare or Unique Environment Values

Impact Criteria	Assessment
Involve construction of buildings, roads, or other structures, vegetation clearance, or other actions with substantial, and/or long-term or permanent impacts on relevant values, and	Unlikely No important wilderness, natural beauty, rare or unique environmental values that have ascribed to the GBR WHA and NHL have been identified within the section of Calliope River Island that will be subject to construction of the Project. Calliope River Island sits within a broader industrial, urban and port context. Project infrastructure will adjoin existing transmission and substation infrastructure. The Project will implement management plans to monitor and manage construction water quality risks including Powerlink's EMP, an Erosion and Sediment Control Plan and Water Quality Management Plan. This will protect values associated with the downstream estuarine environment.
Introduce noise, odours, pollutants or other intrusive elements with substantial, and/or long-term or permanent impacts on relevant values.	Unlikely No important wilderness, natural beauty, rare or unique environmental values that have ascribed to the GBR WHA and NHL have been identified within the section of Calliope River Island that will be subject to construction of the Project. Construction related impacts will be temporary and managed to avoid and minimise impacts. Long term permanent impacts from noise, odours, pollutants or other intrusive elements are not expected.

It is considered that the Project **is unlikely to have a significant impact** on the GBR WHA / NHL wilderness, natural beauty or other rare or unique environment values.

9.4.2 WHA and NHL Indigenous Heritage Values

9.4.2.1 Engagement with Bailai, Gurang, Gooreng Gooreng, Taribelang Bunda Peoples

Powerlink's engagement activities are guided by a Stakeholder Engagement Framework which is underpinned by the key principles of integrity, openness, responsiveness, accountability and inclusiveness. Powerlink's Community Engagement Strategy also underpins engagement planning approach and commitments to ensure engagement is focused on undertaking respectful and transparent engagement across all stages of the infrastructure lifecycle. Powerlink's engagement program for the Project aims to:

- Provide timely, relevant and meaningful information about the project, reflective of the scale and complexity of the project activities.
- Ensure landholders, Traditional Owner groups, the wider community and other stakeholders are aware of key project activities and how they can provide input within the scope of consultation processes.
- Use a range of engagement methods to facilitate two-way information sharing with identified stakeholder groups.

As determined under Part 4 of the ACHA 2003, the Aboriginal party for the Project Area within the GBR WHL / NHL is the Bailai, Gurang, Gooreng Gooreng, Taribelang Bunda People (BGGGTBP; QUD6026/2001).

Powerlink is progressing engagement with the BGGGTBP. Early engagement commenced in March 2023. Meetings have been held to discuss various aspects of this project, including the design and location of the proposed transmission line easement, as well as cultural heritage survey activities. Refer to Chapter 11 for further information.

Engagement is ongoing with the goal to reach a cultural heritage management agreement for the Project Area.

Powerlink is also engaged with BGGGTBP to seek a Cultural Heritage Management Agreement (CHMA) for the portion of the Project Area lying within the BGGGTBP native title determination area. The CHMA can be recognised as 'another agreement' under Part 3, Section 23(3) of the ACHA 2003, and sets out agreed procedures as well as terms and conditions through which Powerlink can fulfil its 'cultural heritage duty of care'.

9.4.2.2 Assessments for Indigenous Cultural Heritage

Under Part 3, Section 23(1) of the ACHA 2003, Powerlink recognises that it carries the 'cultural heritage duty of care' for its proposed scope of works within the Project Area. In accordance with the ACHA 2003 and the Guidelines, Powerlink completed a search of the Queensland Aboriginal and Torres Straits Islander Cultural Heritage (ATSICH) Database and Register (completed on 17 February 2025). There were no records on the ATSICH within the Project Area within the GBR WHA / NHL boundary.

Cultural heritage surveys on Calliope River Island were conducted by Powerlink with BGGGTBP representatives in April 2024. Areas surveyed included existing roads, small areas that had been previously burned and exposed mud flats. While parts of the survey area had been heavily impacted by previous and significant ground disturbance, the extent of those impacts do not remove the potential for Aboriginal cultural heritage material both on the surface and sub-surface. The survey results included the location of an isolated stone artefact and a separate stone artefact scatter on Calliope River Island, outside of but adjacent to, the Disturbance Footprint of the Project.

9.4.2.3 Assessment of Impacts on Indigenous Cultural Heritage Values

This section assesses the impacts on Indigenous Cultural Heritage values for the GBR WHA and NHL in accordance with the Significant Impact Guidelines 1.1 in particular:

- WHA–Other cultural heritage values including Indigenous heritage values
- NHL–Indigenous heritage values.

There are no recorded shell deposits (middens) or fish traps within the Project Area.

The results of cultural heritage survey in April 2024 indicated that stone artefacts and subsurface archaeological potential may still be present within the Project Area within the GBR WHA.

Indirect impacts to intangible values associated with the GBR WHA, such as story places and marine totems, are subject to further consultation with BGGGTBP.

Assessment of Significant Impacts on the GBR WHA

A significant impact assessment for the GBR WHA for 'Other cultural heritage values including Indigenous heritage values' is presented in **Table 9.4**.

Table 9.4 Assessment of Significant Impacts on the GBR WHA

Impact Criteria	Assessment
Restrict or inhibit the existing use of a World Heritage property as a cultural or ceremonial site causing its values to notably diminish over time	Unlikely The Project will occur within the GBR WHA boundary on Calliope River Island and surrounding tidal waterways, and is limited to a small Disturbance Footprint associated with expansion of the C laydown areas, changes to access tracks, Calliope River Substation, which may include components such as reactors, transformers, synchronous condensers, static synchronous compensation and the expansion of the existing 132 kV and 275 kV switching yards. No works are proposed in the tidal waterways. No impacts are anticipated to restrict or inhibit or notably diminish over time the existing use of a cultural or ceremonial site within the GBR WHA property. Powerlink will continue to engage with the BGGGTBP about the delivery of this Project within the GBRWHA.

Impact Criteria	Assessment
Permanently diminish the cultural value of a World Heritage property for a community or group to which its values relate	Unlikely The Project is limited to a small Disturbance Footprint associated with expansion of the Calliope River Substation, which may include components such as reactors, transformers, synchronous condensers, laydown areas, changes to access tracks, static synchronous compensation and the expansion of the existing 132 kV and 275 kV switching yards. No works are proposed in the tidal waterways. There is no evidence that the Project would permanently diminish the cultural values of the GBR WHA property for any community or group to which its values relate. Powerlink will continue to engage with the BGGGTBP about the delivery of this Project within the GBRWHA.
Alter the setting of a World Heritage property in a manner which is inconsistent with relevant values	Unlikely The Project is limited to a small Disturbance Footprint associated with expansion of the Calliope River Substation, which may include components such as reactors, transformers, synchronous condensers, laydown areas, changes to access tracks, static synchronous compensation and the expansion of the existing 132 kV and 275 kV switching yards. No works are proposed in the tidal waterways.. his will result in limited change to the existing industrial, port and urban setting around Calliope River Island, and would be unlikely to alter any significant setting of the GBR WHA property.
Remove, damage, or substantially disturb cultural artefacts, or ceremonial objects, in a World Heritage property, and	Unlikely There is no evidence that shell midden or fish traps occur within the Project Area. Stone artefacts and subsurface archaeological evidence may be located within the Disturbance Footprint. This potential for impact would be minimised and managed in agreement with BGGGTBP under a CHMA, which is being developed jointly with BGGGTBP by Powerlink.
Permanently damage or obscure rock art or other cultural or ceremonial features with World Heritage values	Unlikely There is no evidence that cultural or ceremonial features ascribed to the GBR WHA, such as story places and marine totems, occur within the Project Area, or that should they occur, they would be permanently damaged, obscured, or substantially disturbed by the proposed action. This potential for impact would be minimised and managed in agreement with BGGGTBP under a CHMA, which is being developed jointly with BGGGTBP by Powerlink.

It is considered that the Project **is unlikely to have a significant impact** on the GBR WHA 'Other cultural heritage values including Indigenous heritage values'.

Assessment of Significant Impacts on the GBR NHL

A significant impact assessment for the GBR NHL for 'Indigenous heritage values' is presented in **Table 9.5.**

Table 9.5 Assessment of Significant Impacts on the GBR NHL for Indigenous Heritage Values

Impact Criteria	Assessment
Restrict or inhibit the continuing use of a National Heritage place as a cultural or ceremonial site causing its values to notably diminish over time	Unlikely While the Project will occur within the GBR NHL boundary on Calliope River Island, the action is limited to a small Disturbance Footprint associated with expansion of the Calliope River Substation, which may include components such as reactors, transformers, synchronous condensers, laydown areas, changes to access tracks, static synchronous compensation and the expansion of the existing 132 kV and 275 kV switching yards. No works are proposed in the tidal waterways. No impacts are anticipated to restrict or inhibit or notably diminish over time the existing use of a cultural or ceremonial site within the GBR NHL place. Powerlink will continue to engage with the BGGGTBP about the delivery of this Project within the GBR NHL.
Permanently diminish the cultural value of a National Heritage place for an Indigenous group to which its National Heritage values relate	Unlikely The Project is limited to a small Disturbance Footprint associated with expansion of the Calliope River Substation, which may include components such as reactors, transformers, synchronous condensers, laydown areas, changes to access tracks, static synchronous compensation and the expansion of the existing 132 kV and 275 kV switching yards. No works are proposed in the tidal waterways. There is no evidence that the Project would permanently diminish the cultural values of the GBR NHL property for any community or group to which its values relate. Powerlink will continue to engage with the BGGGTBP about the delivery of this Project within the GBR NHL.
Alter the setting of a National Heritage place in a manner which is inconsistent with relevant values	Unlikely The Project is limited to a small Disturbance Footprint associated with expansion of the Calliope River Substation, which may include components such as reactors, transformers, synchronous condensers, laydown areas, changes to access tracks, static synchronous compensation and the expansion of the existing 132 kV and 275 kV switching yards. No works are proposed in the tidal waterways. This will result in limited change to the existing industrial, port and urban setting around Calliope River Island, and would be unlikely to alter any significant setting of the GBR NHL place.
Remove, destroy, damage or substantially disturb archaeological deposits or cultural artefacts in a National Heritage place	Potential Stone artefacts and subsurface archaeological evidence may be located within the Disturbance Footprint. The Project may require disturbance of archaeological deposits and/or cultural artefacts through their removal. This impact would be minimised and managed in agreement with BGGGTBP under a CHMA, which is being developed jointly with BGGGTBP by Powerlink.

Impact Criteria	Assessment
Destroy, damage or permanently obscure rock art or other cultural or ceremonial, artefacts, features, or objects in a National Heritage place	Unlikely There is no evidence that cultural or ceremonial features ascribed to the GBR NHL, such as story places and marine totems, occur within the Project Area, or that should they occur, they would be permanently damaged, obscured, or substantially disturbed by the Project. This potential for impact would be minimised and managed in agreement with BGGGTBP under a CHMA, which is being developed jointly with BGGGTBP by Powerlink.
Notably diminish the value of a National Heritage place in demonstrating creative or technical achievement	Unlikely The GBR NHL is not recognised for demonstrating creative or technical achievement.
Permanently remove, destroy, damage or substantially alter Indigenous built structures in a National Heritage place, and	Unlikely No Indigenous built structures, such as fish traps, are recorded or likely to occur with the Project Area.
Involve activities in a National Heritage place with substantial and/or long-term impacts on the values of the place	Unlikely Consultation with BGGGTBP is ongoing and the potential for substantial and/or long-term impacts on and management of any Indigenous cultural values associated with the GBR NHL will be considered. This potential for impact would be minimised and managed in agreement with BGGGTBP under a CHMA, which is being developed jointly with BGGGTBP by Powerlink.

It is considered that the Project **is unlikely to have a significant impact** on the GBR NHL Indigenous heritage values.

9.4.2.4 Indigenous Cultural Values Engagement

In line with National Heritage Management Principles, the BGGGTBP are considered the primary source of information on the value of their heritage. The active participation of BGGGTBP in identification, assessment and management of any tangible and intangible values and impacts to those values, is integral to the effective protection of their cultural heritage. Powerlink will continue engagement with BGGGBTBP about the Project. This will include seeking a Cultural Heritage Management Agreement (CHMA) for the portion of the Project Area lying within the BGGGTBP native title determination areas an “other agreement” under the ACHA 2003.

Any agreement on the management and mitigation of Aboriginal cultural heritage values within the GBR WHA / NHL may include provision for regular monitoring, review and reporting on the conservation of any Indigenous cultural heritage values within the Project Area.

Further engagement with BGGGTBP will be guided by Powerlink's Strategic Engagement Framework and with reference to the *Interim Engaging with First Nations People and Communities on Assessments and Approvals under Environment Protection and Biodiversity Conservation Act 1999 (interim guidance)* (DCCEEW 2023).

Cultural heritage management protocols and procedures will be integrated within broader environmental management planning and processes, including via the Project's EMP.

To ensure the consideration of cultural values associated with water quality impacts, engagement with BGGGTBP will include consideration of the results of the surface water quality assessment and appropriate management and mitigation actions that would address any cultural concerns regarding the potential for downstream water quality impacts on tangible and intangible cultural values within the GBR WHA / NHL.

While the Project would occur outside of the PCCCR TUMRA, understanding of the cultural values associated with the GBR WHA / NHL will be sought from TUMRA stakeholders such as BGGGTBP, and their guidance sought on ensuring the Project assists aspirations of BGGGTBP to maintain cultural connections with their sea country.

9.4.3 WHA and NHL Historical (and other) Cultural Heritage Values

9.4.3.1 Assessments Completed

Desktop searches of relevant databases and registers for potential historical cultural heritage values within the Project within the GBR WHA / NHL did not identify any known values.

As per the NHL statement of significance, detailed in **Section 9.3.2**, there are "over 30 historic shipwrecks in the area, and on the islands are ruins and operating lighthouses that are of cultural and historical significance". There are no known or recorded historic shipwrecks, ruins and/or operating lighthouses, or other historic heritage in the Project Area.

9.4.3.2 Assessment of Significant Impacts on Historic (and Other) Heritage Values

A significance impact assessment following the Significant Impact Guidelines (DoE 2013) is presented in **Table 9.6** and **Table 9.7**.

The impact criteria are generally the same with minor differences shown in:

- *Italics* for different National Heritage criteria wording.

Table 9.6 GBR WHA / NHL Historic Heritage Values

Impact Criteria	Assessment
Permanently remove, destroy, damage or substantially alter the fabric of a World Heritage property (*National Heritage place in a manner which is inconsistent with relevant values*)	Unlikely There are no known or recorded historic shipwrecks, ruins and/or operating lighthouses, or other historic heritage in the proposed action area.

Impact Criteria	Assessment
Extend, renovate, refurbish or substantially alter a World Heritage property (*National Heritage place*) in a manner which is inconsistent with relevant values	Unlikely There are no known or recorded historic shipwrecks, ruins and/or operating lighthouses, or other historic heritage in the proposed action area.
Permanently remove, destroy, damage or substantially disturb archaeological deposits or artefacts in a World Heritage property *(National Heritage place)*	Unlikely There are no known or recorded historic shipwrecks, ruins and/or operating lighthouses, or other historic heritage in the proposed action area.
Involve activities in a World Heritage property (*National Heritage place*) with substantial and/or long-term impacts on its values	Unlikely There are no known or recorded historic shipwrecks, ruins and/or operating lighthouses, or other historic heritage in the proposed action area.
Involve construction of buildings or other structures within, adjacent to, or within important sight lines of, a World Heritage Property (*National Heritage place*) which are inconsistent with relevant values, and	Unlikely There are no known or recorded historic shipwrecks, ruins and/or operating lighthouses, or other historic heritage in the proposed action area.
Make notable changes to the layout, spaces, form or species composition in a garden, landscape or setting of a World Heritage property (*National Heritage place)* which are inconsistent with relevant values.	Unlikely There are no known or recorded historic shipwrecks, ruins and/or operating lighthouses, or other historic heritage in the proposed action area.

It is considered that the Project **is unlikely to have a significant impact** on the GBR WHA / NHL historic heritage values.

Table 9.7 GBR NHL Other Cultural Heritage Values

Impact Criteria	Assessment
Restrict or inhibit the continuing use of a National Heritage place as a cultural or ceremonial site causing its values to notably diminish over time	Unlikely There are no known or recorded historic shipwrecks, ruins and/or operating lighthouses, or other historic heritage in the Project Area.
Permanently diminish the cultural value of a National Heritage place for a community or group to which its values relate	Unlikely There are no known or recorded historic shipwrecks, ruins and/or operating lighthouses, or other historic heritage in the Project Area.
Destroy or damage cultural or ceremonial, artefacts, features, or objects in a National Heritage place	Unlikely There are no known or recorded historic shipwrecks, ruins and/or operating lighthouses, or other historic heritage in the Project Area.

Impact Criteria	Assessment
Notably diminish the value of a National Heritage place in demonstrating creative or technical achievement	Unlikely There are no known or recorded historic shipwrecks, ruins and/or operating lighthouses, or other historic heritage in the Project Area.

It is considered that the Project **is unlikely to have a significant impact** on the GBR NHL Other cultural heritage values.

9.4.4 Environment of the Great Barrier Reef Marine Park

9.4.4.1 Assessments Completed

The potential impacts to surface water for the GBRMP are discussed in Chapter 6 and the Surface Water Impact Assessment (**Appendix D**) and Water Quality Management Plan (**Appendix G**).

9.4.4.2 Assessment of Significant Impacts on the GBRMP

A significance impact assessment following the Significant Impact Guidelines (DoE 2013) is presented in **Table 9.8.**

Table 9.8 GBRMP

Impact Criteria	Assessment
Modify, destroy, fragment, isolate or disturb an important, substantial, sensitive or vulnerable area of habitat or ecosystem component such that an adverse impact on marine ecosystem health, functioning or integrity in the Great Barrier Reef Marine Park results	**Unlikely** The Project is not within the GBRMP so will not have direct impacts on GBRMP habitats or ecosystem. Potential indirect water quality impacts from the Project will be effectively managed through water quality measures as addressed in the Surface Water Impact Assessment (**Appendix D**) and Water Quality Management Plan (**Appendix G**). Industry standard erosion and sediment control measures will be implemented at construction sites during construction and temporary construction areas will be rehabilitated as soon as work has been completed. Water quality monitoring will be undertaken during construction to determine any water quality changes attributable to the Project and where necessary, undertake corrective actions. The operation of the Project including maintenance activities, is not anticipated to have any downstream water quality impacts on the GBRMP.

Impact Criteria	Assessment
Have a substantial adverse effect on a population of a species or cetacean including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution	**Unlikely** The Project is not within the GBRMP so will not have direct impacts on populations of a species or cetacean within the GBRMP. Potential indirect water quality impacts from the Project will be effectively managed through water quality measures as addressed in the Surface Water Impact Assessment (**Appendix D**) and Water Quality Management Plan (**Appendix G**). Industry standard erosion and sediment control measures will be implemented at construction sites during construction and temporary construction areas will be rehabilitated as soon as work has been completed. Water quality monitoring will be undertaken during construction to determine any water quality changes attributable to the Project and where necessary, undertake corrective actions. The operation of the Project including maintenance activities, is not anticipated to have any downstream water quality impacts on the GBRMP.
Result in a substantial change in air quality or water quality (including temperature) which may adversely impact on biodiversity, ecological health or integrity or social amenity or human health	**Unlikely** The Project is not within the GBRMP so will not have direct impacts on air quality and water quality within the GBRMP. Potential indirect air quality impacts from the Project during construction will be appropriately managed through industry standard air quality and dust management measures as identified in Powerlink's EMP (**Appendix K**). Potential indirect water quality impacts from the Project will be effectively managed through water quality measures as addressed in the Surface Water Impact Assessment (**Appendix D**) and Water Quality Management Plan (**Appendix G**). Industry standard erosion and sediment control measures will be implemented at construction sites during construction and temporary construction areas will be rehabilitated as soon as work has been completed. Water quality monitoring will be undertaken during construction to determine any water quality changes attributable to the Project and where necessary, undertake corrective actions. The operation of the Project including maintenance activities, is not anticipated to have any air quality and downstream water quality impacts GBRMP.
Result in a known or potential pest species being introduced or becoming established in the Great Barrier Reef Marine Park	**Unlikely** The Project is not within the GBRMP so will not introduce or assist to establish pest species directly into the GBRMP. The construction and operation of the Project upstream of the GBRMP, will implement strict biosecurity protocols in accordance with Powerlink's EMP (**Appendix K**) and Chapter 7 to manage pest species that could be introduced or become established in the GBRMP.

Impact Criteria	Assessment
Result in persistent organic chemicals, heavy metals, or other potentially harmful chemicals accumulating in the marine environment such that biodiversity, ecological integrity, or social amenity or human health may be adversely affected	**Unlikely** The Project is not within the GBRMP so will not introduce harmful metals and chemicals directly within the GBRMP. Potential indirect introduction of harmful metals and chemicals from the Project upstream of the GBRMP, will be effectively managed through management of harmful metals and chemicals as well as water quality measures as addressed in the Surface Water Impact Assessment (**Appendix D**) and Water Quality Management Plan (**Appendix G**) as well as Powerlink's EMP (**Appendix K**). Industry standard chemical handling as well as erosion and sediment control measures will be implemented at construction sites during construction and temporary construction areas will be rehabilitated as soon as work has been completed. Water quality monitoring will be undertaken during construction to determine any water quality changes attributable to the Project and where necessary, undertake corrective actions. The operation of the Project including maintenance activities, is not anticipated to introduce harmful metals and chemicals into waterways upstream of the GBRMP.
Have a substantial adverse impact on heritage values of the Great Barrier Reef Marine Park, including damage or destruction of an historic shipwreck.	**Unlikely** The Project is not within the GBRMP as will not impact on historic shipwrecks and other heritage values within the GBRMP.

It is considered that the Project **is unlikely to have a significant impact** on the environment of the GBRMP.

9.5 Summary of GBR Significant Impact Assessments

This chapter has assessed the Project for significant impacts to MNES values associated with the Great Barrier Reef. Potential water quality impacts have been assessed and been determined to be able to be effectively managed through the mitigation measures in Chapter 7, the Water Quality Management Plan (**Appendix G**) and Powerlink's EMP (**Appendix K**). Potential impacts to Indigenous cultural values will be managed through ongoing consultation and engagement with BGGGTBP as described in Chapter 11.

The outcomes of the significant impact assessments are:

- GBR WHA:
    - Natural heritage values:
        - Values associated with geology or landscapes–unlikely to have a significant impact
        - Biological and ecological values–unlikely to have a significant impact
        - Wilderness, natural beauty or rare or unique environmental values–unlikely to have a significant impact.

- Cultural heritage values:
  - Historic heritage values–unlikely to have a significant impact
  - Other cultural heritage values including Indigenous heritage values–unlikely to have a significant impact.

- GBR NHL:
  - Natural heritage values:
    - Values associated with geology or landscapes–unlikely to have a significant impact
    - Biological and ecological values–unlikely to have a significant impact
    - Wilderness, natural beauty or rare or unique environmental values–unlikely to have a significant impact.
  - Cultural heritage values:
    - Historic heritage values–unlikely to have a significant impact
    - Other cultural heritage values–unlikely to have a significant impact.

10.0 Cumulative Impact Assessment

This chapter addresses 6.1.1 and 6.1.5 of the PER Guidelines and provides a cumulative impact assessment for the MNES controlling provisions applicable for the Project. The direct, indirect and facilitated impacts of the Project are discussed in Chapters 6, 8 and 9.

10.1 Approach

The assessment of potential impacts to MNES in Chapters 6, 8 and 9 has focussed on impacts related to just the Project. Other unrelated projects in the surrounding area (i.e. within 20 km of the Project) may also have an impact on the environment and on the MNES controlling provisions. The consideration of the combined or cumulative impacts from the Project with other projects in the area is necessary to understand the overall impact on protected matters. This requires assessment of cumulative impacts across the geographic area and across time.

Other projects considered in this cumulative impact are within the 'EPBC Act Referral Portal' (available at https://epbcpublicportal.environment.gov.au/allreferrals/).

Projects [10] that have been considered in the cumulative impact assessment are described in **Table 10.1**, which also includes information on the status of each project, the distance of the listed project from the Project Area, and the size of the listed project. Sixty (60) referred projects were excluded from the assessment, listed in **Table 10.2**, due to being classed as "Withdrawn" or "Not Controlled Action". This cumulative impact assessment only focuses on Projects that have a significant impact on MNES.

Projects with EPBC Act referrals lodged prior to 2017 do not have publicly available documentation quantifying impacts and, therefore, could not be considered.

[10] The list of projects is at September 2025

Table 10.1 EPBC Act Referred Projects within the 20 km Buffer of the Project Area which were Considered

Project Title and EPBC Act Reference Number		Industry Type	Status as at October 2025	Referral Outcome	Approximate Distance from Project Area (km)	Approximate Disturbance Footprint (ha)
Aluminium Smelter Expansion (2001/477)		Manufacturing	Post-Approval	Controlled Action	16.5	20
Coal Mining Lease 6993 (The Bluff) (2002/569)		Mining	Post-Approval	Controlled Action	0.5	130
Talisman Saber 2005 Military Exercise (2004/1819)		Commonwealth	Post-Approval	Controlled Action	3.0	unknown
Install & operate gas pipeline (2005/2059)		Energy Generation and Supply (non-renewable)	Post-Approval	Controlled Action	Intersects Project Area	unknown
Wiggins Island Coal Terminal (2005/2374)		Transport–Water	Post-Approval	Controlled Action	Intersects Project Area	520
Gladstone–Fitzroy Pipeline (2007/3501)		Transport–Water	Post-Approval	Controlled Action	Intersects Project Area	330
Curtis Island Liquified Natural Gas (LNG) precinct and associated infrastructure	Development of a Natural Gas Liquefaction Park (2008/4057)	Energy Generation and Supply (non-renewable)	Post-Approval	Controlled Action	7.4	200
	Development of marine facilities to service natural gas liquefaction park (2008/4058)	Energy Generation and Supply (non-renewable)	Post-Approval	Controlled Action	7.0	20
	Gas Pipeline with Alternative Pipeline to Supply Natural Gas Liquefaction Park (2008/4096)	Energy Generation and Supply (non-renewable)	Post-Approval	Controlled Action	Intersects Project Area	2,000
	Queensland Curtis LNG Project–Pipeline Network (2008/4399)	Energy Generation and Supply (non-renewable)	Post-Approval	Controlled Action	Intersects Project Area	3,680

Project Title and EPBC Act Reference Number	Industry Type	Status as at October 2025	Referral Outcome	Approximate Distance from Project Area (km)	Approximate Disturbance Footprint (ha)
Queensland Curtis LNG Project–LNG Marine Facilities (2008/4401)	Energy Generation and Supply (non-renewable)	Post-Approval	Controlled Action	Intersects Project Area	40
Development, Construction and Decommissioning of LNG Plant and Onshore Facilities (2008/4402)	Energy Generation and Supply (non-renewable)	Post-Approval	Controlled Action	7.4	300
Shipping Activities Associated with the QLD Curtis LNG Project (2008/4405)	Energy Generation and Supply (non-renewable)	Post-Approval	Controlled Action	6.0	unknown
Port of Gladstone Western Basin Strategic Dredging and Disposal Project (2009/4904)	Transport–Water	Post-Approval	Controlled Action	6.0	880
Construct and operate 447km high pressure gas transmission pipeline (2009/4976)	Energy Generation and Supply (non-renewable)	Post-Approval	Controlled Action	Intersects Project Area	2,682
LNG Plant and Ancillary onshore and marine facilities (2009/4977)	Energy Generation and Supply (non-renewable)	Post-Approval	Controlled Action	7.5	750
Boundary Hill South Lease Extension (2012/6324)	Mining	Post-Approval	Controlled Action	12.6	317
Port of Gladstone Gatcombe & Golding Cutting Channel Duplication Project (2012/6558)	Transport–Water	Post-Approval	Controlled Action	5.5	250
Turtle Street Beach Resort, Curtis Island, Qld (2015/7585)	Tourism and Recreation	Post-Approval	Controlled Action	17.5	20

Project Title and EPBC Act Reference Number	Industry Type	Status as at October 2025	Referral Outcome	Approximate Distance from Project Area (km)	Approximate Disturbance Footprint (ha)
Clinton Vessel Interaction Project–Clinton Widening, Qld (2017/7976)	Transport–Water	Post-Approval	Controlled Action	2.5	21
Lot 7 Borrow Pits, Aldoga Road, Gladstone, Qld (2018/8381)	Waste Management (sewerage)	Post-Approval	Controlled Action	4.7	121
Aldoga Solar Farm Project (2020/8773)	Energy Generation and Supply (renewable)	Post-Approval	Controlled Action	7.0	394
Specimen Hill Wind Farm (2020/8864)	Energy Generation and Supply (renewable)	Post-Approval	Controlled Action	Intersects Project Area	836
H2-Hub Gladstone–Export-class Green Hydrogen and Ammonia Complex (2021/9049)	Manufacturing	Referral Decision	Controlled Action	Intersects Project Area	126
Callide Wind Farm (2021/9057)	Energy Generation and Supply (renewable)	Post-Approval	Controlled Action	2.5	896
Forest Springs–Commercial and residential development (2021/9135)	Commercial Development	Post-Approval	Controlled Action	6.0	60
Upper Calliope Solar Farm (2023/09752)	Energy Generation and Supply (renewable)	Assessment		Intersects Project Area	2,678
Hughes Road Battery Energy Storage System (2024/09892)	Energy Generation and Supply (renewable)	Assessment		14	4

Project Title and EPBC Act Reference Number	Industry Type	Status as at October 2025	Referral Outcome	Approximate Distance from Project Area (km)	Approximate Disturbance Footprint (ha)
Big G Pumped Hydropower Energy Storage (2024/10056)	Energy Generation and Supply (renewable)	Referral Decision		Intersects Project Area	507

Table 10.2 EPBC Act Referred Projects within the 20 km Buffer of the Project Area which were Excluded

Reference Number	Title of Referral	Industry Type	Stage	Status as at September 2025	Referral Outcome
2001/160	Aldoga Aluminium Smelter Gladstone	Manufacturing	Post Approval	Withdrawn	Controlled Action
2002/764	Construction of a Chlor-Alkali-Ethylene Di-Chloride (CA/EDC) Plant at the Gladstone	Manufacturing	Completed	Withdrawn	Controlled Action
2003/922	Construction of a Chlor-Alkali/Ethylene Di-Chloride	Manufacturing	Completed	Withdrawn	Controlled Action
2005/2257	Nickel and cobalt laterite mine, High-pressure acid leach plant, slurry pipeline	Manufacturing	Completed	Withdrawn	Controlled Action
2005/2376	HPAL Nickel Plant	Manufacturing	Post-Approval	Withdrawn	Controlled Action
2008/4060	Construction of Bridge and Road to Access Proposed Natural Gas Liquification Park	Transport–Land	Completed	Withdrawn	Controlled Action
2008/4061	Gas Transmission Pipeline to supply Natural Gas Liquefaction Park	Energy Generation and Supply (non-renewable)	Completed	Withdrawn	Referral Decision
2008/4400	Bridge Construction Connecting Mainland & Curtis Island	Energy Generation and Supply (non-renewable)	Completed	Withdrawn	Controlled Action
2008/4403	Queensland Curtis LNG Project–Mainland Road and Bridge Approach	Energy Generation and Supply (non-renewable)	Completed	Withdrawn	Controlled Action
2008/4404	Queensland Curtis LNG Project–Curtis Island Road	Energy Generation and Supply (non-renewable)	Completed	Withdrawn	Controlled Action

Reference Number	Title of Referral	Industry Type	Stage	Status as at September 2025	Referral Outcome
2008/4406	Queensland Curtis LNG Project–Swing Basin and Channel Dredging	Energy Generation and Supply (non-renewable)	Completed	Withdrawn	Controlled Action
2009/4826	Port of Gladstone Western Basin Strategic Dredging and Disposal Project	Transport–Water	Completed	Withdrawn	Referral Decision
2009/5007	The Arrow LNG Facility, Curtis Island, Gladstone	Energy Generation and Supply (non-renewable)	Post-Approval	Withdrawn	Controlled Action
2009/5008	The Arrow Gas Transmission Pipeline, Gladstone to Curtis Island	Mining	Post-Approval	Withdrawn	Controlled Action
2009/5029	Construction of a high pressure buried gas pipeline, Kogan to Gladstone, QLD	Energy Generation and Supply (non-renewable)	Post-Approval	Withdrawn	Controlled Action
2009/5195	ZeroGen Integrated Gasification Combined Cycle Power Plant and CO2 Capture, Transport and Storage	Mining	Completed	Lapsed	Controlled Action
2011/6034	Blackwater to Gladstone Gas Pipeline Project	Energy Generation and Supply (non-renewable)	Completed	Withdrawn	Controlled Action
2012/6348	Development of the Yarwun Coal Terminal	Transport–Water	Completed	Withdrawn	Controlled Action
2012/6459	Arrow Bowen Pipeline (CSG), QLD	Energy Generation and Supply (non-renewable)	Post-Approval	Withdrawn	Controlled Action
2013/6925	Glen Eden residential estate development, Glen Eden, Qld	Residential Development	Completed	Withdrawn	Referral Decision
2014/7241	Gladstone New Fuels Development Project–stage 2A	Exploration (mineral, oil and gas–non-marine)	Completed	Withdrawn	Controlled Action
2017/8107	Stage 1 and 2 borrow pits, stockpiles, haul roads and Stage 3 red mud dam, Aldoga, Qld	Waste Management (non-sewerage)	Completed	Withdrawn	Controlled Action
2022/09369	Renewable Diesel and Sustainable Aviation Fuel Project	Energy Generation and Supply (renewable)	Completed	Withdrawn	-
2024/09901	CQ-H2 Hydrogen Transport Facility (HTF) Project	Energy Generation and Supply (renewable)	Assessment	Withdrawn	-

Reference Number	Title of Referral	Industry Type	Stage	Status as at September 2025	Referral Outcome
2024/09902	CQ-H2 Hydrogen Production Facility (HPF) Project	Energy Generation and Supply (renewable)	Assessment	Withdrawn	-
2024/09935	CQ-H2 Surplus Industrial Water Pipeline (SIWP) Project	Energy Generation and Supply (renewable)	Assessment	Withdrawn	-
2000/124	Fisherman's Landing Port Facility	Transport–Water	Completed	Referral Decision Made	Not Controlled Action
2000/54	Extension of R G Tanna Coal Wharf	Transport–Water	Completed	Referral Decision Made	Not Controlled Action
2001/141	Awoonga Dam Raising	Water Management and Use	Completed	Referral Decision Made	Not Controlled Action
2001/193	Calcining Plant	Manufacturing	Completed	Referral Decision Made	Not Controlled Action
2002/740	Fishermans Landing site conversion for Lime Kiln	Manufacturing	Completed	Referral Decision Made	Not Controlled Action
2003/1229	Powerlink Gladstone to Larcom Creek 275kV Transmission Line	Energy Generation and Supply (non-renewable)	Completed	Referral Decision Made	Not Controlled Action (Particular Manner)
2004/1619	Expansion and dredging at existing RG Tanna Coal Terminal	Transport–Water	Completed	Referral Decision Made	Not Controlled Action
2004/1906	RG Tanna Coal Terminal Expansion	Transport–Water	Completed	Referral Decision Made	Not Controlled Action
2006/2855	Gladstone State Development Area, Ammonia Production Facility	Manufacturing	Completed	Referral Decision Made	Not Controlled Action
2006/2928	Expansion of Red Mud storage facility	Waste Management (non-sewerage)	Completed	Referral Decision Made	Not Controlled Action
2006/2965	Expansion of the Trap Gully Open Cut Mining Area, Callide Mine	Mining	Completed	Referral Decision Made	Not Controlled Action

Reference Number	Title of Referral	Industry Type	Stage	Status as at September 2025	Referral Outcome
2007/3434	Boundary Hill Mine Extension	Mining	Completed	Referral Decision Made	Not Controlled Action
2007/3773	Moura Link–Aldoga Rail Project	Transport–Land	Completed	Referral Decision Made	Not Controlled Action
2008/3954	Liquefied Natural Gas Export Terminal	Energy Generation and Supply (non-renewable)	Completed	Referral Decision Made	Not Controlled Action
2008/3994	Project Sun Liquefied Natural Gas Plant and Pipeline	Energy Generation and Supply (non-renewable)	Completed	Referral Decision Made	Not Controlled Action
2009/4702	Calliope Range Deviation–single carriageway, dual lane road along 4.7 km of Dawson Highway	Transport–Land	Post-Approval	Referral Decision Made	Not Controlled Action (Particular Manner)
2009/4786	Gladstone Steel Making Facility	Manufacturing	Completed	Referral Decision Made	Not Controlled Action
2009/4884	Rail deviation including construction of 2 new rail lines	Transport–Land	Completed	Referral Decision Made	Not Controlled Action
2009/5064	Replacement of Existing Processing Plant with a smaller Technology Demonstration Plant	Mining	Completed	Referral Decision Made	Not Controlled Action
2009/5229	Construction of Calliope River 275 kV and 132 kV Bulk Supply Substation	Energy Generation and Supply (non-renewable)	Completed	Referral Decision Made	Not Controlled Action
2010/5646	Construction of a portable water pipeline and a sewer pressure main	Water Management and Use	Completed	Referral Decision Made	Not Controlled Action
2010/5735	Curtis Island Water & Sewerage Facilities Project Seismic Survey	Waste Management (sewerage)	Post-Approval	Referral Decision Made	Not Controlled Action (Particular Manner)
2012/6265	Aldoga Power Station	Energy Generation and Supply (non-renewable)	Completed	Referral Decision Made	Not Controlled Action
2013/6857	Riverstone Rise residential, commercial & industrial development, Benaraby, Qld	Residential Development	Completed	Referral Decision Made	Not Controlled Action

Reference Number	Title of Referral	Industry Type	Stage	Status as at September 2025	Referral Outcome
2013/6940	Awoonga Dam flood capacity upgrade, Gladstone	Water Management and Use	Completed	Referral Decision Made	Not Controlled Action
2015/7522	Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	Natural Resources Management	Completed	Referral Decision Made	Not Controlled Action
2015/7595	Cement Australia East End Mine Extension, Mt Larcom, QLD	Mining	Completed	Referral Decision Made	Not Controlled Action
2017/7858	Proposed clay borrow pit and associated haul roads and stockpiles, Gladstone, Qld	Mining	Completed	Referral Decision Made	Not Controlled Action
2017/7905	Aldoga Livestock Handling Facility	Agriculture and Forestry	Completed	Referral Decision Made	Not Controlled Action
2018/8251	Aldoga Solar Farm, Aldoga, QLD	Energy Generation and Supply (renewable)	Completed	Referral Decision Made	Not Controlled Action
2018/8305	Gladstone Energy and Ammonia Project, Qld	Energy Generation and Supply (non-renewable)	Completed	Referral Decision Made	Not Controlled Action
2022/09442	Boyne Tannum Aquatic Recreation Centre	Tourism and Recreation	Completed	Referral Decision Made	Not Controlled Action
2024/09863	Callide Solar Power Station Project	Energy Generation and Supply (renewable)	Completed	Referral Decision Made	Not Controlled Action
2025/10108	Raglan Battery Energy Storage System	Energy Generation and Supply (non-renewable)	Completed	Referral Decision Made	Not Controlled Action

10.2 Ecological MNES

This section considers the potential cumulative impacts on the ecological MNES controlling provisions (i.e. threatened species, threatened ecological communities and migratory species known or potential to occur in the Project Area) for the Project and the combined impacts of other projects.

10.2.1 Projects with Habitat Loss

Terrestrial MNES are most likely to be impacted during Project construction when on-ground impacts to habitat and individuals of a species are most likely to occur. To assess habitat loss impacts to all relevant MNES, all projects within a 20 km distance from the Project Area have been assessed (as identified on the EPBC Act Referral Portal).

Of the projects included in the cumulative impact assessment, only some are expected to potentially impact ecological MNES that are known, or have a moderate to high likelihood of occurring, within the Project Area. Projects with referrals dated from 2018 onwards which provide publicly available information relating to the mapped area of MNES habitat within their Disturbance Footprint or impact area, are listed in **Table 10.3** with the associated MNES impact areas.

The H2-Hub Gladstone–Export-class Green Hydrogen and Ammonia Complex is expected to impact MNES, but no publicly available information currently specifies the extent or quantity of these impacts, so it has not been included in the table.

Table 10.3 Impact to MNES Habitat (ha) from other EPBC Act Referred Projects within 20 km Buffer of this Project

MNES	Lot 7 Borrow Pits, Aldoga Road, Gladstone	Aldoga Solar Farm Project	Specimen Hill Wind Farm	Callide Wind Farm	Forest Springs – Commercial & Residential Development	Upper Calliope Solar Farm	Hughes Road Battery Energy Storage System	Big G Pumped Hydropower Energy Storage	Calvale to Calliope River Project	Combined Total of all Projects
SEVT TEC	-	-	-	-	-	-	-	-	2.2	2.2
Eucalypt floodplain forest TEC	-	-	-	-	-	-	-	-	16.6	16.6
Atalaya collina	-	-	-	-	-	-	-	-	1.6	1.6
Bertya opponens	-	-	-	-	-	-	-	-	77.7	77.7
Cossinia australiana	-	-	-	-	-	-	-	-	2.4	2.4
Cycas megacarpa	-	-	623	290	-	-	-	223	53.5	1,189.5
Polianthion minutiflorum	-	-	-	-	-	-	-	-	8.1	8.1
Samadera bidwillii	-	-	-	-	-	-	-	-	115.9	115.9
Australian painted snipe	-	-	-	-	-	-	-	-	0.6	0.6
Latham's snipe	-	-	-	-	-	-	-	-	0.6	0.6
Squatter pigeon (southern)	162	162	93	819	-	433	-	343	152.3	2,164.3
Painted honeyeater	-	-	-	-	-	-	-	-	9.0	9.0
White throated needletail	-	-	836	895	4	-	4	341	154.9	2,234.9
Black breasted button quail	-	-	-	-	-	-	-	-	3.7	3.7

MNES	Lot 7 Borrow Pits, Aldoga Road, Gladstone	Aldoga Solar Farm Project	Specimen Hill Wind Farm	Callide Wind Farm	Forest Springs – Commercial & Residential Development	Upper Calliope Solar Farm	Hughes Road Battery Energy Storage System	Big G Pumped Hydropower Energy Storage	Calvale to Calliope River Project	Combined Total of all Projects
Seabirds and migratory shorebirds	-	-	-	-	-	-	-	-	1.1	1.1
Grey headed flying fox	-	-	-	-	4	-	4	-	125.3	133.3
Greater glider (southern and central)	-	-	205	396	-	352	4	341	141.5	1,439.5
Yellow-bellied glider (south-eastern)	-	-	-	-	-	-	4	230	20.9	254.9
Koala	96	262	254	207	4	2670	4	345	421.7	4,263.7
Northern quoll	-	-	-	-	-	-	-	264	92.2	356.2
Water mouse	-	-	-	-	-	-	-	-	0.5	0.5
Collared delma	-	-	27	-	-	-	-	-	49.0	76
Marine turtles	-	-	-	-	-	-	-	-	0.0	0
Eastern osprey	-	-	-	-	-	-	-	-	0.2	0.2
Fork-tailed swift	-	-	-	-	-	-	-	-	417.6	417.6
Oriental cuckoo	-	-	-	-	-	-	-	-	155.0	155.0

10.2.2 Cumulative Assessment of Habitat Impacts

To understand the cumulative impact on habitat for the MNES in consideration, potential habitat was modelled using publicly available data within a 20 km buffer of the Project Area.

The assessment areas have been mapped through application of relatively broad rules based on State mapping (with no information available regarding habitat feature availability or abundance), while MNES mapping for the Project Area has been field validated and subject to fine-scale adjustments. Nonetheless, for the purposes of this cumulative impact assessment, the approach is considered valid.

The total area of habitat impacted for each species across the included projects within the cumulative impact assessment is provided in **Table 10.4**, along with the total area of habitat available for the species within the 20 km buffer.

Table 10.4 Cumulative Area of Habitat Impacted for Terrestial MNES

MNES	Cumulative Impact of Projects Combined (ha)	Mapped Available Habitat (ha)	DETSI Habitat Model[1] Available / Notes on Mapping Approach
TECs			
SEVT TEC	2.2	6,803	**No**–Potential suitable habitat was modelled using all polygons with remnant REs as RE 1 or 2: 11.2.3, 11.3.11, 11.4.1, 11.5.15, 11.8.6, 11.8.13, 11.9.4, 11.9.8, 11.11.18
Eucalypt floodplain forest TEC	16.6	4,941	**No**–Potential suitable habitat was modelled using all polygons with remnant REs as RE 1 or 2: 12.3.2, 12.3.2a, 12.3.3, 12.3.3a, 12.3.3d, 12.3.4a, 12.3.7, 12.3.7c, 12.3.7d, 12.3.10, 12.3.11, 12.3.11a, 12.3.11b, 12.3.12, 12.3.14a, 12.3.15, 12.3.19
Flora			
Atalaya collina	1.6	722	**No**–Potential suitable habitat was modelled using BVG 7a, clipped to the species' distribution[2]
Bertya opponens	77.7	6,131	**No**–Potential suitable habitat was modelled using remnant and high-value regrowth vegetation in BVGs 7a, 10a, 10b, 12a, 13c, 13d, 17b, 24a, clipped to the SNES distribution mapping for the species[2]
Cossinia australiana	2.4	24,032	**Yes**–clipped to the species' mapped distribution[2]
Cycas megacarpa	1,189.5	117,487	**Yes**–clipped to the species' mapped distribution[2]

MNES	Cumulative Impact of Projects Combined (ha)	Mapped Available Habitat (ha)	DETSI Habitat Model[1] Available / Notes on Mapping Approach
Polianthion minutiflorum	8.1	8,069	**Yes**–clipped to the species' mapped distribution[2]
Samadera bidwillii	115.9	17,679	**Yes–**clipped to the species' mapped distribution[2]
Fauna			
Squatter pigeon	2,164.3	156,626	**Yes–**clipped to the species' mapped distribution[2]
Painted honeyeater	9.0	5,706	**Yes–**clipped to the species' mapped distribution[2]
White throated needletail	2,234.9	461,377	**No**–potential suitable habitat was modelled using SNES habitat mapping, clipped to the species distribution[2]
Black breasted button quail	3.7	3,045	**Yes–**clipped to the species' mapped distribution[2]
Greater glider (southern and central)	1,439.5	48,528	**Yes–**clipped to the species' mapped distribution[2]
Yellow-bellied glider (south-eastern)	254.9	49,259	**Yes–**clipped to the species' mapped distribution[2]
Koala	4,263.7	189,952	**No**–potential suitable habitat was modelled using all high-value regrowth and remnant vegetation excluding that within dominant BVG 7 and 35, clipped to the species' SNES distribution mapping within the buffer area
Northern quoll	356.2	1,052	**No**–potential suitable habitat was modelled using all high-value regrowth and remnant vegetation excluding that within dominant BVG 8, 21, 22, 24, 25, 29, 34, 35, clipped to the species' SNES distribution mapping[2]
Water mouse	0.5	155	**Yes–**clipped to the species' mapped distribution[2]
Collared delma	49.0	24,341	**Yes–**clipped to the species' mapped distribution[2]
Australian painted snipe	0.6	53,540	**Yes–**clipped to the species' mapped distribution[2]

MNES	Cumulative Impact of Projects Combined (ha)	Mapped Available Habitat (ha)	DETSI Habitat Model[1] Available / Notes on Mapping Approach
Marine turtles (combined)	0.0	24,790	**No**–potential suitable habitat was modelled using all polygons with RE1 as ocean, estuary or sand within the buffer area
Migratory Species			
Fork-tailed swift	417.6	475,408	**No**–potential suitable habitat was modelled using SNES distribution mapping[2]
Latham's snipe	0.6	16	**No**–potential suitable habitat was modelled using high-value regrowth and remnant vegetation within BVG 34a–g, clipped to the species' SNES distribution mapping[2]
Oriental cuckoo	155.0	203,934	**No**–potential suitable habitat was modelled using high-value regrowth and remnant vegetation within all BVGs except 29a, 29b, 30a, 30b, 31a, 31b, 32a, 32b, 33a, 33b, 16d, 28a, 28d, 34a, 34c, 34d, 34e, 34f, 34b, 34g, 35b, 35a, clipped to the species' SNES distribution mapping[2]
Osprey	0.2	16,959	**No**–potential suitable habitat was modelled using high-value regrowth and remnant vegetation within BVG 34a–g, 15b, 16a, 16c, 16d, 19b, 22b, 22a, 22c, 26a, clipped to the species' SNES distribution mapping[2]
Migratory shorebirds (non-threatened, combined)	1.1	4,723	**No**–Potential suitable habitat was conservatively taken as the lowest area of modelled habitat from the threatened migratory shorebirds
Migratory Shorebirds (threatened)			
Common greenshank	1.1	7,749	**No**–potential suitable habitat was modelled using high-value regrowth and remnant vegetation within BVG 34a–g and 35, clipped to the species' SNES distribution mapping[2]
Curlew sandpiper	1.1	12,051	**No**–the largest modelled value for the migratory shorebirds was taken as a conservative estimate
Eastern curlew	1.1	12,051	**Yes–**clipped to the species' mapped distribution[2]

MNES	Cumulative Impact of Projects Combined (ha)	Mapped Available Habitat (ha)	DETSI Habitat Model[1] Available / Notes on Mapping Approach
Great knot	1.1	6,263	**Yes–**clipped to the species' mapped distribution[2]
Greater sand plover	1.1	11,976	**Yes–**clipped to the species' mapped distribution[2]
Lesser sand plover	1.1	6,367	**Yes–**clipped to the species' mapped distribution[2]
Nunivak bar-tailed godwit	1.1	12,013	**Yes–**clipped to the species' mapped distribution[2]
Red knot	1.1	12,051	**No**–the largest modelled value for the migratory shorebirds was taken as a conservative estimate
Ruddy turnstone	1.1	4,723	**No**–potential suitable habitat was modelled using high-value regrowth and remnant vegetation within BVG 34a–g and 35, clipped to the species' SNES distribution mapping[2]
Sharp-tailed sandpiper	1.1	9,118	**No**–potential suitable habitat was modelled using high-value regrowth and remnant vegetation within BVG 34a–g and 35, clipped to the species' SNES distribution mapping[2]
Terek sandpiper	1.1	4,723	**No**–potential suitable habitat was modelled using high-value regrowth and remnant vegetation within BVG 34a–g and 35, clipped to the species' SNES distribution mapping[2]

[1] Department of Environment Science, 2022

[2] (Department of Climate Change Energy the Environment and Water, 2024)

10.3 Great Barrier Reef MNES

This section considers the potential cumulative impacts on the Great Barrier Reef MNES controlling provisions (i.e. GBR World Heritage property, GBR National Heritage place and the environment of the GBRMP) for the Project together with other projects. The PER Guidelines identify the potential for water quality impacts from the Project on Great Barrier Reef MNES values and this is the focus of the cumulative impacts assessment. The Reef 2050 Plan also requires cumulative impacts on the Reef to be assessed to achieve resilience to long-term threats, such as climate change.

Unrelated projects in the surrounding area (i.e. within 20 km of the Project) may have the potential to have water quality impacts on the Great Barrier Reef MNES values. Relevant projects are listed in **Table 10.1**. Projects likely to have the greatest potential water quality impacts on the Great Barrier Reef involve:

- large scale land clearing and disturbance
- large scale disturbance of beds and banks of water bodies
- extraction, transport, handling, industrial processing and use of coal, gas, chemicals and minerals.

Energy generation developments and agricultural uses in the Gladstone hinterland have the potential to clear and disturb large areas of land around the Project Area.

The Port of Gladstone and adjoining Gladstone State Development Area are adjoining and downstream of the Project Area around Gladstone Harbour. Their purpose is to support significant port related and industrial developments and operations. The harbour is subject to ongoing maintenance dredging to support maritime transport operations.

These land and marine water based activities along with other actions, when considered together, create a cumulative water quality impact on the GBR MNES values.

The water quality assessment for this Project–refer to Chapters 6 and 10, and Surface Water Impact Assessment (**Appendix D**) and the Water Quality Management Plan (**Appendix G**) determined that with the application of water quality management measures, the risk to the Great Barrier Reef MNES values is negligible. In particular:

1. Water Quality: The Project will incorporate appropriate water treatment measures as far as practicable to achieve compliance with the Calliope Water Quality Objectives.
2. Water Quantity: The change in impervious area represents less than 0.5% of the total Project Area. Drainage from these impervious areas will not be directly connected, allowing stormwater to be distributed and infiltrated between the impervious area and the receiving watercourse. Consequently, the hydrologic impacts of the Project at the catchment scale are likely to be undetectable.
3. The Project is unlikely to have impacts on marine habitats in the GBR World Heritage property, National Heritage place and Marine Park due to being located sufficiently upstream of marine areas. The Water Quality Management Plan and erosion and sediment control practices to be implemented by the Project will ensure the marine waters and habitats are not adversely impacted.

As the Project is unlikely to result in adverse water quality impacts to the Great Barrier Reef MNES values, it is unlikely to contribute to cumulative water quality impacts to the Great Barrier Reef MNES values in association with other projects.

10.4 Cumulative Impacts Discussion

The cumulative impact assessment for the Project considers a broad suite of developments within a 20 km radius of the Project Area. These surrounding projects span a range of industries from port, energy and mining to transport and manufacturing and collectively may contribute to regional impacts on MNES.

Renewable energy projects are a growing component of regional development. Wind and solar farms such as the Specimen Hill Wind Farm, Upper Calliope Solar Farm, and Callide Wind Farm provide relatively detailed EPBC Act referral documentation. Wind farms can have a dual cumulative effect: habitat loss through clearing for turbine pads, access tracks, and transmission corridors, and direct impact to avifauna and bats from collision mortality and altered flight behaviour. Large-bodied birds of prey (e.g., raptors) and migratory species are often at elevated risk, and the fragmentation of intact ridgelines or woodland habitat can further reduce functional connectivity across the landscape. While the renewable energy projects offer long-term benefits in decarbonisation, localised impacts need to be balanced against broader ecological pressures already present in the region.

Among the various developments, the Curtis Island LNG precinct is the most recently developed significant industrial cluster in the region. This sits within the Great Barrier Reef WHA and NHL. The precinct comprises three large-scale projects, including gas liquefaction plants, marine terminals, extensive pipeline networks, and associated shipping activities. Several of these developments intersect directly with the Project Area, and together they account for thousands of hectares of disturbance. The cumulative footprint of the LNG precinct and pipeline network has led to:

- Clearing of remnant vegetation supporting listed threatened ecological communities.
- Fragmentation of terrestrial habitats, reducing connectivity for MNES such as the koala (*Phascolarctos cinereus*) and greater glider (*Petauroides volans*).
- Clearing and degradation of coastal and estuarine habitats, directly impacting MNES such as shorebirds and migratory shorebirds, marine turtles, water mouse and saltmarsh TEC.
- Ongoing operational pressures, including shipping activity, noise, and artificial lighting, which contribute to disturbance of turtle nesting beaches, shorebird roosts, and marine fauna movement corridors.

Other projects such as the Wiggins Island Coal Terminal, the Gladstone–Fitzroy Pipeline, and the Aluminium Smelter Expansion though smaller in footprint and located further from the Project Area, have incrementally contributed to habitat loss and degradation. Their impacts are also relevant when considering the cumulative pressures on MNES across the landscape.

This assessment also acknowledges additional contributors such as military exercises (e.g., Talisman Saber 2005), tourism developments (e.g., Turtle Street Beach Resort), and infrastructure upgrades (e.g., Clinton Vessel Interaction Project). These varied activities, though individually modest, add to the disturbance and cumulative effects when combined with large-scale industrial and energy projects.

All of these projects require clearing and/or disturbance of soils as well as some requiring disturbance of marine areas such as through dredging. The land based actions create the potential for water quality impacts from soil disturbance and erosion and the marine based actions create the potential for water quality impacts from the disturbance of beds and banks of water bodies. These actions need to be considered together to understand the cumulative water quality impacts on the Great Barrier Reef MNES values.

The cumulative assessment recognises that projects occur across a range of timeframes (many yet to have commenced), with impacts layered over decades and overlapping spatial footprints. While this Project cannot influence other developments, it will implement avoidance and mitigation measures to limit its own contribution to cumulative impacts where required.

It is important to recognise the broader development context in which this Project is situated. The Project Area lies within a highly industrialised region where high-impact projects are concentrated, particularly around Curtis Island and the Gladstone industrial precinct. As a result, the surrounding landscape is already characterised by extensive disturbance, reduced habitat quality and ongoing operational pressures. This context highlights that its impacts will occur within an area where ecological values have already been subject to cumulative pressures over several decades.

The cumulative impact landscape surrounding the Project reflects decades of industrial expansion and infrastructure growth that have collectively affected MNES. Within this context, the Project is expected to make a relatively small but measurable contribution to cumulative habitat impacts, primarily through additional clearing of remnant vegetation and localised fragmentation of habitat corridors,

The impacts of this Project will generally occur alongside existing transmission lines and substations which are already cleared. When considered alongside existing and emerging pressures, the Project has the potential to reduce connectivity for threatened fauna to a nominal degree and add to the regional loss of biodiversity values.

The Project's contribution to cumulative habitat impacts has been minimised through careful siting of infrastructure during the design process. During the construction and operational phases, the implementation of mitigation measures will minimise incremental habitat loss and disturbance.

With the application of the Project's water quality management measures, it is unlikely that the Project will contribute to the cumulative water quality impacts on Great Barrier Reef MNES values from other projects.

11.0 Consultation

This chapter addresses section 11.1 of the PER Guidelines and outlines the consultation undertaken about the Project including the consultation approach, stakeholder identification, consultation activities to date, proposed consultation, consultation outcomes and indigenous engagement.

11.1 Consultation Approach

Powerlink is committed to effective and genuine engagement practices with landholders, Traditional Owner groups, the wider community and other stakeholders.

Powerlink's activities are guided by key principles of integrity, openness, responsiveness, accountability and inclusiveness. Powerlink's Community Engagement Approach also underpins our engagement planning and commitments to ensure Powerlink remain focused on undertaking respectful and transparent engagement across all stages of the infrastructure lifecycle. Our Community Engagement Approach is available online at:

- www.powerlink.com.au/brochures/community-engagement-approach.

Powerlink's engagement program for the Project aims to:

- Provide timely, relevant and meaningful information about the Project, reflective of the scale and complexity of the project activities.
- Ensure landholders, Traditional Owner groups, the wider community and other stakeholders are aware of key project activities and how they can provide input within the scope of consultation processes.
- Use a range of engagement methods to facilitate two-way information sharing with identified stakeholder groups.

11.2 Stakeholder Identification

The project stakeholders who have received regular project communications throughout the planning phase are summarised in **Table 11.1**.

Table 11.1 Project Stakeholders Identified During the Planning Phase

Stakeholder Group	Stakeholders
Elected Representatives	**State:** • Mr Bryson Head, Member for Callide • Glenn Butcher, Member for Gladstone
	Federal: • Mr Colin Boyce, Member for Flynn
Local Government	**Banana Shire Council (BSC):** • Nev Ferrier, Mayor • Tom Upton, Chief Executive Officer (CEO)
	Gladstone Regional Council (GRC):

Stakeholder Group	Stakeholders
	• Matt Burnett, Mayor • Leisa Dowling, CEO
Directly Affected Landholders	**Residential / agricultural:** • Sections A, C and E where easement widening is required • Sections A, B, D (part) and E, where existing easements will be used • Section B (part) where a new easement will be created within Calliope Range State Forest • Section D (part) where a new easement will be created within Mount Stowe State Forest
	Companies and government bodies with property or infrastructure along the corridor, including utilities, industry, Queensland Government, and local government
Adjacent Landholders	Within 1 km of the transmission easement alignment
	Near neighbours (further than 1 km away) including parts of Yarwun and Bracewell
Traditional Owner Groups	Gaangalu Nation People (GNP)
	Bailai, Gurang, Gooreng Gooreng, Taribelang Bunda People (BGGGTBP)
Aviation Safety	Civil Aviation Safety Authority (CASA)
	Gladstone Airport Corporation (GAC)
High Pressure Gas Pipeline Operators	Santos–Gladstone Liquified Natural Gas (GLNG) Transmission Pipeline
	Jemena–Queensland Gas Pipeline (QGP)
	APA Group–Wallumbilla Gladstone Pipeline (WGP)
	Australia Pacific LNG Pipeline (APLNG)–Origin, ConocoPhillips and Sinopec (owner), Origin (operator)
Wider Community / General Public	Community groups Local business, industry groups and government Volunteering and school-based communities Local emergency services Environmental groups and organisations including: • Fitzroy Basin Association • Capricorn Catchments Group • Capricorn Pest Management Group • Dawson Catchment Coordinating Association
	People living in Gladstone Region and Banana Shire LGAs
	People that participated in previous project consultation
	Subscribers to project updates

11.2.1 Potentially Affected Communities

Powerlink's ongoing work in Central Queensland and previous project engagement (**Table 11.2**) have highlighted the following views among communities within and proximate to the Project Area.

11.2.1.1 Property-specific Concerns

Powerlink's Landholder Relations Advisor has maintained regular and ongoing contact with directly impacted landholders since early 2023. Feedback from landholders is reflected in **Table 11.5**, and relates to property-specific matters such as compensation, biosecurity, visual impact and commercial impacts/ business continuity.

11.2.1.2 Social Impacts

Powerlink are aware of broader social concerns felt by some community members relating to renewable energy, including:

- Concerns about significant renewable energy development activity in the area
- Differing community sentiment about renewable energy and other energy technologies
- How a project's benefits and impacts are distributed within a community.

While not project-specific, these concerns indirectly relate to Powerlink's role in reinforcing the transmission network in response to future changes in how electricity is generated and used in the wider Gladstone area.

Powerlink is undertaking a Social Impact Assessment (SIA) for projects in Central Queensland, including the Calvale to Calliope River Transmission Line Reinforcement Project. The assessment follows the Queensland Government's SIA Guideline (2025), applying a participatory and evidence-based methodology. The process includes scoping, socio-economic baseline analysis, stakeholder engagement, and impact identification across the five SIA key matters: local business and industry procurement, housing and accommodation, workforce management, community health and wellbeing, and community and stakeholder engagement.

The SIA looks at how these projects may affect individuals, communities, and society—both positively and negatively. The SIA informs Project-specific Social Impact Management Plans (SIMPs), which will outline implementation responsibilities, monitoring arrangements and management measures to ensure social impacts and opportunities are effectively managed throughout the construction and operation phase of the Project.

11.2.1.3 Economic Opportunities

Throughout 2025, Powerlink has engaged with local industry stakeholders, traditional owners and businesses to better understand their capability, capacity and interest in supporting Powerlink projects in the Central Queensland region. Key views expressed over this three-month period focussed on opportunities (**Table 11.5** provides further detail):

- For local businesses to supply goods and services to Powerlink, clearing and access contractors and our main works contractors
- For improved visibility of upcoming tenders and awarded contracts
- To grow local capability to help ensure sustainable project delivery and stable economic growth.

11.2.1.4 Environmental Factors

The Department's feedback from the January 2025 Referral consultation highlighted views about potential impacts on threatened species, ecological communities, and habitats. These issues are addressed through this Public Environment Report.

11.3 Consultation to Date

Powerlink has conducted a comprehensive stakeholder consultation programme to date. **Table 11.2** summarises key engagement milestones during the planning phase. Targeted engagement with Traditional Owner groups, elected representatives and landholders has been regular and ongoing throughout project planning.

Engagement with the GNP and BGGGTBP is detailed in **Section 11.6**. **Photo 11.1** to **Photo 11.6** illustrates Powerlink's consultation material and activities.

Table 11.2 Project Planning Phase–Consultation Activities

#	Engagement Phase	Timing	Purpose of Engagement	Status
1	Early Engagement and project introduction with key stakeholders and landholders	March–August 2023	• Targeted consultation to introduce the project and gain early understanding of key issues and interests. • Project web page established on Powerlink website.	Complete
2	Release of Draft Corridor Selection Report (CSR)	June 2024	• Consultation with landholders, Traditional Owner groups, the community and other stakeholders, to support the release of the Draft CSR (detail about activities and findings provided below).	Complete
3	Release of the Final CSR	August 2024	• Communication with project stakeholders, to generate awareness of the Final CSR, which confirms the final corridor to be progressed to planning and environmental approvals. • The Final CSR included a summary of feedback received during Draft CSR consultation, and Powerlink's response.	Complete
4	Consultation with landholders and other stakeholders to inform the planning and	mid-2023–end-2025	• Targeted consultation with landholders along the final corridor and other key stakeholders (including Traditional Owners). • Engaged with directly impacted landholders about: ○ Land Access Protocol and Project Participation and Access Allowance	Complete

#	Engagement Phase	Timing	Purpose of Engagement	Status
	approvals process		(PPAA) and facilitating access for field studies. ○ Understanding their concerns and priorities. ○ Understanding land use in-detail, including any property-specific or commercial land activities that may be impacted or will co-exist with the project. ○ Infrastructure placement, including transmission towers and supporting infrastructure such as access tracks. • Meeting with the Department of State Development, Infrastructure and Planning (DSDIP) to discuss the Ministerial Infrastructure Designation (MID) application–4 September 2024 & 17 October 2025. • *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) Pre-Referral Meeting with the Department of Climate Change, Energy, the Environment and Water (DCCEEW)–10 October 2024.	
5	Update to key stakeholders about planning and environmental approvals	December 2024–January 2025	• Letter and email updates to key project stakeholders in December, providing a progress update on the project approvals process (including upcoming Referral consultation). • Follow-up email in January, to advise EPBC Act Referral was open for consultation.	Complete
6	Local industry and business engagement	January–April 2025	• Early engagement to inform procurement planning, to maximise local and indigenous participation in project delivery. • Key stakeholders: Councils, key industry stakeholders, Traditional Owner groups.	Complete
7	Project update	April 2025	• Project newsletter, including update on the approvals process. • Newsletter distributed widely to key stakeholders and the community through letterbox drop, web page update, and at two local industry events in Gladstone on 9 and 30 April 2025.	Complete

#	Engagement Phase	Timing	Purpose of Engagement	Status
8	SIA engagement	June – July 2025 November – December 2025	• Focus group workshops were held in Gladstone, Biloela, Theodore and Bouldercombe. • Key stakeholders: representatives from health, economic development, education & training, and community members. • Targeted interviews with key stakeholders (including Traditional Owners).	Complete
9	Central Queensland engagement pop-ups	31 July & 2 August 2025 21 & 22 November 2025 27 & 28 March 2026	• Pop-up information sessions at high foot traffic locations at four Central Queensland locations (Gladstone, Biloela, Rockhampton and Bouldercombe). • Included the latest CQ Regional Update newsletter, Calvale to Calliope River Transmission Line Reinforcement Project newsletter and a large regional map showing Powerlink's projects. • It is intended that Regional Update newsletters and associated pop-up information sessions will occur regularly, making the Powerlink team available to the community to find out more about our Central Queensland projects and ask questions.	Ongoing
10	**Formal Consultation on Ministerial Infrastructure Designation application**	24 November – 22 December 2025	• Formal 20-business-day public consultation period on the MID application. • Powerlink undertook communication and engagement activities to generate awareness of the MID Proposal and consultation period. • Included community information drop-in sessions at multiple locations along the project alignment.	Complete
11	**Formal consultation on draft Public Environment Report for EPBC Act approval**	12 February – 11 March 2026	• Formal 20-business-day public consultation on the Draft Public Environment Report (PER) documentation and management plans.	Complete

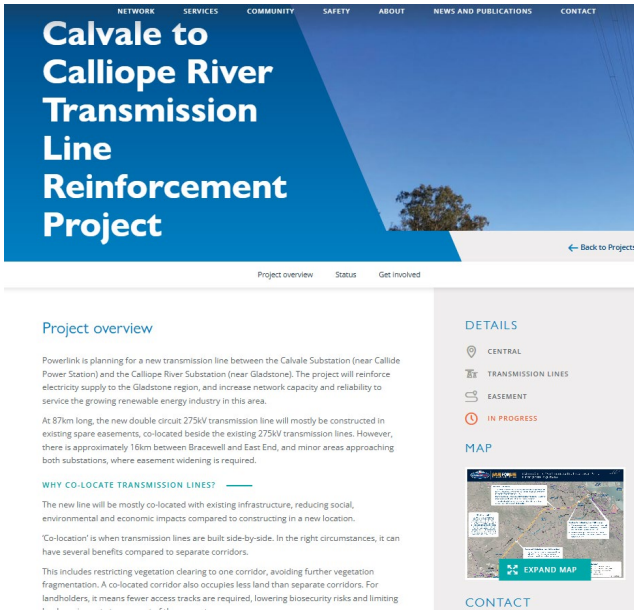


Photo 11.1 Project webpage on Powerlink website–established early 2023, and regularly updated

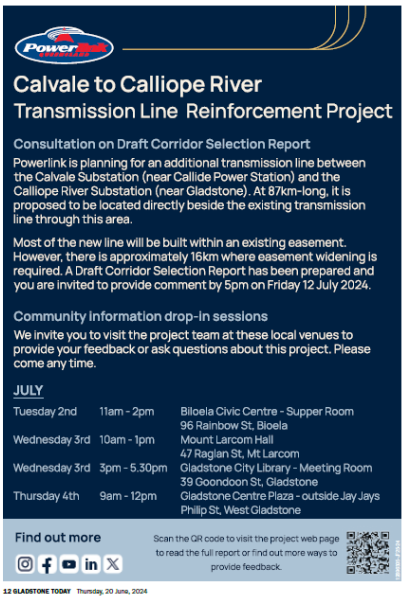


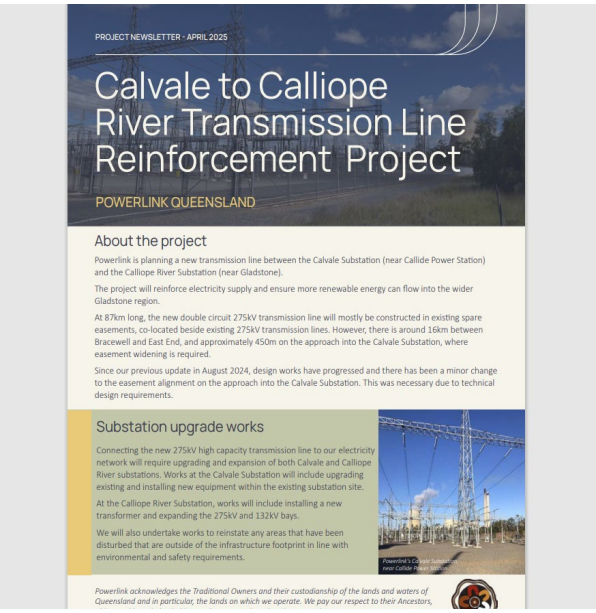
Photo 11.2 Newspaper advertising to notify the community about consultation on Draft Corridor Selection Report and upcoming community information sessions (also ran online advertising)



Photo 11.3 Community information drop-in session at Mount Larcom to seek feedback on Draft Corridor Selection Report–July 2024



Photo 11.4 Project team members and information available at Gladstone Supply Chain Expo–April 2025


PROJECT NEWSLETTER - APRIL 2025

Calvale to Calliope River Transmission Line Reinforcement Project

POWERLINK QUEENSLAND

About the project

Powerlink is planning a new transmission line between the Calvale Substation (near Callide Power Station) and the Calliope River Substation (near Gladstone).

The project will reinforce electricity supply and ensure more renewable energy can flow into the wider Gladstone region.

At 87km long, the new double circuit 275kV transmission line will mostly be constructed in existing spare easements, co-located beside existing 275kV transmission lines. However, there is around 16km between Bracewell and East End, and approximately 450m on the approach into the Calvale Substation, where easement widening is required.

Since our previous update in August 2024, design works have progressed and there has been a minor change to the easement alignment on the approach into the Calvale Substation. This was necessary due to technical design requirements.

Substation upgrade works

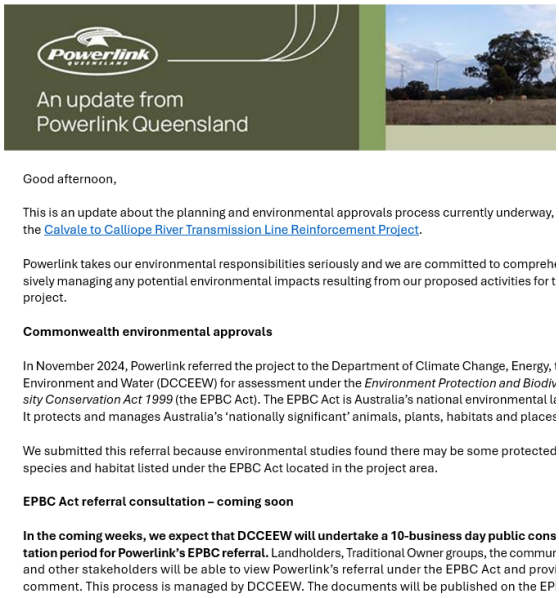
Connecting the new 275kV high capacity transmission line to our electricity network will require upgrading and expansion of both Calvale and Calliope River substations. Works at the Calvale Substation will include upgrading existing and installing new equipment within the existing substation site.

At the Calliope River Substation, works will include installing a new transformer and expanding the 275kV and 132kV bays.

We will also undertake works to reinstate any areas that have been disturbed that are outside of the infrastructure footprint in line with environmental and safety requirements.

Powerlink acknowledges the Traditional Owners and their custodianship of the lands and waters of Queensland and in particular, the lands on which we operate. We pay our respect to their Ancestors,

Photo 11.5 Regular project newsletters distributed widely (digital and printed) to project stakeholders and the community


An update from Powerlink Queensland

Good afternoon,

This is an update about the planning and environmental approvals process currently underway, the Calvale to Calliope River Transmission Line Reinforcement Project.

Powerlink takes our environmental responsibilities seriously and we are committed to comprehe sively managing any potential environmental impacts resulting from our proposed activities for t project.

Commonwealth environmental approvals

In November 2024, Powerlink referred the project to the Department of Climate Change, Energy, Environment and Water (DCCEEW) for assessment under the *Environment Protection and Biodiv sity Conservation Act 1999* (the EPBC Act). The EPBC Act is Australia's national environmental l It protects and manages Australia's 'nationally significant' animals, plants, habitats and places

We submitted this referral because environmental studies found there may be some protected species and habitat listed under the EPBC Act located in the project area.

EPBC Act referral consultation – coming soon

In the coming weeks, we expect that DCCEEW will undertake a 10-business day public cons tation period for Powerlink's EPBC referral. Landholders, Traditional Owner groups, the commur and other stakeholders will be able to view Powerlink's referral under the EPBC Act and provi comment. This process is managed by DCCEEW. The documents will be published on the EP

Photo 11.6 Email to project stakeholders about upcoming EPBC Referral consultation–sent December 2024. Update sent January 2025, when consultation went live

11.4 Proposed Consultation

As described in **Table 11.3**, Powerlink will further consult with relevant stakeholders to support the approvals phases of the Project.

Table 11.3 Proposed Consultation Activites

Engagement Phase	Timing	Purpose of Engagement	Status
Update on feedback received during MID and EPBC consultation periods	Early to mid-2026	To provide an update on the feedback received, next steps and anticipated timeframes.	Upcoming
Post planning and environmental approval	Targeted mid-2026, pending approvals	To communicate the completion of the approvals process and advise next steps and timeframes leading into the construction phase.	Pending approvals
Regional Transmission Update and engagement pop-ups	August 2026	The next Regional Transmission Update newsletter and engagement pop-up sessions are expected to occur in August 2026.	Upcoming

Powerlink undertook additional communication and engagement activities to support the release of the Draft PER in accordance with direction from DCCEEW. **Table 11.4** describes the activities that have been undertaken to comply with the EPBC Act, and the following section describes additional activities that Powerlink proposes to undertake.

Table 11.4 Mandatory Communication Activities Undertaken to Support Draft PER Consultation Period

#	Requirement	Powerlink Response
1	After receiving the Ministers approval to publish the report, Powerlink made the draft PER available for a period of public comment, for at least 20 business days from Thursday 12 February 2026 to Wednesday 11 March 2026	Completed.
2	Powerlink developed a publication notice in accordance with 16.04 of the EPBC Regulations and successfully sought from approval from DCCEEW. A public notice was published in the following locations: • In The Australian (national) and The Courier Mail (state) newspapers (printed editions) • On News Corp's 'Buy Search Sell' online public notice portal • In Gladstone Today (weekly newspaper), in the first available edition after the approval to publish was received.	Completed.
3	Powerlink published the Draft PER at the following locations: • On Powerlink's website • Two physical copies and 2 x USB copies at the Gladstone City Library, 39 Goondoon Street, Gladstone Central • Two physical copies and 2 x USB copies at the State Library of Queensland, Stanley Place, South Brisbane • Published in The Australian (national) and The Courier Mail (state) newspapers (printed editions). • Published on News Corp's 'Buy Search Sell' online public notice portal • Published in Gladstone Today (weekly newspaper), in the first available edition after the approval to publish was received • Provided electronic copies to DCCEEW.	Completed.

Engagement undertaken to support draft PER consultation:

Powerlink undertook the following activities to inform project stakeholders and the community about the Project, including:

- Preparation of a Project newsletter, detailing:
  - What is the Draft PER Report for this project, why it's been prepared, and what's in it
  - How it can be viewed (online, or in-person)
  - How to contact the Powerlink project team with any questions, through a range of communication channels
  - How to make a formal submission to Powerlink, and the consultation end date.
- Updates to the Powerlink project webpage: www.powerlink.com.au/calvale-calliope and the Social Pinpoint engagement platform (accessed via the project web page).
- Individually addressed letters, with newsletter enclosed, sent to landholders and Traditional Owner groups along the alignment.

- Newsletter mailout to nearby landholders.
- General email update to other project stakeholders (as listed in **Table 11.1**).
- Managing community enquiries through the existing project communication channels:
    - email: cqprojects@powerlink.com.au
    - phone: 1800 635 369 (Monday to Friday, 7.30 am–5.00 pm)
    - online contact form on the project webpage.

Powerlink's Landholder Relations Advisor for the Project maintains regular communication with directly impacted landholders, and is available via phone, email or in-person to manage landholder enquiries.

11.5 Consultation Outcomes

Draft Corridor Selection Report (CSR) - 2024

On Monday 17 June 2024, Powerlink published a Draft Corridor Selection Report (CSR) for the Project. A CSR is a Powerlink document that details Powerlink's process for assessing the viability of routes for an electricity transmission corridor.

The community was invited to comment on the Draft CSR over a four-week consultation period, between Monday 17 June 2024 and 5 pm Friday 12 July 2024.

The consultation period and feedback channels were promoted through a range of communication activities, including advertising, letters, newsletter mail-out, emails, briefings and the project web page. Multiple options were made available for feedback, including:

- In-person, through community information drop-in sessions and stakeholder meetings.
- Phone, mostly through conversations between Powerlink's Landholder Relations Advisor and landholders.
- Online, including feedback form and email.

Most feedback was provided verbally, either in-person or by phone. The stakeholder group that provided the most feedback was the directly impacted landholders, via the Powerlink Landholder Relations Advisor. **Table 11.5** describes the key feedback issues and themes raised during the consultation period.

After the draft CSR consultation period was complete, Powerlink:

- Reviewed and considered feedback
- Responded individually to stakeholders
- Incorporated the key issues/ themes and Powerlink's response, into the Final CSR.

The Final CSR and a project newsletter were published in August 2024. This included a summary of the key issues and themes, and Powerlink's response (**Table 11.5**). The Draft and Final CSRs, and all project newsletters, are available on the project's online 'community hub' which can be accessed through the Project web page www.powerlink.com.au/calvale-calliope .

In response to feedback about Powerlink's current biosecurity practices, Powerlink developed new, plain English responses to Frequently Asked Questions (FAQs) about Powerlink's systems and

processes for managing biosecurity risk, including avoiding the spread of weeds. This document is also available on the project web page and is used by the Landholder Relations Advisor to support conversations with landholders.

Ministerial Infrastructure Designation (MID) engagement – 2025

Community engagement on the Project's MID Proposal Report was undertaken in late 2025. The consultation process was initiated and managed by the DSDIP, and seven submissions were received. Submissions identified themes around land access, environmental considerations, infrastructure siting, amenity impacts and the importance of timely project delivery.

Powerlink will consider and respond to this feedback as part of finalising the MID Proposal Report. The report will then be submitted to DSDIP and the Planning Minister for consideration and final decision.

Draft Public Environment Report Public Consultation – 2026

DCCEEW provided the approval to publish to Powerlink on Wednesday 11 February 2026. Powerlink began notifying stakeholders shortly afterwards, with all notification activities completed by Thursday 12 February 2026. Powerlink's consultation ran for 20 business days, concluding at 5pm on Wednesday 11 March 2026. One submission was received during the public consultation period, focusing on the Offset Management Strategy that was withheld from the published draft PER due to commercial-in-confidence reasons.

Ongoing engagement with landholders, Traditional Owner groups, the community and other stakeholders remains a key focus during all phases of Powerlink projects. This ensures Powerlink can strengthen and leverage relationships with key groups throughout the project lifecycle. A summary of the key issues and themes, and Powerlink's response is provided in **Table 11.5**.

Table 11.5 Key Issues Raised During Consultation and Powerlink Response

Topic	Key Issues & Themes	Powerlink Response
Compensation	• Payment amount, criteria, and eligibility to receive payments. • Potential impacts to lifestyle, amenity, and property values and future saleability.	• All landholders who have easements acquired or widened over their property for a new transmission line are entitled to compensation under the *Acquisition of Land Act 1967* (AL Act). Compensation under the AL Act is not applicable where an existing spare transmission easement is utilised. • Powerlink will work with landholders across the project to determine the application of Powerlink's Landholder Payment Framework, noting that the portion of any payment under this framework linked to compensation under the AL Act is not applicable where an existing spare transmission easement is used. Powerlink will seek to understand any potential impacts on landholders' properties due to the new infrastructure and Powerlink's ongoing operations and discuss next steps with landholders.
Biosecurity matters	• Potential spread of weeds from using access tracks and activity within the easement.	• Powerlink understands that biosecurity is a priority for landholders. Powerlink takes biosecurity seriously and has processes in place to avoid spreading weeds between properties or introducing new weeds from outside the local area. Powerlink

Topic	Key Issues & Themes	Powerlink Response
	• Current weed management approach.	takes preventative measures to minimise exposure to weeds, such as: ○ Conducting regular vehicle wash downs ○ Avoiding travel through areas heavily affected by biosecurity matter ○ Visiting clean areas first, before travelling to affected areas ○ Staying on roads and designated access tracks in work areas ○ Obtaining weed and seed declarations on any fill material brought onto a property. • Powerlink will work with landholders to identify biosecurity risks on each property and develop appropriate management measures, including those referred to in existing Biosecurity Management Plan's. Powerlink values their long-term, working relationships with landholders, and intend to work with landholders regarding biosecurity from the planning phase through to construction, operation and maintenance.
Commercial impacts	• Potential impacts on business operations and planned developments.	• Powerlink recognises that residents, business operators and developers may have concerns about how the new transmission line and construction works could impact their lifestyle, operations or planned development. • Powerlink is committed to working with landholders, business operators and developers to manage and mitigate impacts where possible. This means understanding land use in detail and looking together at ways to minimise impact and maximise co-existence opportunities. • While some activities cannot occur on, or near, an easement, many can continue as normal. For example, grazing or growing crops (less than 3.5 m high) can generally occur on an easement, providing electrical safety clearance requirements are maintained. For further detail about activities that can occur an easement, please refer to powerlink.com.au/easements.
Visual amenity	• Additional visual amenity impacts due to the taller height of the new transmission towers, compared to the existing towers.	• Visual amenity is a key consideration in the design phase of a Powerlink project. Powerlink is committed to working with landholders and the surrounding community to understand the most appropriate location for transmission towers. Powerlink will seek to minimise and mitigate any potential impacts to landholders and community by strategically designing the line where possible,

Topic	Key Issues & Themes	Powerlink Response
		noting other social, environmental and economic factors. • The MID Proposal will be supported by an LVIA report that will address impacts to visual amenity in accordance with the relevant provisions of the local planning scheme(s).
Broader social concerns about renewable energy (not project specific)	• Living in an area with significant renewable development activity. • Differing community sentiment regarding renewable energy. • Distribution of benefits and impacts within a community.	• The Project is required to secure the future supply of electricity to the Gladstone area, in preparation for the expected decarbonisation of major industrial loads in the Gladstone region. Powerlink will seek to keep landholders, Traditional Owner groups, key stakeholders and community informed throughout the project process including planning, construction and operational phases as relevant. **Support Services Available** • Powerlink acknowledges that there are many renewable energy projects planned for the region and landholders may be facing a time of uncertainty due to the rapidly changing landscape in the renewable energy market. • For landholders and community members needing support, Powerlink has a professional counselling service available (Rural Health Connect). This is an independent provider and is completely confidential with several sessions provided free of charge. For more information, please visit www.powerlink.com.au/support. **Powerlink Community Grants** • As part of the energy transformation, Powerlink is helping deliver benefits to communities across Queensland. Powerlink's community investment program provides small grants aligning with Powerlink's values of supporting sustainable communities and economic development. • Powerlink's goal is to support projects and activities aligning with resilience, safety, wellbeing, and economic outcomes, ultimately leading to positive impacts for groups and communities. • There have been two Powerlink Community Grant rounds during the planning phase of this project: • In 2024, grant applications were open between 22 August and 3 October 2024. • In 2025, applications opened on 21 July 2025, and closed on 22 August 2025. • Community groups, community clubs and not-for-profit organisations in Banana Shire, Gladstone Region and selected other Local Government Areas are invited to apply.

Topic	Key Issues & Themes	Powerlink Response
		• Powerlink Community Grants support initiatives and activities valued at up to $5,000 located in regional Queensland. Grants are available annually, for projects commencing from January the following year. For further information, please visit www.powerlink.com.au/communitygrants.

Offset Management Strategy	• Exclusion of the Offset Management Strategy from publication
	• Feedback provided in the submission included:
	  ○ That the information about proposed offsets available within the report body did not provide sufficient detail.
	  ○ Requested more information be provided about how the sites are suitable, what ecological benefits they provide and how they meet policy principles and requirements for protected species.
	• Concerns about transparency and setting a precedent for future projects.
		• Powerlink and DCCEEW have a Memorandum of Understanding (MOU) to facilitate process improvement and efficient environmental assessment of relevant projects under the EPBC Act. The MOU provides a mechanism for Powerlink to work collaboratively and transparently with DCCEEW, including regular and consistent engagement, to support effective and robust assessments. In accordance with section 170BA of the EPBC Act, the Offset Management Strategy was withheld from public exhibition in agreement with DCCEEW, as it contained commercial-in-confidence material.
		• The Offset Management Plan, which supersedes the OMS, is included within the Final PER. The OMP includes detailed information on both impact and offset site habitat quality, specific details on the offset area, and clearly outlines how the proposed offset meets the EPBC Environmental Offsets Policy.

11.6 Indigenous Engagement

11.6.1 Native Title Matters

Powerlink has undertaken a Native Title assessment for all land parcels directly impacted by the Project corridor. The land parcels have been assessed in the following manner:

- Land parcel current tenure and ownership verification.

- Native Tittle matters relevant to the specific parcel are investigated in Queensland Native Title Information Management Environment (QNTIME) and recorded.
- Tenure history of the land parcel is researched and recorded through ownership documents such as titles and survey plans.
- Documents and findings are cross referenced with the QNTIME results.
- All findings are further assessed for dealings and activities that are allowable under the Native Title Act specific for that activity (Native Title Work Procedures).

QNTIME is the information system used to manage data related to native title claims, determinations, and agreements in Queensland. It contains spatial and textual information on native title, Indigenous land use agreements, and relevant historical and legal information. The system is used by government departments to assist in decision-making processes involving land and natural resources. It holds data such as native title claims, native title determinations, and Indigenous Land Use Agreements (ILUA). It also includes information on representative bodies, research into tenure and usage, and conclusions of extinguishment.

If the land parcel does not meet the extinguishment requirements it is deemed that native title has not been extinguished. The evaluation of each land parcel in QNTIME covers the following matters:

- Has a NT *determination* has been made over the specific parcel
- Has a claim (*Application*) has been registered over the specific parcel/area
- Are any Agreements (ILUA) in place specific and/or relevant to the required dealings on the parcel?
- Has the Parcel undergone an Acquisition?
- Has the Parcel undergone an assessment and subsequent *Conclusion* reached that native title has been extinguished by relevant means?

Based on the aforementioned investigative evidence and research documents, if the Land Parcel does not pass the requirements for NT extinguishment evidence and validity, the Parcel is deemed as not having native title extinguished and subject to issue of a Section 24KA notice (facilities for services to the public) under the Native Title Act 1993.

The current alignment has had the following results returned from the above investigations:

- 67 parcels in alignment
- 44 parcels under a valid conclusion that native has been extinguished–C/57473, C/60654 & C/41637
- 15 parcels with proven PEPA extinguishing NT
- 8 parcels where NT **has not** been extinguished
    - Comprising:
        - 1 conservation park
        - 56 freehold properties
        - 4 rail corridors
        - 1 reserve
        - 2 rolling term lease

    - 2 State forests
    - 1 timber reserves.
- Additionally:
    - 25 roads and tracks
    - 7 creeks and rivers all currently under the determination in force for Bailai, Gurang, Gooreng Gooreng, Taribelang Bunda People (NNTT: QCD2017/010 & Crt Ref: QUD6026/2001).

All investigations, findings and documents are recorded in detail against each land parcel and saved for compliance.

11.6.2 Cultural Heritage Management Principles

In accordance with the guidelines published within the *Interim Engaging with First Nations People and Communities on Assessments and Approvals* under the EPBC Act (DCCEEW, 2023), Powerlink upholds best practice consultation with Indigenous peoples and communities through respectful and effective engagement by:

- ensuring cultural safety
- building and maintaining trust
- engaging early and often
- negotiating suitable timeframes
- negotiating suitable submission formats.

11.6.3 Engagement and Agreements with Traditional Owners

To achieve the engagement goals, Powerlink first identified the relevant Indigenous cultural heritage parties for the Project Area under Part 4 of the Queensland *Aboriginal Cultural Heritage Act 2003* (ACH Act), comprising the:

- GNP (GNP; QUD33/2019)
- BGGGTBP (BGGGTBP; QUD6026/2001).

Powerlink commenced early engagement with both Traditional Owner groups from as early as March 2023. Since then, Powerlink has engaged in multiple meetings with both Traditional Owner groups to discuss various aspects of the Project, including the design and location of the proposed transmission line, as well as commenced cultural heritage management activities with both groups for the sections of the Project Area within their respective traditional countries.

Powerlink also has an existing 'Whole-of-Claim' (WoC) Cultural Heritage Investigation and Management Agreement (CHIMA) with the GNP which was executed in December 2015. This CHIMA is recognised as 'another agreement' under Part 3, Section 23(3) of the ACH Act, and sets out the agreed procedures as well as terms and conditions through which Powerlink can fulfil its 'cultural heritage duty of care'.

At present, Powerlink is engaged with ongoing discussions with the BGGGTBP, to reach a similar Cultural Heritage Management Agreement (CHMA) over the portion of the Project Area within their traditional country. Powerlink also engaged with both Traditional Owner groups to discuss the Relationship Agreement initiative and to seek their advice on entering into a WoC Relationship Agreement.

Going forward, Powerlink will continue to have regular on-site and off-site meetings with both the GNP and BGGGTBP, to engage with both relationship and cultural heritage management matters related to this project, in accordance with the terms of the current CHIMA with the GNP, as well as the future CHMA with the BGGGTBP.

Table 11.6 summarises and outlines the primary stages of engagement and consultation, as well as cultural heritage assessment with the GNP and BGGGTBP for the Project.

Table 11.6 Summary of Early Engagement and Cultural Heritage Management Events to Date

	Date	Traditional Owner Group	Task	Details
Stage Early Engagement Cultural Heritage Assessment & Early Works Activities	6 March 2023	BGGGTBP	Request for initial meeting	Powerlink requested to meet to introduce the Project and discuss cultural heritage assessment and management.
	21 March 2023	GNP	Request for initial meeting	Powerlink requested to meet to introduce the Project and discuss cultural heritage assessment and management.
	25 March 2023	GNP	Meeting 1	Powerlink met with the GNP to introduce and discuss the Project.
	28 April 2023	BGGGTBP	Meeting 1	Powerlink met with the BGGGTBP to introduce and discuss the Project.
	8 May 2023	BGGGTBP	Formal response to Meeting 1	• BGGGTBP requested more information regarding the Project. • BGGGTBP indicated their willingness to enter into a CHMA with Powerlink for this project.
	25 August 2023	GNP	Meeting 2	Powerlink met with the GNP to discuss the Project further.
	6 October 2023	GNP	Meeting 3	Powerlink met with the GNP to discuss the Terms of Reference for cultural heritage assessment and management for the Project.
	26 February 2024	GNP	Meeting 4	Powerlink met with the GNP to discuss the Terms of Reference for cultural heritage assessment and management for the Project.
	19 September 2023	GNP	Works Program Notice 1	Powerlink issued a 'Works Program Notice' to request GNP to commence cultural heritage assessment for the Project.
	28 February 2024	BGGGTBP	Meeting 2	Powerlink met with the BGGGTBP to introduce and discuss the Project. • Cultural values in relation to the Great Barrier Reef World Heritage Area were discussed. • Cultural heritage assessment for the Project Area was discussed.
	11 April 2024	BGGGTBP	Works Program Notice 1	Powerlink issued a 'Works Program Notice' to request BGGGTBP to commence cultural heritage assessment for this project, focusing on the portion of the Project Area located around the existing Calliope River Substation.

Date	Traditional Owner Group	Task	Details
18 April 2024 to 19 April 2024	BGGGTBP (with Umwelt as Powerlink Technical Advisor)	Cultural Heritage Survey 1	Powerlink and BGGGTBP commenced cultural heritage survey over the Calliope River Substation portion of the Project Area.
1 May 2024	BGGGTBP (with Umwelt as Powerlink Technical Advisor)	Cultural Heritage Survey Report 1	On behalf of Powerlink, Umwelt prepared a report for the cultural heritage survey over the Calliope River Substation portion of the Project Area.
27 May 2024 to 31 May 2024 & 3 June 2024 to 7 June 2024	BGGGTBP (with Umwelt as Powerlink Technical Advisor)	Cultural Heritage Survey 2	Powerlink and BGGGTBP commenced cultural heritage survey over various portions of the Project Area.
12 July 2024	BGGGTBP	Meeting 3	Powerlink and BGGGTBP discussed reaching a CHMA with Powerlink for this project.
29 July 2024	GNP	Works Program Notice 2	Powerlink re-issued a 'Works Program Notice' to request GNP to commence cultural heritage assessment for this project.
26 September 2024	GNP	Meeting 5	Powerlink met with the GNP to discuss the Terms of Reference for cultural heritage assessment and management for the Project. GNP committed to commencing cultural heritage assessment in early March 2025.
5 November 2024	BGGGTBP (with Umwelt as Powerlink Technical Advisor)	Cultural Heritage Survey Report 2	On behalf of Powerlink, Umwelt completed a report for the cultural heritage survey over various portions of the Project Area.
20 December 2024	BGGGTBP	Meeting 4	Powerlink and BGGGTBP discussed reaching a range of matters including reaching a CHMA with Powerlink for this project, as well as resuming and completing cultural heritage assessment over the Project Area.

Date	Traditional Owner Group	Task	Details
5 February 2025	GNP	Meeting 6	Powerlink met with the GNP to discuss the Terms of Reference for cultural heritage assessment and management for the Project. GNP commits to conducting cultural heritage assessment from 10-21 March 2025.
10 March 2025 21 March 2025	GNP	Cultural Heritage Survey 1	Powerlink and GNP commenced and completed cultural heritage survey over the Project Area.
25 March 2025	GNP (with Central Queensland Cultural Heritage Management as Technical Advisor)	Cultural Heritage Survey Report 1	On behalf of GNP, Central Queensland Cultural Heritage Management (CQCHM) completed an 'Initial Cultural Heritage Assessment' (ICHA) report for the cultural heritage survey over the entire portion of the Project Area within GNP traditional country.
28 March 2025	GNP	Meeting 7	Powerlink met with the GNP to discuss the results of the cultural heritage survey contained within the ICHA report and draft a 'Cultural Heritage Management Strategy' (CHMS) for identified cultural heritage constraints on site.
2 April 2025 to 12 May 2025	GNP	Cultural Heritage Monitoring of Geotechnical Investigations	GNP commenced and completed cultural heritage monitoring of geotechnical investigations in the portion of the Project Area within GNP traditional country.
11 April 2025	GNP	Meeting 8	Powerlink met with the GNP to discuss the results of the cultural heritage survey contained within the ICHA report and draft a CHMS for identified cultural heritage constraints.
4 April 2025	BGGGTBP	Meeting 5	Powerlink and BGGGTBP discussed a range of matters, including reaching a CHMA with Powerlink for this project, as well as resuming and completing cultural heritage assessment over the Project Area. Powerlink also discussed the draft Relationship Agreement (provided to Dillon Bowers on 14 March 2025) and Traditional Owner Relationship Agreement (RA) shared benefits offer.

Date	Traditional Owner Group	Task	Details
24 April 2025	GNP	Meeting 9	Powerlink met with the GNP to discuss the results of the cultural heritage survey contained within the ICHA report, and draft a CHMS for identified cultural heritage constraints on site.
7 May 2025	Port Curtis Coral Coast Trust (PCCC) on behalf of the BGGGTBP	Meeting 1	Powerlink and the PCCC discussed cultural heritage matters for the Project, and agreed to draft and reach an 'Early Works Agreement' (EWA), to facilitate Geotechnical Investigations in the portion of the Project Area within BGGGTBP traditional country.
15 May 2025 to 3 June 2025	BGGGTBP	Drafting and executing the EWA	On 15 May 2025, Powerlink and BGGGTBP commenced drafting the EWA, to facilitate Geotechnical Investigations in the portion of the Project Area within BGGGTBP traditional country. The EWA was finalised and executed on 3 June 2025.
19 May 2025 to 6 July 2025	PCCC on behalf of the BGGGTBP	Cultural Heritage Monitoring of geotechnical investigations	On behalf of the BGGGTBP, the PCCC commenced and completed cultural heritage monitoring of Geotechnical Investigations in the portion of the Project Area within BGGGTBP traditional country.
16 August 2025 to 17 August 2025	GNP	Meeting 10	Powerlink met with the GNP to discuss all current projects within their traditional country, including the Project.
17 October 2025	BGGGTBP	Meeting 6	Powerlink and BGGGTBP met to focus on cultural heritage, relationship agreement, procurement opportunities, employment/training.
25 October 2025	GNP	Meeting 11	Powerlink met with GNP to discuss relationship agreement, social impacts.
27 November 2025	BGGGTBP	Meeting 7	Joint working group session to align on local content/work packages, pre-reads and cadence; relationship agreement and capacity building.
2 December 2025	GNP	Draft CHMS Agreement	Powerlink provided a draft CHMS Agreement to GNP for consideration.

11.6.4 Legislative Requirements

11.6.4.1 State

Powerlink abides by statutory framework and principles governing the recognition, protection and conservation of Indigenous cultural heritage within Queensland, comprising:

- ACH Act
- the ACH Act Duty of Care Guidelines (the Guidelines).

Under Part 3, Section 23(1) of the ACH Act, Powerlink recognises that it carries the 'cultural heritage duty of care' for its proposed scope of works within the Powerlink Project Area.

11.6.4.2 Queensland ATSICH Database and Register

In accordance with the ACH Act and the Guidelines, Powerlink recently completed a search of the Queensland Aboriginal and Torres Straits Islander Cultural Heritage (ATSICH) Database and Register (completed on 17 February 2025) which identified that 20 cultural heritage site points are located within the Project Area–refer to **Table 11.7** and **Figure 11.1** (Queensland Government, 2025).

Table 11.7 ATSICH Cultural Heritage Site Points within the Project Area (Queensland Government, 2025)

Site ID	Latitude	Longitude	Date Recorded	Attribute	Cultural Heritage Party
JE:D85	-24.154222	150.741622	10/12/2001	Isolated Find	Gaangalu Nation People
JE:D86	-24.188132	150.714631	10/12/2001	Artefact Scatter	Gaangalu Nation People
JE:D87	-24.192476	150.711228	10/12/2001	Artefact Scatter	Gaangalu Nation People
JE:D90	-24.309729	150.658625	10/12/2001	Isolated Find	Gaangalu Nation People
JE:D91	-24.320924	150.656991	10/12/2001	Artefact Scatter	Gaangalu Nation People
JE:D92	-24.322826	150.656789	10/12/2001	Isolated Find	Gaangalu Nation People
JE:D93	-24.32354	150.656815	10/12/2001	Isolated Find	Gaangalu Nation People
JE:D94	-24.339605	150.629367	10/12/2001	Artefact Scatter	Gaangalu Nation People
JE:D95	-24.340037	150.62928	10/12/2001	Isolated Find	Gaangalu Nation People
JE:D96	-24.258325	150.664136	10/12/2001	Artefact Scatter	Gaangalu Nation People
JE:D99	-24.273904	150.662305	10/12/2001	Artefact Scatter	Gaangalu Nation People
JE:E16	-24.062334	150.818228	01/11/2001	Artefact Scatter	Bailai, Gurang, Gooreng Gooreng, Taribelang Bunda People
JE:E17	-24.060214	150.82027	01/11/2001	Artefact Scatter	Bailai, Gurang, Gooreng Gooreng, Taribelang Bunda People
JE:E18	-24.038313	150.837459	01/11/2001	Artefact Scatter	Bailai, Gurang, Gooreng Gooreng, Taribelang Bunda People
JE:E19	-24.020972	150.851077	01/11/2001	Artefact Scatter	Bailai, Gurang, Gooreng Gooreng, Taribelang Bunda People
JE:E23	-24.070957	150.811387	01/11/2001	Artefact Scatter	Bailai, Gurang, Gooreng Gooreng, Taribelang Bunda People
JE:E24	-24.07359	150.809277	01/11/2001	Artefact Scatter	Bailai, Gurang, Gooreng Gooreng, Taribelang Bunda People
JE:E25	-24.118837	150.771839	01/11/2001	Artefact Scatter	Bailai, Gurang, Gooreng Gooreng, Taribelang Bunda People
JF:D47	-24.001286	150.866184	01/11/2001	Artefact Scatter	Bailai, Gurang, Gooreng Gooreng, Taribelang Bunda People
JF:D48	-23.993633	150.872884	01/11/2001	Artefact Scatter	Bailai, Gurang, Gooreng Gooreng, Taribelang Bunda People

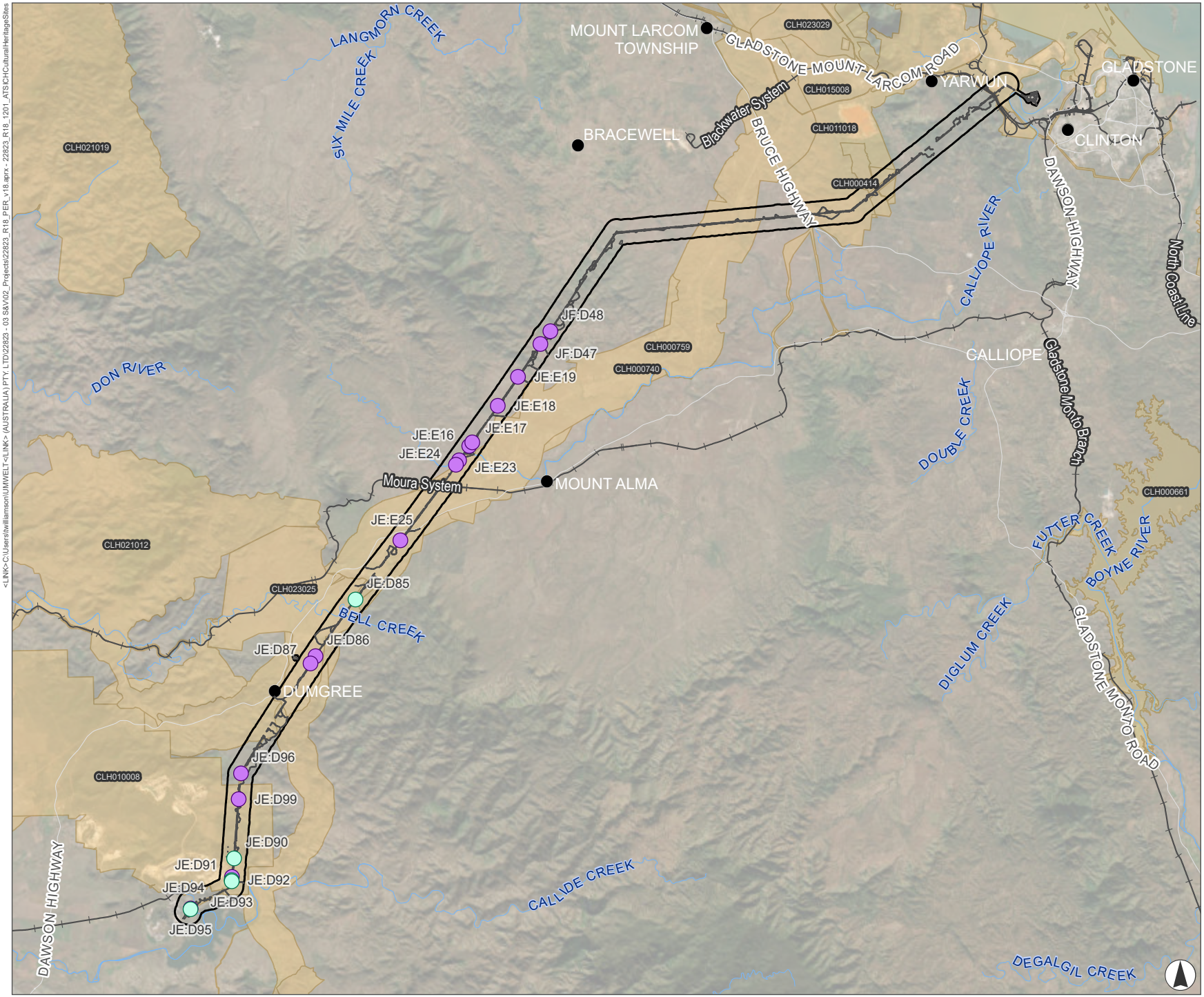


FIGURE 11.1

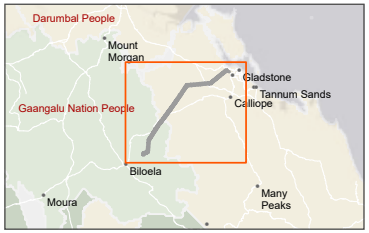
ATSICH Cultural Heritage sites within the Project Area

Legend

- Roads
- Railway
- Watercourse
- Project Area
- Disturbance Footprint
- Cultural Heritage Management Plan
- Artefact Scatter
- Isolated Find

Cultural Heritage Party Boundary

- Determined
- ILUA
- Previously registered
- Registered



0 5 10

Kilometres

Scale 1:350,000 at A4
GDA 1994 MGA Zone 56

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Image Source: ESRI Basemap (2025) | **Data Source:** Queensland D of Resources (2025)

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12.0 Offsets

12.1 Summary of Significant Residual Impacts

This section addresses Section 9 of the PER Guidelines and outlines Powerlink Queensland (Powerlink) proposed approach to offsetting significant residual impacts to MNES resulting from The Project.

A SIA (Chapter 8) was undertaken for all MNES with known, likely or potential occurrence within the Project Area. The Disturbance Footprint covers 423.7 ha. For the purposes of the SIA and offset calculations, a precautionary assumption of complete canopy removal was adopted, while recognising that ground-layer impacts will be avoided where *Cycas megacarpa* and *Samadera bidwillii* individuals are present and retained. Despite the implementation of micro-siting, co-location within existing easements, spanning of sensitive features and best-practice mitigation measures, residual impacts remain for several MNES.

Eight MNES were assessed as likely to incur a significant residual impact including two Endangered TECs, two threatened flora species and four threatened fauna species. For koala and *Samadera bidwillii*, certain mapped habitat types were assessed as not habitat critical to the survival of the species and therefore do not generate offset obligations, consistent with the Significant Impact Guidelines 1.1 (Department of the Environment, 2013). A summary of the SIA outcomes is provided in **Table 12.1**.

Table 12.1 Impact Assessment Summary Table

MNES	Habitat Type	Status	Area (ha) in Disturbance Footprint	SIA Outcome
TEC				
SEVT	-	Endangered	2.2	Likely
Eucalypt Floodplain Forest TEC	-	Endangered	16.6	Likely
Threatened Flora				
Cycas megacarpa	Known–confirmed	Endangered	53.0	Likely
	Known–suspected		0.5	
Samadera bidwillii	Known	Vulnerable	0.2	Likely
	Suitable		115.7	Unlikely
Threatened Fauna				
Collared delma	Suitable	Vulnerable	49.0	Likely
Greater Glider (Southern and Central)	Likely or current denning	Endangered	31.5	Likely

MNES	Habitat Type	Status	Area (ha) in Disturbance Footprint	SIA Outcome
	Potential or future denning		105.7	
	Foraging and dispersal		4.3	
Koala	Breeding, foraging and shelter	Endangered	131.0	Likely
	Climate refugia		22.8	
	Dispersal		267.9	Unlikely
Yellow-bellied glider (south-eastern)	Denning, foraging and dispersal	Vulnerable	20.9	Likely

12.2 Offset Requirements

The total offset requirements for each MNES requiring compensation has been calculated using the EPBC Act Offset Assessment Guide (OAG) (Department of Sustainability, Environment, Water, Population and Communities, 2012). The OAG incorporates the EPBC Act listing status of each matter along with quantitative and qualitative variables, including the extent and condition of impacted habitat, the condition of proposed offset habitat and the prescribed habitat quality improvement in the offset. The detailed OAG outputs are provided within the Offset Management Plan (OMP) (**Appendix F)**.

The OMP forms the technical basis for the Project's proposed offset package and demonstrates how the offset properties satisfy the EPBC Act Environmental Offsets Policy. The OMP also outlines the suite of management actions, habitat quality improvement measures and risk-management considerations that will underpin offset delivery. The OMP operationalises the strategy by providing detailed, enforceable management commitments, monitoring requirements, performance criteria and reporting procedures required under the EPBC approval.

Eight MNES were assessed as generating an offset requirement under the EPBC Act, including SEVT, Subtropical Eucalypt Floodplain Forest TEC, *Cycas megacarpa, Samadera bidwillii,* collared delma, greater glider, koala and yellow-bellied glider (herein referred to collectively as the 'Offset MNES').

Certain habitat types for koala and *Samadera bidwillii* were excluded from the offset calculations. Consistent with the Significant Impact Guidelines 1.1–Matters of National Environmental Significance (Department of the Environment, 2013), only habitat considered habitat critical to the survival of a species contributes to determining significant residual impacts. Koala dispersal habitat and *Samadera bidwillii* suitable habitat, although present, were not assessed as habitat critical to survival (**Chapter 8**) and therefore were not included in the Impact Area inputs to the OAG. For the purposes of this chapter and the OMP, the Impact Area is defined as the area of MNES habitat that directly intersects the Disturbance Footprint and will therefore be impact by The Project.

The resulting offset area requirements for all Offset MNES are presented in **Table 12.2**.

Table 12.2 Offset Area Requirements for Impacted MNES based on the OAG

MNES	Status	Habitat Type	Area (ha) in Disturbance Footprint	Offset Multiplier	Total Offset Area (ha) Requirement
SEVT	Endangered	-	2.2	7.0	15.5
Eucalypt Floodplain Forest TEC	Endangered	-	16.6	4.2	70.2
***Cycas megacarpa*– full clearing**	Endangered	Known– confirmed	23.2	8.5	197.2
		Known– suspected	0.5		4.2
***Cycas megacarpa*– selective clearing**	Endangered	Known– confirmed	29.8	2.8	84.1
		Known– suspected	0		0
Samadera bidwillii	Vulnerable	Known	0.2	7	1.4
Collared delma	Vulnerable	Suitable	49.0	8.1	396.4
Greater Glider	Endangered	Likely or current denning	31.5	5.6	177.9
		Potential or future denning	105.7		596.2
		Foraging and dispersal	4.3		24.2
Koala	Endangered	Breeding, foraging and shelter	131.0	4.8	623.6
		Climate refugia	22.8		108.6
Yellow-bellied glider	Vulnerable	Denning, foraging and dispersal	20.9	5.8	120.9

12.2.1 *Cycas megacarpa*

The offset liability for *Cycas megacarpa* has been calculated to distinguish between fully cleared habitat and selectively cleared habitat where individual cycads will be retained in situ, recognising the differing impact types associated with Project construction.

For selectively cleared areas, the offset requirement was calculated based on the expected reduction in habitat quality attributable to the Project, rather than treating these areas as fully cleared habitat. The reduction in habitat quality was quantified by comparing the average HQS of *Cycas megacarpa* habitat in non-remnant condition with that of remnant condition habitat across the Impact Area assuming an absent canopy height and canopy cover (score of 0) for all non-remnant sites as anticipated for these areas following the selective clearing. The difference between these scores represents the anticipated decline in habitat quality following canopy removal while retaining cycads. This reduction in habitat quality value was then input into the OAG as the impact habitat quality for selectively cleared areas**. Table 12.3** presents the HQS of these two MNES condition types and indicates a moderate decline in the Site Condition component reflecting the simplified vegetation structure and composition without a canopy or subcanopy. Moreover, the Site Context component will decline as the degradation to a non-remnant state reduces the patch size and connectedness attributes. There is no difference in the species-stocking rate (SSR) component as individuals will be retained in situ and are therefore assessed at the matter level throughout the Impact Area/ Project Area (**Appendix B).**

Fully cleared areas of *Cycas megacarpa* habitat were assessed using the impact HQS applicable to those areas, reflecting a greater loss of habitat function (**Table 12.3**). The offset liability of each impact type is summed to calculate the total *Cycas megacarpa* offset requirement (**Table 12.4).**

Table 12.3 Summary of the *Cycas megacarapa* HQS throughout Remnant And Non-remnant Areas

MNES–Condition	Site Condition	Site Context	Species Stocking Rate	Habitat Quality Score
***Cycas megacarpa*–remnant**	1.8	1.7	2.9	**6.3**
***Cycas megacarpa*–non-remnant**	1.0	0.6	2.9	**4.4***
Expected reduction in HQS input as the 'Impact Habitat Quality' for selectively cleared areas				**2**

*Minor differences reflect cumulative rounding of individual MHQA component scores.

12.3 Approach to Offset Package

A direct, land-based offset strategy will be delivered to acquit 100% of the offset requirements for each of the Offset MNES (**Table 12.4**) as consistent with the EPBC Act Environmental Offsets Policy (Department of Sustainability, Environment, Water, Population, Communities and Public Affairs, 2012). Powerlink's offset strategy focuses on securing and managing suitable offset properties that support suitable habitat for the Offset MNES and provide opportunities to achieve habitat quality improvements.

Two suitable offset properties have been identified within the Brigalow Belt bioregion for SEVT, *Cycas megacarpa, Samadera bidwillii,* collared delma, greater glider, koala and yellow-bellied glider. These properties contain extensive areas of remnant vegetation, riparian corridors, confirmed records or highly suitable habitat, and regrowth to non-remnant condition vegetation with genuine regeneration potential (**Appendix F**). Ecological assessments remain ongoing, and the final OMP will incorporate the full, verified extent of Offset MNES habitat across these properties. Offsets for these seven MNES will be met using both properties, provided the consolidated offset obligations are achieved.

The Eucalypt Floodplain Forest TEC, which only occurs only within the SEQ bioregion (within Queensland), will be secured as a separate direct, land-based offset. A suitable SEQ bioregion property has been identified that fully meets or exceeds the calculated offset requirement for this TEC, with the offset area and its management, monitoring and reporting commitments to be presented in the OMP (along with the Brigalow Belt property(s)) and submitted with the final PER.

Collectively, this approach ensures that all Offset MNES are matched to ecologically appropriate offset sites with high potential for measurable, long-term conservation gains.

Table 12.4 Summary of the Direct Offset Package

MNES	Total Offset Area (ha) Requirement	Direct Offset %	Offset Property Bioregion
SEVT	15.5	100	Brigalow belt
Eucalypt Floodplain Forest TEC	70.2	100	SEQ
Cycas megacarpa	285.5	100	Brigalow belt
Samadera bidwillii	1.4	100	Brigalow belt
Collared delma	396.4	100	Brigalow belt
Greater Glider	798.3	100	Brigalow belt
Koala	732.2	100	Brigalow belt
Yellow-bellied glider	120.9	100	Brigalow belt

12.3.1 Offset Area: Brigalow Belt

Two properties have been identified as suitable offset areas for SEVT, *Cycas megacarpa, Samadera bidwillii,* collared delma, greater glider, koala and yellow-bellied glider. Both properties form a contiguous landscape supporting extensive areas of remnant and regrowth vegetation, riparian corridors, alluvial flats and large open-woodland systems with strong regenerative capacity (**Appendix F**). The ecological survey program undertaken to date confirms:

- Direct presence of *Cycas megacarpa, Samadera bidwillii,* greater glider and koala.
- Extensive suitable and high-value habitat for all seven Offset MNES.
- High connectivity across both properties, contributing to landscape-scale ecological function.
- High potential for conservation gains, particularly through assisted natural regeneration, weed suppression, feral animal control and fire management.

These properties contain habitat in excess to the offset requirements for each of the seven MNES and the ongoing survey program is expected to further refine the extent and distribution of suitable habitat and occupied areas.

12.3.2 Offset Area: South East Queensland

A single property has been identified as a suitable offset area for Eucalypt Floodplain Forest TEC. The property is largely associated with an alluvial landform, located along a major river, whilst supporting numerous smaller drainage features. The alluvial landform is the defining feature of the property underpinning its ecological significance by supporting climate refugia zones, ecological corridors and vegetation communities that contain dense shelter and breeding habitat for multiple MNES. The property holds restorative value through opportunities in existing non remnant areas, regrowth vegetation or highly degraded remnant vegetation. The ecological survey program undertaken to date confirms:

- direct presence of Eucalypt Floodplain Forest TEC, as well as analogous regional ecosystems that hold potential to be managed toward achieving TEC status connectivity via waterways and drainage features, which are comprised within a State significant corridor
- high potential for conservation gains, particularly through assisted natural regeneration and weed suppression.

12.3.3 Legal Mechanisms for Securing Offset Areas

Offset areas will be secured through legally enforceable mechanisms under the *Land Act 1994* (Qld), such as a registered conservation covenant, ensuring long-term protection of the MNES and ongoing implementation of required management actions. Final offset area boundaries and security mechanisms are presented within the OMP submitted with the final PER.

12.4 Offset Management Plan Commitment

Powerlink has prepared as part of the final PER a detailed OMP (**Appendix F**). The OMP outlines the site-specific management actions, monitoring program, governance arrangements and progress criteria required to deliver the prescribed conservation gains for each Offset MNES including:

- Habitat quality improvements achieved through assisted natural regeneration, targeted weed control, grazing management and fauna-sensitive fire regimes.
- Protection and enhancement of known populations of *Cycas megacarpa* and *Samadera bidwillii*, secured through long-term legal protection and targeted threat reduction.
- Transition of regrowth and degraded paddocks into higher-quality habitat, improving vegetation structure, recruitment of food trees and availability of shelter and denning resources for greater glider, yellow-bellied glider and koala.
- Protection and enhancement of known and emerging TECs, including SEVT and Eucalypt Floodplain Forest TEC, secured through long term legal protection and enhanced through targeted management such as assisted natural regeneration and weed control.
- Targeted weed control of *Lantana montevidensis* (creeping lantana) to improve the availability of shelter features within collared delma habitat.
- Risk-of-loss avoidance, through securing land historically exposed to clearing, grazing, weed invasion and altered fire regimes.

- Restoration of riparian corridors and buffers, strengthening landscape connectivity and enhancing resilience in key climate-refuge areas.

The OMP details how conservation outcomes will be achieved through assisted natural regeneration, weed suppression, feral animal control, ecologically appropriate fire management and protection of sensitive habitat features.

The OMP also formalises the monitoring framework, including MHQA-based habitat quality assessments, condition monitoring and implementation triggers to ensure adaptive management. This framework demonstrates measurable progress toward the required habitat quality improvements and ensures that the offsets remain compliant with the EPBC Act Environmental Offsets Policy and associated PER conditions.

13.0 Social and Economic Matters

This chapter addresses section 13 of the PER Guidelines and outlines the social and economic impacts of the Project, including the methodology, social baseline profile, social impact assessment and analysis and details on the Project's economic cost and impacts.

13.1 Social

13.1.1 Methodology

Powerlink is undertaking a separate, comprehensive SIA, which is currently in development at the time of writing this PER (March 2026). The outcomes of that assessment have not been considered in the development of this assessment. As such, preliminary social impacts identified in this chapter are based on available secondary data, including initial consultation outcomes undertaken by Powerlink, and experience in identifying social impacts relating to similar projects.

In the absence of specific social impact guidance within the PER Guidelines, the Queensland Social Impact Assessment Guideline and its supplementary material (DSDIP, 2025) has, in part, been applied in combination with a methodology developed by Umwelt, as detailed in the following sections.

For the purposes of this assessment, high-level scoping (social locality definition), social baseline analysis, along with identification of preliminary social impacts has been undertaken only. It is assumed that the separate Social Impact Assessment will, in accordance with the Social Impact Assessment Guideline, address in-depth scoping of social impacts, further social baseline analysis, social impact assessment and evaluation, impact mitigation and benefit enhancement.

13.1.1.1 Defining the Social Locality

The term 'social locality' is widely used in the social impact assessment practice and is synonymous with the term 'study area' as used in the Queensland Social Impact Assessment Guideline (DSDIP, 2025, p. 6). For the purposes of this section, only the term 'social locality' will be used. There is no fixed meaning or predetermined geographic boundary to a social locality (e.g. the local suburbs, or within 500 m of the project); instead, the scale of the social locality is established on a context-specific basis that considers the nature of the project and its impacts.

As provided by the Social Impact Assessment Guideline, the social locality is defined by:

- the nature and scale of the proposed project, including associated infrastructure
- the scope of the potential social impacts throughout the project lifestyle
- the location and characteristics of potentially affected communities (including nearby regional communities and relevant local government areas)
- key built and natural features including, for example, infrastructure such as the local road network and local areas of recreation and open space and nearby urban / rural centres
- native title rights and other interests held by First Nations peoples

- location of other projects in the region, as identified in the EIS where relevant, or through discussion with relevant local governments, which may contribute to cumulative social impacts over time (DSDIP, 2025)

Section 13.1.2.1 identifies the social locality for the Project.

13.1.1.2 Social Baseline Development

A social baseline profile gathers knowledge from various data sources to increase understanding of the social locality, including potentially affected communities. The social baseline profile is a foundational component of a social impact assessment, as it provides the basis from which social impacts associated with the Project may be predicted, assessed, monitored and managed over time.

To understand the communities of interest to the Project, and to evaluate their resilience and adaptive capacity to change, the social baseline provided within this report has utilised the Sustainable Livelihoods Approach or 'community capitals' analysis approach (UK Department for International Development, 2001).

According to this framework, people seek to maintain their livelihood within a context of vulnerability (Coakes & Sadler, 2011). Specifically, threats to their livelihood include shocks (such as sudden onsets of natural disasters, health problems, conflicts, and economic crises), trends (for instance, those relating to the economy, health, resources, and governance) and seasonality (such as cyclical fluctuations in prices or employment). People draw upon these assets to build and maintain their livelihood. A livelihood is considered sustainable '…when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base'.

The Sustainable Livelihoods approach draws on broad categories of community capitals (human, social, natural, physical and economic/financial) as a fundamental basis to identifying and further enhancing community capacity and resilience. This methodology has been further developed by Coakes and Sadler (2011) and applied in social impact assessment practice. The vulnerability of each capital area can be assessed through the selection of both quantitative and qualitative indicators specific to each capital area to assess a community's vulnerability to change, or conversely adaptive capacity (**Figure 13.1**).

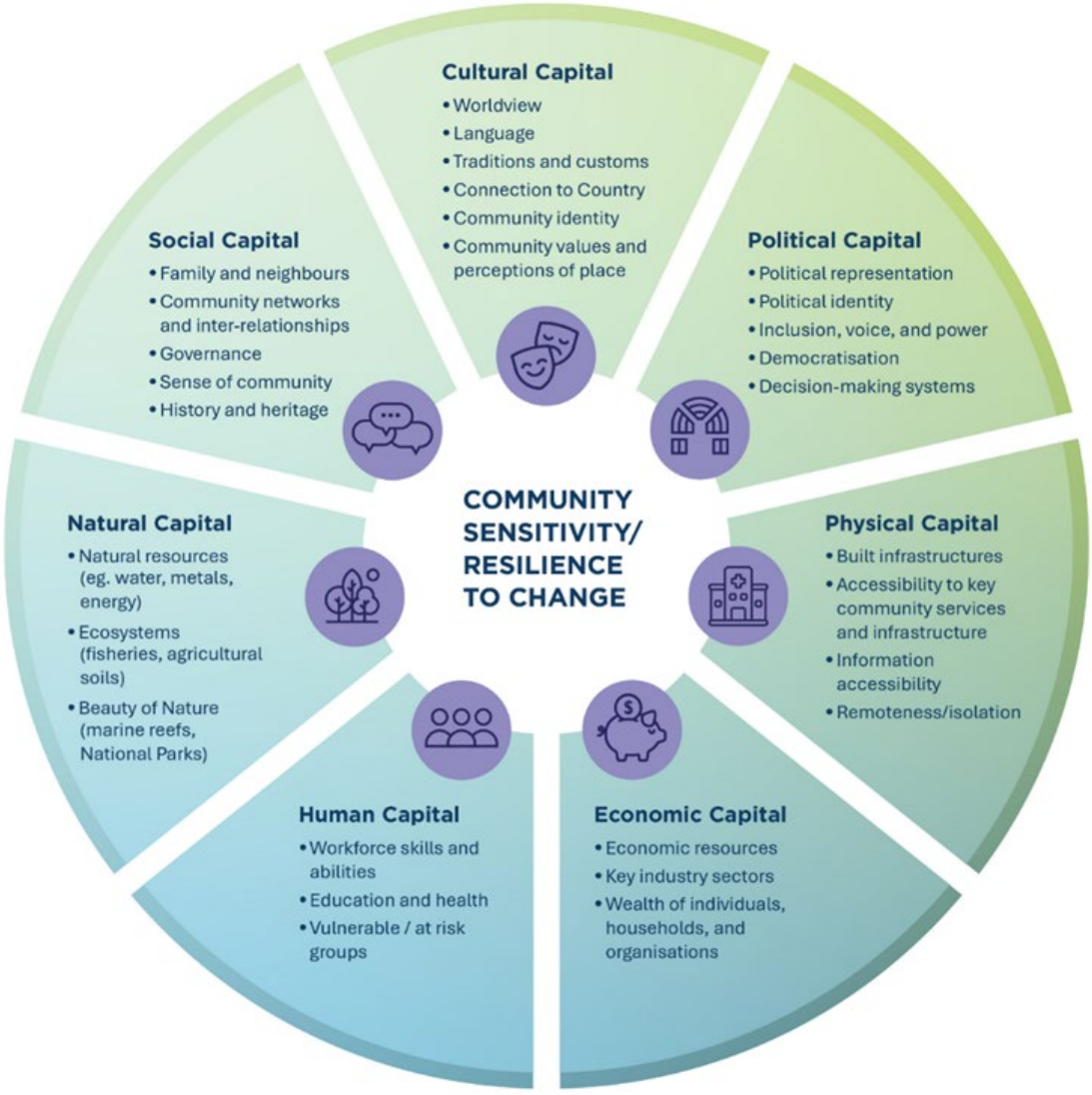


Figure 13.1 Community Capital (Sustainable Livelihoods Approach)

Source: adapted from UK Department for Internal Development (2001); Coakes and Sadler (2011).

Data to inform the development of the social baseline has been gathered from limited primary sources (via Powerlink consultation) and a range of secondary sources, both of which have been verified as part of this assessment.

13.1.1.3 Assumptions and Limitations

This chapter has been informed largely by secondary sources, with no additional stakeholder engagement undertaken to inform the assessment. Preliminary engagement data has been provided by Powerlink which has been reviewed to inform the background context. It is assumed that secondary data sources used contain valid, representative data and have not been misconstrued.

As previously noted, a separate Social Impact Assessment is currently in development at the time of writing (December 2025) which will provide a detailed assessment and evaluation of the social impacts relating to the Project.

It is also assumed that in accordance with the Social Impact Assessment Guideline, preliminary social impacts identified in the PER should be considered for the purposes of identifying key social vulnerabilities of the Project, only. There is need for further exploration and consideration of these preliminary social impacts, along with the development of appropriate adaptive management measures in a separate comprehensive Social Impact Assessment and associated Social Impact Management Plan.

13.1.2 Social Baseline Profile

13.1.2.1 Social Locality

As discussed in **Section 13.1.1.1**, a social locality provides a study area for the Project's social impacts based on a number of variables such as the scale and nature of the project, extent and magnitude of potential social impacts, and communities' vulnerability and adaptive capacity to change. **Table 13.1** defines the social locality for the Project, including stakeholders that may be affected or interested either directly or indirectly. **Figure 13.2** illustrates the social locality at a local and regional scale.

Table 13.1 Social Locality Definition

Aspect	Item	Justification
Local Impacted Communities		
Host Landholders	26 landholders to host Project infrastructure	Host landholders are likely to directly experience both positive and negative impacts of the Project.
Neighbouring Landholders	24 landholders within 1 kilometre (km) of the transmission easement	Neighbouring landholders are included due to having a property boundary within the Project Area. These neighbours are most likely to experience amenity changes associated with the Project due to changes in their surroundings.
Host Localities	Suburbs and Localities (SALs) which the Project traverses, including: 1) Dumgree 2) Mount Alma 3) Bracewell 4) East End 5) West Stowe 6) Yarwun 7) Callide	Residents of these SALs may experience impacts associated with changing amenity, surroundings and accessibility.
Local Towns (Population <10,000)	Biloela Calliope	Biloela and Calliope are both located in close proximity to the Project. Sections A through E of the Project stretches from the Calvale Power Station, 12.5 km east-north-east of Biloela, to the Calliope River Substation, 5 km west of the Gladstone CBD. Calliope is located approximately 13 km south of the Project at its closest point, and while unlikely to provide significant services to the Project, remains important for social impact considerations. Both towns having populations of between five and six thousand. Biloela is the administrative centre of the Banana Shire local government area (LGA) and so has a higher degree of autonomy

Aspect	Item	Justification
		and service provision compared to Calliope, which due to its proximity to Gladstone is relatively underserviced.
Service Hubs	Gladstone	Service centres in the region are important hubs for local residents and industry as well as for servicing the Project, in terms of workforce accommodation, health, education and community services, and local suppliers. Gladstone is the primary service hub in the Project's vicinity, hosting a population of around 45,000 people in its urban area. It is the second largest city in Central Queensland behind Rockhampton. As such, Gladstone is likely to service the Project and its population density makes it more susceptible to negative social impacts also.
Host Local Government Areas	LGAs which host Project infrastructure, namely: 1) Banana Shire LGA 2) Gladstone Region LGA	As the host LGAs for the Project, residents in Banana Shire and Gladstone Region LGAs are likely to experience social impacts relating to the Project such as livelihoods impacts (employment opportunities). There is a degree of collaboration required between councils to facilitate potential positive impacts.
Neighbouring Local Government Areas	Adjacent LGAs to Project infrastructure, including: 1) Rockhampton Region LGA 2) North Burnett Region LGA 3) Central Highlands Region LGA 4) Western Downs Region LGA	Given the Project will support renewable energy development in the region, there are significant linkages between the host LGAs of Banana Shire and Gladstone Region and adjacent LGAs of Rockhampton Region, North Burnett Region, Western Downs Region and Central Highlands Region(including respective townships).These LGAs have been identified as comprising part of the social locality, as they may experience social impacts to a lesser degree, both positive and negative, especially relating to livelihoods. Maranoa Region LGA to the southwest has been excluded due to its relative geographic distance to the Project Area compared to other adjacent LGAs. Western Downs Region LGA is relatively geographically distant from the Project, but it has been included due to its concentration of proposed and approved renewable energy projects, which may create cumulative social impacts.
First Nations		
Traditional Lands on Which the Project is Proposed	Gaangalu Nation People Bailai, Gurang, Gooreng Gooreng, Taribelang Bunda People (BGGGTBP)	The Project extends across the native title claim area of the Gaangalu Nation People, and the native title determination area of the Bailai, Gurang, Gooreng Gooreng, Taribelang Bunda People (BGGGTBP).
Native Title Applicants and Holders	Gaangalu Nation People (QCD2024/001) Wadja People (QC2012/010) Wulli Wulli People (QCD2015/009)	Within the Project host LGAs of Banana Shire and Gladstone Region, there are six active native title determinations and applications, with the Wadja, Wulli Wulli and Auburn Hawkwood determinations and applications being mostly in Banana Shire. Consultation has been undertaken by Powerlink to date with the Gaangulu Nation People (GNP) and the BGGGTBP group.

Aspect	Item	Justification
	Wulli Wulli People #3 (QC2017/011) Auburn Hawkwood People (QCD2019/006) Bailai, Gurang, Gooreng Gooreng, Taribelang Bunda People (BGGGTBP) (QCD2017/010)	
Government		
Local Government	Banana Shire Council Gladstone Regional Council	The host local governments of Banana Shire and Gladstone Region LGAs respectively have a direct interest in the Project in relation to both impacts and benefits, direct and cumulative.
Business, Industry, Environmental and Community Groups		
Chambers of Commerce	Gladstone Chamber of Commerce and Industry (GCCI) Callide Dawson Chamber of Commerce	Local chambers of commerce and industry represent a cross-section of businesses and commercial operators in the region; involvement in social impact and benefit identification can assist in maximising opportunities for local business while mitigating impacts.
Key Industry Groups and Associations	The South End Progress Association (Gladstone) Queensland Farmers Federation Grain Growers CQ Conservation Council	Community associations, industry and interest groups may have an interest, direct or indirect, in Project outcomes.
Regional Development Organisations	RDA Central and Western Queensland	Regional Development Australia (RDA) is a network of government-affiliated bodies which promote and facilitate regional development across the country. RDA Central and Western Queensland is the agency responsible for the area around the Project's social locality and may have an interest in Project outcomes.
Key Environmental Groups	Fitzroy Basin Association Capricorn Catchments Group Capricorn Pest Management Group	These environmental groups have had a history of ongoing consultation with Powerlink; they are active in the region and have an awareness and interest in Project outcomes, especially given the Project's interaction with conservation areas and state forests.

Aspect	Item	Justification
Education Providers		
Tertiary Education Providers	Gladstone SuperGrid Training Centre My Skills Institute (Biloela) Central Queensland University	Education services are an essential consideration when reviewing social impacts of the Project, both due to an increased demand (and subsequent reduced supply) from incoming construction workforces, and due to the opportunities relating to skills and workforce development relating to tertiary education.
Schools	**Banana LGA:** • 10 primary schools • 4 P-12 schools • 2 high schools **Gladstone LGA:** • 15 primary schools • 4 P-12 schools • 7 high schools	
Childcare And Preschool Facilities	Range of childcare and preschool services in Banana Shire and Gladstone Region LGAs	
Accommodation Providers		
Short Term Accommodation Services	Range of hotels, motels, caravan parks and other short-term accommodation options in the social locality	Accommodation is an important consideration for Project social impact assessment due to both reduction in supply for local residents and opportunities for housing temporary construction workforces.
Temporary Workforce Accommodation (TWA)	HomeGround Gladstone Banana Accommodation Village	Located in the town of Calliope, HomeGround Gladstone is a permanent, purpose-built temporary workforce accommodation village which can house more than 2,000 workers at once. The Banana Accommodation Village is another, privately owned, temporary workforce accommodation village located near the town of Banana, not far from the Calvale Substation. These may provide opportunities for Project workforce accommodation.
Health Services		
Hospitals, Gps, Specialist Clinics and Allied Health Services	Biloela Hospital Baralaba Multipurpose Health Service Moura Multipurpose Health Service	The Project must consider impacts to health service provision in the social locality relating to temporary workforce arrangements.

Aspect	Item	Justification
	Theodore Multipurpose Health Service Taroom Hospital Gladstone Hospital Various GPs, specialists and allied health services within the social locality	
Emergency Service Providers		
Police and Fire Services in The Region	Gladstone Rural Fire Service (RFS) Biloela Police Station	Impacts to emergency service provision as a result of increased temporary workforce presence in the region could lead to negative social impacts for local residents. Firefighting services are especially important given the nature of the Project as a major electricity infrastructure project.
Key Roads and Transport Routes		
Highways, Motorways and State Roads	Dawson Highway (State Route 60) Bruce Highway (A1)	The Project generally follows the Dawson Highway between Biloela and Gladstone, intersecting at Point B (refer to Project map–Figure 1.1). The Bruce Highway is part of the larger A1 route which connects the eastern coast of Australia; the Project intersects it in Section D. Accessibility impacts may be present and are important to consider given the importance and traffic volume of these routes.
Arterial Roads	Hanson Road (State Route 58)	This second-degree road intersects the main highways of relevance to the Project, and themselves carry significant traffic. Therefore, the above impacts must also be considered for such roads.
Local and Regional Roads	Biloela Callide Road Mount Alma Road Kaluda Road Back Road Ayrarie Road Fig Tree Road Blacks Road Coal Road	These smaller roads are intersected by, or are in close proximity to, the Project. Accessibility changes will create social impacts for local landowners and residents.
Passenger Rail	Rockhampton Tilt Train Spirit of the Outback Spirit of Queensland	These rail lines carry passengers along the eastern Queensland coast, with all three lines passing through Gladstone. The Rockhampton Tilt Train terminates at Rockhampton, while the Spirit of Queensland continues north to Cairns and the Spirit of the Outback turns west to Longreach. Although it is anticipated there will not be impacts to the passenger rail network due to the Project, the lines need to be considered in relation to the movement of people within the social locality.
Freight Rail	Central Queensland Coal Network	The Central Queensland Coal Network (CQCN), operated by Aurizon, is the largest export coal rail network in Australia (Aurizon, n.d.).The CQCN connects the Callide Power Station and mines in Banana Shire with the Port of Gladstone as well as other ports in Mackay and Abbott Point.

Aspect	Item	Justification
Regional Airports	Gladstone Airport Baralaba Aerodrome Moura Aerodrome Taroom Aerodrome Thangool Aerodrome Theodore Aerodrome	Central Queensland relies moderately on-air transport for business, commerce and tourism. Potential impacts to access or operations of Gladstone Airport may have negative ramifications. Aerodromes in the Banana Shire are unlikely to be affected but should be considered in terms of way of life, accessibility and livelihoods for locals across the social locality.
Ports	Port of Gladstone	The Port of Gladstone is a key export port for Queensland and Australia, being the largest multi-commodity port in Queensland and fifth largest in the country.
Nearby Projects and Infrastructure		
Nearby Major Projects	Refer to Chapter 10	There are a number of nearby projects that have been identified in the host LGAs which have the potential to create cumulative social impacts.
Nearby Gas Pipelines	Gladstone Liquefied Natural Gas (GLNG) Transmission Pipeline Queensland Gas Pipeline (QGP) Wallumbilla Gladstone Pipeline (WGP) Australia Pacific LNG Pipeline (APLNG)	There are several high-pressure gas pipelines within the vicinity of the Project Area which must be considered to avoid cumulative impacts as well as in relation to direct safety concerns.
Physical Geography		
Prominent Natural Features	Calliope River Alma Creek Bells Creek Collards Creek Scrub Creek Zig Zag Creek Paddock Creek Harper Creek Branch Creek Larcom Creek Gravel Creek Calliope Conservation Park Calliope Range State Forest Mount Stowe State Forest Mount Larcom	Key natural features and areas (including many creeks which the Project crosses) within the social locality that are likely to be valued by both its residents and visitors to the area. Impacts to viewing points should be considered, in addition to environmental and ecological impacts.

The Social Locality for the Project is illustrated in **Figure 13.2**.

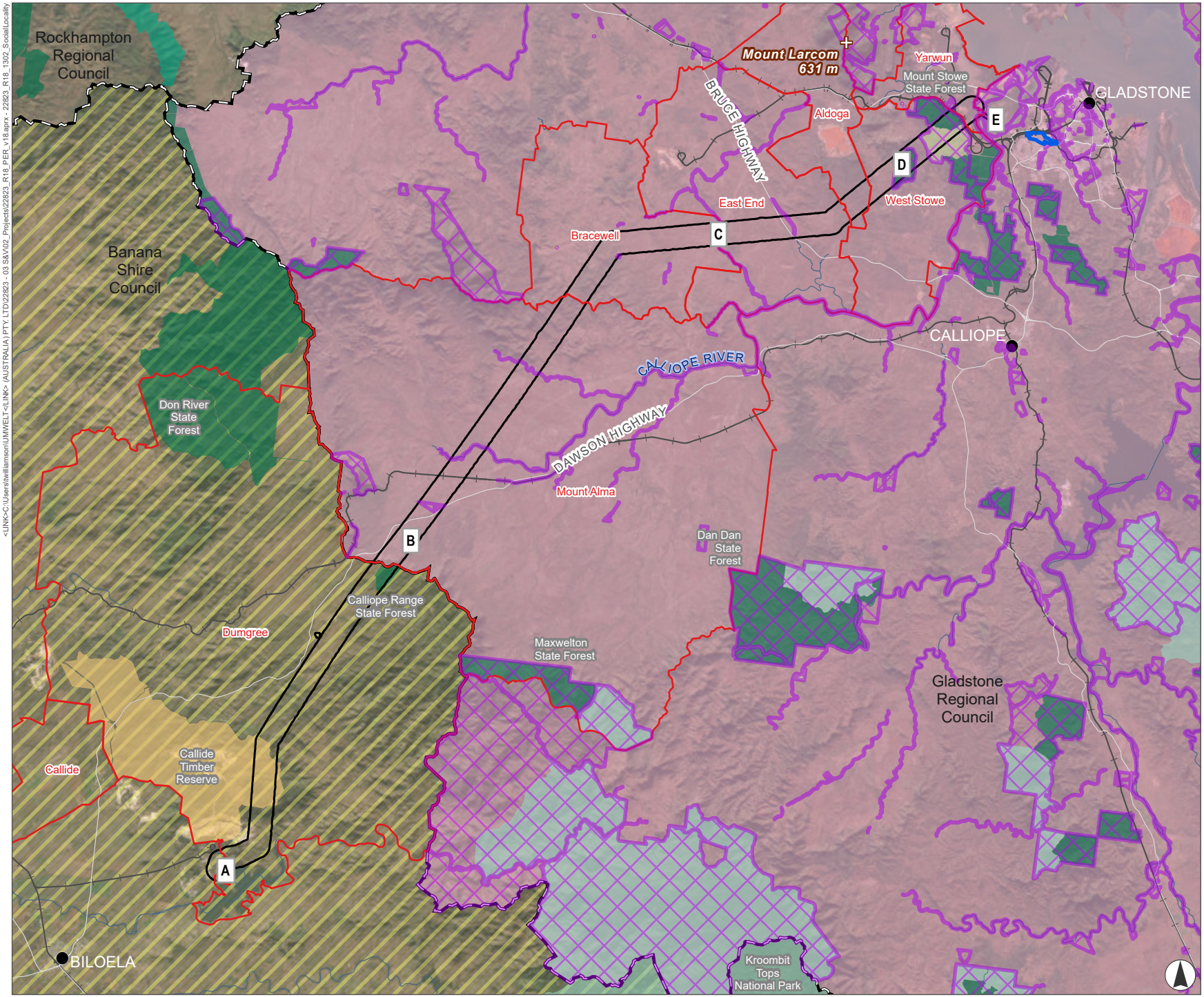


FIGURE 13.2

Social Locality

Legend

- Town
- Natural Features
- Roads
- Railway
- Watercourses
- Local Government Area (LGA)
- Project Area
- Corridor Section (label)
- Suburbs and Localities
- Airports

Native Title Determinations

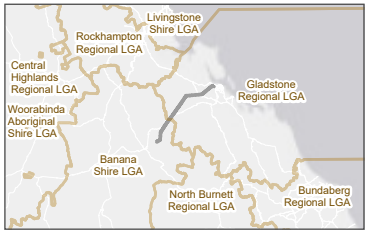
- Bailai, Gurang, Gooreng Gooreng, Taribelang Bunda People

Host LGAs

- Banana Shire
- Gladstone Regional

Protected Areas

- Conservation Park
- National Park
- Resources Reserve
- State Forest
- Timber Reserve



0 5 10

Kilometres

Scale 1:380,000 at A4
GDA 1994 MGA Zone 56

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Image Source: ESRI Basemap (2025) | **Data Source:** Queensland D of Resources (2025)

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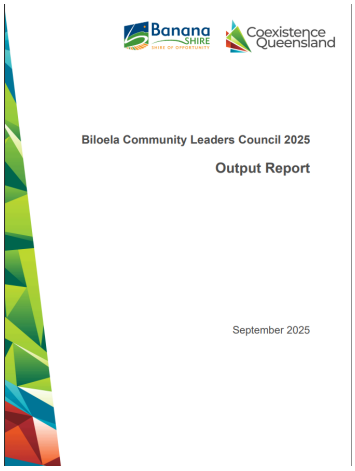
13.1.2.2 Strategic Context

The Project is located within Central Queensland, a diverse and productive region consisting of 12 LGAs stretching east-west from the coast to the outback (DSDIP, 2025). The region had a total estimated population in 2023 of just under 250,000 and is expected to increase to over 290,000 by 2046 (DSDIP, 2025). Regional population centres include the cities of Rockhampton, Gladstone and Mackay near the coast, and towns such as Emerald, Biloela, Moranbah and Longreach inland. In Gladstone, key industries of employment are centred around the Port of Gladstone, which is the largest multi-commodity port in Queensland (Gladstone Ports Corporation, n.d.). Secondary industries such as manufacturing and materials processing also have a strong presence in Gladstone. In Banana Shire LGA, the two established key industries are agriculture (especially beef cattle farming) and coal mining.

At a local and regional governance level, themes around strategic priorities emerge (including both social and economic issues) from relevant documents and plans which have been summarised in **Table 13.2**.

Table 13.2 Regional Governance Issues, Opportunities and Priorities

Document	Key Themes	Description
Banana Shire Community Plan 	• Heritage protection • Civic participation • Economic diversification • Infrastructure development	Ensuring built and natural heritage, as well as Aboriginal cultural heritage, is protected and maintained for future generations. Ensuring all residents of Banana Shire can effectively participate in and contribute to the fabric of the region. Building on economic strengths while embracing new economic opportunities and emerging industries. Improving and advocating for infrastructure, especially transport networks, in the Shire.
Gladstone Region Community Development Strategy 	• Capacity building • Placemaking • Fostering connected communities • Supporting wellbeing • Proactive and community-led planning	Gladstone Regional Council aims to support and facilitate greater capacity among individuals, businesses and community groups by building relationships and providing resources for them to prosper. Council is also to connect its services with those of the state government and other agencies where possible to minimise overlap and confusion. Creating desirable shared spaces which are accessible, safe and vibrant for communities to use and enjoy.

Document	Key Themes	Description
Gladstone Region Economic Transition Roadmap 2022-32 	• Energy sector decarbonisation • Economic diversification • Workforce development • Community benefit • Environmental protection	The Gladstone Region is a unique balance of heavy industry and protected ecosystems, including the Great Barrier Reef. The Strategic Priorities are centred around developing renewable energy in the region and the bourgeoning green hydrogen industry, as well as developing a capable and skilled workforce, while protecting the delicate natural environment. The Project directly facilitates these aims.
Biloela Community Leaders Council 2025 Output Report 	• Community benefit sharing • Liveability and wellbeing • Economic growth and diversification • Environmental protection • Industry coexistence and land use planning • Cultural heritage protection and Indigenous rights • Infrastructure and services development	Community has identified a number of needs in Banana Shire, especially a housing shortage which could be addressed by project investment. Community organisations need revitalisation, investment and retention of volunteer staff. There is tension between competing industries for valuable land, including mining, energy and agriculture. Cumulative impacts can also occur because of these competing land uses. The local workforce requires development to suit current and future needs. Community members are concerned about the rate of industry growth without adequate local infrastructure and services to keep pace. Better collaboration and involvement of local community members in the planning and outcomes of projects would be mutually beneficial.

Source: Banana Shire Council (2017), Gladstone Regional Council (2021; 2022), Coexistence Queensland (2025)

The Federal Government has committed Australia to reach net zero greenhouse gas emissions by 2050 in line with the Paris Agreement, with a legislated target of 43% reduction from 2005 levels by 2030, further establishing the Net Zero Economy Authority to oversee the communication and implementation of this goal (Australian Government, n.d.). To empower this transition, the Federal Government is facilitating a shift from fossil fuels, which currently provide the majority of energy in the Australian consumer and industrial markets, to renewable energy sources such as wind and solar.

The Project is enabling infrastructure which is needed as part of the broader transition to renewable energy needed to meet net zero emissions by 2050, and Australia's commitment to the 2015 Paris Agreement (Australian Government, n.d.). Indeed, the Project aligns with the AEMO Integrated System Plan (ISP), an all-encompassing roadmap for the National Energy Market to meet future demand while reducing emissions (Australian Energy Infrastructure Commissioner, 2021)

The Project forms a part of the Gladstone Project. The identified need for the Gladstone Project is to ensure the ongoing reliability and security of supply in the Gladstone area to (Powerlink, 2025a):

- meet the forecast electrical load in anticipation of the closure of the Gladstone Power Station;
- support the decarbonisation of major industries; and
- compensate for loss of essential system services, such as inertia, system strength and voltage control capability, following the closure of Gladstone Power Station.

As of June 2024, the Gladstone Project has been confirmed as eligible for Priority Transmission Investment (PTI) under the current *Energy (Renewable Transformation and Jobs) Act 2024* (note: a current Bill before Parliament seeks to rename this Act to the *Energy (Infrastructure Facilitation) Act 2024*).[11]. The Gladstone Project being identified as a critical investment for the Central Queensland region, further highlighting its importance and contribution to the achievement of the Queensland Government's Energy Roadmap 2025 (Energy Roadmap). The Energy Roadmap recognises that the Gladstone Project will ensure the region's energy needs are met once the Gladstone Power Station potentially closes in 2029, therefore safeguarding Queensland's energy security and reliability.

Despite only comprising approximately 0.33% of the global population, Australia is responsible for around 4.5% of global carbon dioxide emissions when factoring in fossil fuel exports, making the country one of the highest emitters of greenhouse gases per capita in the world (Grant & Hare, 2024). Of global carbon emissions, 90% come from the burning of fossil fuels. In Australia, energy generation is by far the largest contributor to greenhouse gas emissions, comprising around a third of total emissions (Grant & Hare, 2024). Therefore, the importance of prioritising an immediate shift to alternate sources of electricity cannot be overstated.

Queensland is in the process of developing Renewable Energy Hubs to deliver the uplift in supply and storage capacity by supporting cost-efficient, shared transmission connections for new energy generation. Development of hubs will take account of broader system requirements, such as resource availability, existing grid infrastructure and proximity to major load centres to ensure efficient outcomes for the whole system (Queensland Government, 2025). The State Government has identified three hubs being Southern Queensland, Central Queensland and Northern Queensland.

13.1.2.3 Community Profile

The following profile presents a high-level overview of social and economic factors contributing to the existing baseline conditions of the social locality, structured according to the Sustainable Livelihoods approach detailed in **Section 13.1.2.1**. A summary of quantitative data collected to inform the community profile is included in **Table 13.3**. Highlighted cells emphasise statistical outliers among the relevant geographies. Green shading indicates strong community capital, while orange shading indicates lower levels of community capital.

[11] Expected to be replaced by the *Energy Roadmap Amendment Bill 2025* by the end of 2025 and retain the PTI framework for the Gladstone Project (Queensland Parliament, 2025).

Table 13.3 Community Profile Data Summary

Indicator	Banana LGA	Gladstone LGA	Queensland
Human Capital			
Population	14,513	63,515	5,156,138
Indigenous population	5.1%	6.2%	4.6%
Population 15-24	11.2%	11.3%	12.4%
Population 65+	16.2%	13.9%	17.0%
Population growth 2016-2021	1.4%	3.0%	9.6%
% Bachelor degree attainment	10.0%	12.0%	21.9%
% Postgraduate degree attainment	2.1%	2.9%	6.0%
% Certificate attainment	43.0%	51.2%	14.8%
% no long term health conditions	57.7%	58.6%	58.2%
Economic Capital			
Median weekly household income	$1,766	$1,639	$1,675
SEIFA IER[2] decile	7	5	N/A
Top three industries of employment	Beef cattle farming (12.7%) Coal mining (12.2%) Meat processing (3.6%)	Aluminium smelting (5.7%) Alumina production (3.6%) Other heavy and civil engineering construction (3.2%)	Hospitals (5.0%) Supermarket and grocery stores (2.5%) Primary education (2.5&)
Top three occupations	Managers (19.5%) Technicians and trades workers (15.5%) Machinery operators and drivers (14.6%)	Technicians and trades workers (20.6%) Professionals (14.4%) Labourers (12.4%)	Professionals (21.4%) Technicians and trades workers (13.7%) Clerical and administrative workers (12.7%)
Unemployment	3.7%	6.6%	4.2%
Rental stress[3]	14.7%	26.5%	32.3%
Social Capital			
% volunteering	20.9%	16.2%	14.1%
% different address one year ago	13.2%	17.0%	24.2%
% different address five years ago	32.0%	41.8%	54.5%
SEIFA IRSAD[4] decile	6	3	N/A

Indicator	Banana LGA	Gladstone LGA	Queensland
Cultural Capital			
Language other than English spoken at home	6.0%	7.5%	15.6%
% born overseas	21.2%	20.4%	28.6%
Top three countries of birth	NZ (1.1%) England (1.0%) China (1.0%)	NZ (3.1%) England (2.3%) Philippines (1.4%)	NZ (4.0%) England (3.7%) India (1.4%)
Physical Capital			
Total private dwellings	6,123	27,264	2,195,510
Dwelling occupancy rate	81.6%	85.0%	90.6%
% homes owned outright	33.1%	27.3%	31.5%
% rented dwellings	30.0%	33.4%	32.6%
Natural Capital			
% conservation area	5.2%	12.8%	5.8%
% production native forest	11.7%	4.6%	1.7%
% grazing land	73.3%	65.5%	79.7%

[2] Socio-economic indexes for areas: Index of Economic Resources

[3] Defined as expenditure on rent greater than 30% of income

[4] Socio-economic indexes for areas: Index of Relative Socioeconomic Advantage and Disadvantage

Source: ABS (2021); SALM (2025); Queensland Government (2025)

13.1.2.4 Human Capital

The Project traverses the LGAs of Banana Shire and Gladstone Region, home to 14,513 and 63,515 people in 2021, respectively (ABS, 2021). 5.1% of Banana Shire residents and 6.2% of Gladstone Region residents identify as Aboriginal and/or Torres Strait Islander, respectively, higher than the state average of 4.6% (ABS, 2021). Banana LGA is characterised by a dispersed, rural population profile centred around agricultural and mining communities. The main population centre is Biloela in the east of the shire, home to just under 6,000 residents. Other smaller towns include Moura, Theodore and Taroom.

Gladstone Region LGA has a population concentrated around the regional city of the same name, with almost 35,000 residents of the LGA living in the City of Gladstone itself. Other towns of note in the Gladstone Region include Calliope (population 5,263) and Agnes Water (population 2,729) (ABS, 2021). The populations of both LGAs are growing, although Banana Shire's growth between 2016 and 2021 was modest compared to Gladstone Region (1.4% vs 3.0% respectively) (ABS, 2021). Gladstone Region LGA is anticipated to see relatively strong population growth to 2041 (although below the statewide projection), while Banana Shire LGA is expected to see a plateau and slight decline (Queensland Government, 2023).

The age profile of each LGA differs: Banana Shire is characterised by even numbers of each age cohort despite a slight population ageing characteristic of regional Australia, while Gladstone Region has significant cohorts of both children aged 5-14 and adults aged 50-64. There is a relative lack of young adults aged 20-29. Both LGAs have slightly more males than females (ABS, 2021).

Educational attainment across the social locality is similar to that of the State, with relatively good access to secondary and tertiary education opportunities via a network of high schools, and Central Queensland University, respectively. A lower proportion of residents in both Banana Shire and Gladstone Region LGAs had completed Bachelor degrees (10%, 12%), compared to the State average (22%). Also, a lower proportion in both LGAs had completed postgraduate education (2% in Banana Shire, 3% in Gladstone Region, 5% of Queenslanders). Correlatingly, a very high proportion of working-age residents in the LGAs hold certificate (III and IV) level education as highest level of educational attainment (43% in Banana Shire, 51% in Gladstone Region, 19% of Queenslanders).

More than one quarter of working age residents across both LGAs had completed Year 10 as their highest level of education, a higher proportion than the state. This educational profile is consistent with the high degree of employment in trades and agriculture, as explored in the following paragraphs.

The health profile of the social locality is also similar to that of Queensland. For Banana Shire and Gladstone Region, 57.7% and 58.6% of residents respectively reported no long-term health conditions in 2021, compared to 58.2% of Queenslanders. Asthma, arthritis and mental health conditions were the most commonly reported long-term health conditions in both LGAs, similar to the State (PHIDU, 2022).

13.1.2.5 Economic Capital

In Banana Shire LGA, 2021, the two predominant industries of employment are beef cattle farming (employing 12.7% of the working-age population) and coal mining (employing 12.2%) (ABS, 2021). The associated industries of meat processing (3.6%) and fossil fuel electricity generation (2.9%) follow, the latter likely relating to the coal-fired Callide Power Station. Local government administration employed 3.5% of the working-age population. Top occupations of employment include managers (19.5%), technicians and trades workers (15.5%) and machinery operators and drivers (14.6%). The Shire hosts almost 10,000 local jobs (.id, 2024).

The Banana Shire LGA is currently quite economically reliant on its two prime industries of coal mining and beef production, with livestock accounting for more than three quarters of the LGA's agricultural output in terms of value (.id, 2024). The agricultural sector contributes $955 million to the LGA's total economic output (10.1% of total output) annually (.id, 2024).The remaining quarter of agricultural output in Banana Shire is mostly broadacre and cereal crops. However, there are a number of niche industries which are emerging in the shire such as specialist crop agriculture (such as herbs and spices) and horticulture, food processing and ammonium nitrate production (Banana Shire Council, n.d.).

The mining industry is responsible for 65% of the LGA's total economic output, though due to reliance on coal mining, which is gradually phasing out, it is on the decline (.id, 2024). Additionally, the Banana Shire LGA has a strong per-capita presence of small and locally based businesses, with 2,535 locally registered businesses in Banana Shire LGA and 3,354 in Gladstone Region LGA (.id, 2024). A summary of locally registered businesses in Banana Shire LGA by industry is provided in **Table 13.4**. Current publicly accessible data for Gladstone Region LGA is not available (.id, 2025).

Table 13.4 Locally Registered Businesses in Banana Shire LGA by Top Five Industries

Banana LGA		
Industry	**Number of Businesses**	**% of total**
Agriculture, Forestry and Fishing	1,567	61.8
Construction	184	7.3
Rental, Hiring and Real Estate Services	148	5.8
Other Services	115	4.5
Retail Trade	79	3.1
All other industries	*445*	*17.6*
Total	**2,535**	**100%**

Source: .id (2024)

For Gladstone Region LGA, the industry mix is diverse, though it is centred around industrial processing and materials manufacturing, particularly aluminium. The manufacturing sector in Gladstone supports an estimated 4,200 jobs (REMPLAN, 2025). The top industry of employment is aluminium smelting (5.7%), followed by alumina production (3.6%) and other heavy and civil engineering construction (3.2%) (ABS, 2021). A significant proportion of the population are employed as technicians and trades workers (20.6%), with professionals (14.4%) and labourers (12.4%) comprising a further bulk of the workforce. Gladstone Region LGA has a relatively high degree of economic diversity compared to Banana Shire LGA due to its mixed industrial sector and port operations, making it well poised to adapt to future economic trends (Australian Government, 2023).

In terms of income and wealth, the social locality is similar to the wider State (ABS, 2021), with Gladstone Region having a median weekly household income of $1,639 in 2021 compared to $1,675 for Queensland. Banana Shire LGA is relatively wealthy overall considering the high-value industries of mining and agribusiness, with a median household income of $1,766 (ABS, 2021). However, there are pockets of economic disadvantage within the LGAs of interest, with individual suburbs and localities (SALs) showing low levels of access to economic resources as illustrated by the ABS Socio-economic Indexes for Areas (SEIFA), in **Table 13.5**.

Table 13.5 Index of Economic Resources

Locality	Index of Economic Resources (IER)
Dumgree	8
Mount Alma	6
Bracewell	7
East End	7
West Stowe	8
Yarwun	3
Biloela	3
Gladstone Central	1
Calliope (Qld)	5
Banana LGA	7
Gladstone LGA	5

Source: ABS (2021)

13.1.2.6 Social Capital

The social capital of a community can be measured by several indicators which illustrate social cohesion, vulnerable groups and adaptability/resilience to change. A community which has a high prevalence of residents who undertake unpaid voluntary work may indicate stronger social cohesion and a more tight-knit community.

Banana Shire LGA has a high rate of volunteerism with around 21% of residents having undertaken voluntary work for an organisation in the 12-month period to 2021, compared to 14% of Queenslanders (ABS, 2021). Gladstone Region LGA has a lower rate of volunteerism (16%), though it is still higher than the State average. There are several events and expos in the region, such as the Calliope River Historical Village Markets, a monthly gathering of food, produce, handcrafts and other goods set among 20 historic museums (Calliope River Historical Village, 2025).

Banana Shire LGA has a proportionally high number of active community groups and associations for its relatively low population, with the council providing a list of 390 total active groups in the LGA (Banana Shire Council, 2023), indicating a strong and lively community. This assumption is supported by the low level of household mobility in Banana Shire LGA. Household mobility means the proportion of households who have moved to the area within a given time frame (1 year or 5 years), compared to those who have not moved. A high degree of household mobility indicates a transient population, common among major cities and rural FIFO areas, while low household mobility is generally a more settled, established community. For Banana Shire LGA, 13% of residents were living at a different address one year ago, and 32% five years ago (ABS, 2021).

For Gladstone Region LGA those statistics are 17% and 42%, respectively, closer aligned with those of Queensland. Gladstone, being a regional service centre and employment hub, is more likely to have higher mobility and potentially lower levels of social cohesion. Gladstone Regoin LGA also has a slightly higher crime rate [12] per capita than Banana Shire LGA (2.4% vs 1.5%), with traffic and related offences being the most common offence type in both LGAs.

As described in **Section 13.1.2.5**, there is a degree of variation among localities within the host LGAs relating to socioeconomic advantage and disadvantage. The ABS Index of Relative Socioeconomic Advantage and Disadvantage (IRSAD) maps localities based on several factors; the deciles of each locality of interest are provided in **Table 13.6**. As seen, the social locality is generally not highly advantaged in terms of income and income equality, education, employment, health and other factors comprising socioeconomic advantage. Particularly pertinent are the low scores among the populated townships of Biloela and Calliope, and Gladstone Central.

Table 13.6 Index of Relative Socioeconomic Advantage and Disadvantage

Locality	Index of Relative Socioeconomic Advantage and Disadvantage (IRSAD)
Dumgree	5
Mount Alma	3
Bracewell	4
East End	4
West Stowe	4
Yarwun	1

[12] Rate of all offences committed per capita as mapped by Queensland Police (2025)

Locality	Index of Relative Socioeconomic Advantage and Disadvantage (IRSAD)
Biloela	3
Gladstone Central	2
Calliope (Qld)	2
Banana LGA	6
Gladstone LGA	3

Source: ABS (2021)

Vulnerable groups are typically defined as groups of people at higher risk of experiencing social, economic or health-related challenges than the general population (Petrovic, 2023). Some indicators may be used to assess the presence of vulnerable and/or marginalised groups within the social locality, outlined **Table 13.7**.

Table 13.7 Vulnerability Indicators

Indicator	Banana Shire LGA	Gladstone Region LGA	Queensland
Youth population (15-24)	11.2%	11.3%	12.4%
Elderly population (65+)	16.2%	13.8%	17.0%
Indigenous population	5.1%	6.2%	4.6%
Language other than English spoken at home	6.0%	7.5%	15.6%
Unemployment	3.7%	6.6%	4.2%
Rental stress	14.7%	26.5%	32.3%
Disability (core activity need for assistance)	4.1%	5.8%	6.0%

Source: ABS (2021); SALM (2025)

13.1.2.7 Cultural Capital

The Project is proposed on the lands of the Gaangalu Nation People and the Bailai, Gurang, Gooreng Gooreng and Taribelang Bunda people (NNTT, 2025). The land and water surrounding the Project has been cared for by Traditional Owners for tens of thousands of years. There is therefore potential for the presence of tangible and intangible cultural significance within the Project's vicinity.

Banana Shire LGA has recorded items of European heritage, such as the historic Biloela Butter Factory and the Greycliffe and Kilburnie Homesteads, dating from the 1880s (Banana Shire Council, n.d.).

The social locality has a relatively low degree of cultural and linguistic diversity compared to the State and to Australia as a whole. 78.8% of Banana Shire LGA residents and 79.6% of Gladstone Region LGA residents were born in Australia, compared to 71.4% of Queenslanders and 66.9% of Australia (ABS, 2021). For Banana Shire LGA, the top three countries of birth other than Australia were New Zealand (1.1%), England (1.0%) and China (1.0%); for Gladstone Region LGA, it was New Zealand (3.1%), England (2.3%) and the Philippines (1.4%).

Relatedly, languages spoken at home other than English in Banana Shire LGA include Mandarin (0.8%), Tagalog and Filipino (0.4%, 0.3%); for Gladstone Region LGA they include Afrikaans (0.7%), Tagalog (0.6%) and Filipino (0.5%) (ABS, 2021).

13.1.2.8 Political Capital

The Project spans Banana Shire and Gladstone Region LGAs, each of which are represented by a Council composed of a number of councillors, mayor and deputy mayor. The mayor of Gladstone Region is currently Matt Burnett, while the Banana Shire mayor is Neville Ferrier.

On a State level, the Project crosses between the State electoral districts of Callide (which covers Banana Shire LGA and a large area to the south and east) and Gladstone (which takes in the northern half of Gladstone Region LGA including the city itself) (ECQ, 2025). Callide is currently represented by Bryson Head MP of the Liberal National Party (LNP). Gladstone is a historically safe Labor seat, currently being represented by Glenn Butcher MP of the Australian Labor Party (ALP).

Federally, the Project lies within the electorate of Flynn, which covers a broad region north of Bundaberg and south of Rockhampton as well as inland past the town of Emerald (AEC, 2022). The seat of Flynn has been held by the LNP since 2010 and is currently represented by Colin Boyce MP.

Indigenous political and social interests in the region are formally represented by the North Queensland Land Council Native Title Registered Body (NTRB), which spans a vast area between Central Queensland and Cape York (NQLC, n.d.; NNTT, 2025). There are more local Indigenous community organisations and representatives, especially regarding native title, who represent Indigenous governance in the social locality.

Regarding public perceptions, a media review conducted about the Project found both positive and negative sentiment toward the Project, Powerlink, and Queensland's energy future in general. Communities consulted for the Powerlink CopperString project, linking Townsville and Mount Isa with a new transmission line, had a generally supportive view of that project (Powerlink, 2025b), with some concerns about the positioning of a substation leading to its relocation. Some critical media articles have been written regarding the cost of that Project, which has substantially increased beyond its original budget (Rowling, 2024; Dobson, Loney, & Margolis, 2025).

There has been positive press regarding Powerlink's activities in strengthening the State electrical grid in preparation for the energy transition (MacNamara, 2024; ICN, 2025), although media articles specific to the Project itself are sparse. There is an active Facebook group ('Central REZ's Action Group') aimed at protesting the development of Queensland's Central Renewable Energy Zone (REZ), of which the Project is an enabling component. Further, posts on the Biloela Community Notice & Discussion Board (via Facebook) have been critical of Powerlink's Central Queensland plans based on 'landscape destruction' and visual amenity (Facebook, 2025). It is important to note that social media does not capture the full spectrum of community views on topics and issues, especially politicised subjects such as renewable energy, and so must be interpreted with a high degree of caution. Nonetheless, a social media review may assist in understanding some prominent community views, or major online actors in terms of specific projects or issues.

13.1.2.9 Physical Capital

There is a reasonable amount of housing stock available throughout the social locality, with 6,123 total private dwellings in Banana Shire LGA and 27,264 in Gladstone Region LGA (ABS, 2021). The occupancy rate of those LGAs is 82% and 85%, respectively. Banana Shire LGA has a high proportion of homes that are owned outright (33%) compared to Gladstone Region LGA (27%), and a correlating lower proportion of renters (30% versus 33%, respectively). Housing stock is concentrated in the higher density city of Gladstone, and the towns of Biloela and Callide within the social locality.

As of October 2025, the median house price in Banana Shire LGA is $295,000, below the State median of $780,000. Despite short term devaluation in Q2 2025 (-0.89%), the median house price in Banana Shire has increased by more than 8% in the past year. While affordability remains strong in Banana Shire, established residents may have concerns about recent short-term property devaluation. In Gladstone Region, the median house price is $540,000–also below the State median, though not to the same degree as Banana Shire. Gladstone Region has seen high price growth, having increased 6% in Q2 2025 and 23% over the past year (Real Estate Investar, 2025)

There is a relative scarcity of short-term accommodation within Banana Shire LGA particularly, with the shire having six listed hotels including the council-owned Banana Hotel Motel and Banana Accommodation Village. Gladstone Region LGA has a wider range of short-term accommodation options.

Health services in the social locality are well appointed in terms of physical infrastructure, with six hospitals/health campuses in Banana Shire LGA and two in Gladstone Region LGA (CQ Health, 2025). GP services are co-located with other medical services in the Banana Shire's health precincts, while Gladstone has approximately seven GP clinics (Google, 2025). However, the rate of GPs per 100,000 residents is considerably lower than the State (109.2) and national (102.3) average in both Gladstone Region LGA (61.3) and Banana Shire (53.6), suggesting an already strained health workforce. The main referral hospital for Central Queensland is Rockhampton Hospital, which hosts a 24-hour emergency department, dental, maternity and mental health specialists. Gladstone Hospital is also equipped with a 24-hour emergency department and caters to the Banana region (Queensland Health, 2025).

The Project is well connected by road with Central Queensland, given that the proposed transmission corridor approximately follows the Dawson Highway (which runs east-west between Gladstone and Springsure), also crossing the Bruce Highway (which runs north-south between Cairns and Brisbane, connecting with the broader A1 route traversing the eastern seaboard). Notably, The Bruce Highway is one of the least safe highways in Australia, with approximately 30 fatalities occurring every year and amongst the highest rates of road deaths and serious injuries in Queensland (Australian Automobile Association, 2025). The highway is currently undergoing an extensive upgrade program, including sections close to the Project and broader Capricorn Coast (Queensland Government, 2024).

Other important arterial roads in the social locality include the Monto Road (connecting Monto to Calliope) and the Leichhardt Highway (between Rockhampton and Goondiwindi via Banana).

The social locality has a relatively high rate of car dependency, with most residents typically travelling to work by car. In Gladstone Region, 75.9% of residents travelled to work by private car (either as driver or passenger) on the day of the 2021 Census, compared to 65.3% of Banana Shire residents and 65.4% for Queensland.

The Queensland rail network connects Gladstone via several lines including the Spirit of the Outback, Spirit of Queensland and Rockhampton Tilt Train. The Spirit of the Outback line travels west from Rockhampton to Longreach and Winton, north of Banana Shire although not directly connecting towns within the social locality. There is an extensive freight rail network centred around the Port of Gladstone and its export capabilities in particular; a large swath of this rail capacity comprises the privately owned Aurizon network.

The Port of Gladstone is the fifth-largest multi-commodity port in Australia (Gladstone Ports Corporation, n.d.), and the largest in Queensland, being located by a natural deep water harbour (CQROC, 2025). The port primarily exports coal and aluminium. Gladstone Ports Corporation, a government-owned body, also operates the Port of Rockhampton and Port of Bundaberg (Gladstone Ports Corporation, n.d.). Ferry services operate from the Port of Gladstone to the Great Barrier Reef offshore, including Curtis Island and Heron Island (SeaLink, 2025).

The Banana Shire hosts five aerodromes, of which one runs regular commercial flights through Link Airways (Thangool Aerodrome). Thangool and Taroom aerodrome also accommodate chartered flights and are registered with the Civil Aviation Safety Authority (CASA) (Banana Shire Council, 2025). Gladstone Region also has a regional airport (GLT) which is serviced by QantasLink and Virgin (Gladstone Airport, 2025).

13.1.2.10 Natural Capital

There is a high diversity of land uses present within the social locality and Project Area, with a mix of agriculture and mining activity inland, a mix of cropping and grazing pasture, nature conservation areas in the hinterlands and a varied pattern of urban settlements, bushland, heavy industry and logistics near the coastline (Queensland Government, 2025). Crops grown near the Project Area include wheat, sorghum and legumes, with some cotton grown to the west of the Project near the Dawson River; cattle grazing remains the dominant form of agriculture in the social locality. There are also numerous national parks and conservation areas in the vicinity of the Project, summarised in **Table 13.8**. Overall, 73.3% of the geographic area of Banana Shire LGA and 65.5% of Gladstone Region LGA is taken up by agricultural (grazing) land; 11.7% of Banana Shire and 4.6% of Gladstone Region is production (Forestry, timber production) forest, and 5.2% and 12.8% of each LGA respectively is conservation land.

Table 13.8 National Parks and Conservation Areas

Name	Type	LGA
Belmont SF	State Forest	Banana Shire
Overdeen SF	State Forest	Banana Shire
Dawson River Conservation Park	Conservation Park	Banana Shire
Roundstone SF	State Forest	Banana Shire
Callide Timber Reserve	Forestry reserve	Banana Shire
Gogango Range SF	State Forest	Banana Shire
Don River SF	State Forest	Banana Shire
Montour SF	State Forest	Banana Shire
Theodore SF	State Forest	Banana Shire
Calliope Range SF	State Forest	Banana Shire
Maxwellton SF	State Forest	Banana Shire
Palmgrove NP	National Park	Banana Shire
Kroombit Tops NP	National Park	Banana Shire
Isla Gorge NP	National Park	Banana Shire
Borania SF	State Forest	Banana Shire
Precipice NP	National Park	Banana Shire
Dan Dan NP	National Park	Gladstone Region
Wietalaba NP	National Park	Gladstone Region
Dawes NP	National Park	Gladstone Region
Calliope Conservation Park	Conservation Park	Gladstone Region
Mount Stowe SF	State Forest	Gladstone Region
Rundle Range NP	National Park	Gladstone Region

Name	Type	LGA
Castle Tower NP	National Park	Gladstone Region
Pemberton SF	State Forest	Gladstone Region
Bulburin NP	National Park	Gladstone Region

Source: Google (2025); Queensland Government (2025)

The specific land use composition of the transmission corridor's sections is detailed in **Table 13.10**.

Refer to Chapter 2 for further description of the Project and its proposed activities.

Several waterbodies of local and regional importance are located near the Project. The Dawson River is a major waterway which is vital for local ecological systems as well as economically, supporting a large agricultural region throughout Banana Shire LGA on its way to Rockhampton. Callide Creek, near Biloela, is dammed to form Lake Callide, which supplies water to the Callide Power Station at the Project's western terminus. Lake Callide is also a popular recreational destination for residents and tourists, with fishing, camping and boating being popular activities (Visit Queensland, n.d.). The Calliope River is also an important waterway anchoring the town and Port of Gladstone after flowing past the towns of Calliope and Gladstone.

The social locality lies within a humid subtropical climate zone characterised by warm to hot summers and mild winters (BoM, 2025). Temperature generally ranges from a mean maximum of 33.2 degrees Celsius and minimum of 19.8 degrees in January to a mean maximum of 21.9 degrees and minimum of 5.2 in June (BoM, 2025). Rainfall is concentrated in the summer months of December to February in a typical 'wet season' consistent with tropical and subtropical regions. Due to the area's proximity to several water bodies and latitude in Central Queensland, it is vulnerable to flooding. The town of Theodore in the south of Banana Shire LGA was inundated by floodwaters in 2010-11 following a period of unprecedented rain, resulting in the town's complete evacuation (ABC, 2020).

13.1.2.11 Challenges and Opportunities

Table 13.9 provides an overview of challenges and opportunities relevant to the social locality based on the baseline analysis (**Section 13.1.2**)

Table 13.9 Challenges and Opportunities

Challenges	Community Capital	Opportunities
• Projected long-term population decrease in Banana Shire LGA • Lower levels of university education	Human	• Strong population growth expected in Gladstone LGA • Strong presence of Indigenous communities among the social locality • Diverse network of population centres across Banana Shire LGA • High level of certificate-level education across social locality

Challenges	Community Capital	Opportunities
• Economic reliance on mining and agriculture in Banana LGA makes communities more economically vulnerable to change • Pockets of lower economic resources and lower income across social locality	**Economic**	• Higher median incomes across Banana Shire LGA than the State • High level of employment in trades and technician roles • Diversified industry mix in Gladstone Region LGA • Existing economic dependency on mining and agriculture in Banana Shire LGA presents an opportunity for economic diversification
• Somewhat higher crime rate in Gladstone Region LGA than Banana Shire LGA with vehicle offences being prominent • Parts of the social locality face high levels of socioeconomic disadvantage, affecting both rural and urban areas. Vulnerable and marginalised groups may be severely affected by Project impacts or other change	**Social**	• High rate of volunteerism and active community groups in Banana Shire LGA indicating strong community cohesion • Low levels of household mobility in Banana Shire LGA; established and settled communities
• Low levels of cultural and linguistic diversity across the social locality may create barriers to equitable employment and procurement	**Cultural**	• Important Indigenous cultural heritage across the social locality which must be protected Gaangalu Nation People and Bailai, Gurang, Gooreng Gooreng and Taribelang Bunda People live on and care for the lands on which the Project is proposed
• Renewable energy development has been a topic of contention among state and federal politicians as well as community members in Queensland • Some negative sentiment toward the Central Queensland REZ by local residents	**Political**	• Social locality well poised for the development of renewable energy infrastructure and net zero transition • Strong renewable energy targets as part of net zero goals and national climate legislation

Challenges	Community Capital	Opportunities
• Low availability of short-term accommodation options across the social locality, especially in Banana Shire LGA • Relative lack of passenger rail infrastructure servicing Banana Shie LGA and inland Queensland • The region is at high risk of cumulative impacts due to the increasing number of renewable projects being constructed in the area as outlined in Chapter 6	**Physical** 	• Reasonable availability of housing stock within the social locality • Multiple temporary workforce accommodation villages in the social locality • Excellent road linkages between the Project and Central Queensland, and the wider State • Quality port infrastructure located at Gladstone for import of materials • Various medical facilities across the social locality
• The region is at a high risk of climate change related vulnerabilities, including flooding, heatwaves, drought and fire • Several ecologically essential habitats throughout the social locality which must be preserved and protected	**Natural** 	• Wealth of national parks, conservation areas, state forests and bushland within the social locality • Several important waterbodies in the region which may be protected and enhanced
• Health and education services in the Gladstone and Banana regions may be strained by the influx of multiple concurrent construction workforces relating to major project development • Accommodation services may be in short supply due to cumulative workforce influx, affecting tourism as well as vulnerable groups	**Cumulative** 	• Economic stimulus from significant major project development in Central Queensland • Diversification of industry mix occurring in the region

13.1.3 Preliminary Social Impacts

Identified preliminary social impacts are listed in **Table 13.10** and described in the following sections.

Table 13.10 Summary of Identified Preliminary Social and Economic Impacts

Impact
Reduced visual amenity due to Project infrastructure
Impacts to social amenity relating to dust, noise and vibration associated with Project construction activities
Increased travel times and disruption along local and regional roads due to construction activities
Potential for decreased road safety associated with construction activities

Impact
Economic boost associated with local expenditure of construction workforce
Local employment and procurement opportunities
Improved energy reliability
Training and skills development
Intergenerational equity associated with infrastructure development that supports renewable energy development and reduces reliance on fossil fuels
Increased conflict and reduced cohesion due to differing sentiment towards renewable energy development and inequitable distribution of benefits
Livelihood impacts to agricultural operations due to land use change and/or Project activities
Livelihood impacts due to potential devaluation of or inability to sell proximal properties
Potential land acquisition (of easement) affecting community way of life
Degradation of environmental and cultural values of importance to the community
Physical and mental health (stress, anxiety) impacts due to increased dust / noise / EMF exposure and uncertainty surrounding Project activities
Reduced access to health and emergency services due to workforce demand
Reduced access to housing and accommodation due to workforce demand
Cumulative social impacts

13.1.3.1 Reduced Visual Amenity Due to Project Infrastructure

Although the 87 km of main transmission lines associated with the Project are proposed to be co-located alongside existing 275 kV transmission lines, the construction of new transmission towers will cause a change to the visual amenity of the landscape. **Figure 13.3** is an extract from the Central Queensland Transmission Update in February 2025 showing existing transmission lines in Central Queensland. Preliminary consultation outcomes collated by Powerlink highlight reduced visual amenity as a key concern amongst Project stakeholders, recognising that while there is existing visual disturbance this may be exacerbated by additional infrastructure and due to the taller height of the proposed transmission towers.

There are many scenic points of interest within the social locality and surrounds, such as Mount Larcom to the north-west of the Calliope River substation. A vista from the summit of Mount Larcom looking southeast to the Project Area has been included (**Figure 13.4**). Other areas of significant bushland are important sources of visual amenity and as such, disturbance to this amenity is an important impact to consider.



Figure 13.3 Existing Central Queensland Transmission Lines

Source: Powerlink 2025



Figure 13.4 View from Mount Larcom Looking South-east to Project

Source: Google Earth (2025)

Environmental groups and people who recreationally visit natural bushland and landform features in the region, such as Mount Larcom, are likely to value the preservation of visual amenity of the area.

13.1.3.2 Impacts to Social Amenity Relating to Dust, Noise and Vibration Associated with Project Construction Activities

Disruptions to social amenity can describe impacts which alter or diminish how people experience and enjoy their surroundings. There are many factors that can contribute to the amenity of a place, including shade, access to recreational facilities, green space, air quality, sound scapes and visual attractiveness. Furthermore, changes to the ways in which people experience their surroundings can impact their enjoyment of and relationship with place.

Project construction activities are anticipated to generate dust, primarily from the movement of vehicles along unsealed access tracks, as well as noise impacts and potential vibrations resulting from movement of oversize and overmass (OSOM) vehicles. The Project intersects with 67 lots under the ownership of 26 landholders, with residents likely to experience the potential for amenity disruptions while construction activities are in close proximity. Landholders adjacent to the Project are similarly anticipated to experience reduced social amenity due to dust, noise and vibrations while construction is occurring near their property. It should be noted that the Project is linear, and thus landowners will not be exposed to construction-related amenity impacts for the full duration of construction activities.

Furthermore, where the Project intersects with conservation areas, visitors to these sites may experience diminished social amenity where they are proximate to construction activities, particularly given the disturbance of normally natural or peaceful areas. As described in **Section 13.1.3.1**, community and environmental groups active in the region may have particular interest in the social amenity of these areas. Additionally, any negative impacts to the social amenity may negatively affect tourism in the Capricornia region, thus leading to flow-on impacts for business and industry in the region.

13.1.3.3 Increased Travel Times and Disruption Along Local and Regional Roads Due to Construction Activities

Construction activities may result in increased traffic along key roads such as the Dawson and Bruce highways, regional roads such as Hanson Road and the Gladstone Monto Road, and a variety of local roads including property access roads as a flow-on effect. As shown in **Section 13.1.2.9**, Gladstone Region LGA reported a high proportion of residents who travelled to work by car, either as driver or passenger, at 75.9% compared with 65.3% for Banana Shire and 65.4% for Queensland. Both Dawson and Bruce highways are key access corridors for the Capricorn and broader Central Queensland regions, with the 1,600 km Bruce Highway alone carrying more than 100,000 vehicles every day (NRMA, 2024) and serving 62% of Queensland's population (Queensland Government, 2024). This suggests that the proportion of both social locality and broader regional residents may experience increased travel times and disruptions along local and regional roads during daily commutes but only for a short period as the construction of the Project progresses along the alignment.

While increased travel times are likely to be a temporary impact of the Project, there are clear links between experiences of increased traffic congestion and negative wellbeing outcomes (Jiakun, Dick, & Marco, 2022). These outcomes may be exacerbated by multiple Projects with concurrent construction schedules across the social locality (**Chapter 10**). Impacts to travel times and traffic congestion along these key routes may also have significant flow-on effects to livelihoods, access to services, and driver safety. Stakeholders that are most likely to be affected by disruptions to travel time and road access include host and proximal landholders, townships/broader communities, local governments, State Government authorities (such as Queensland Parks and Wildlife Service), and service providers (such as firefighters).

13.1.3.4 Potential for Decreased Road Safety Associated with Construction Activities

Increased heavy vehicle traffic movements and associated potential road deterioration due to the Project on key local and regional roads as well as on the Dawson and Bruce highways may result in a reduction in public safety for drivers and/or pedestrians. This impact relates both to the transfer of construction materials and the movement of the construction workforce leading to increased daily small vehicle traffic particularly on local roads. Indicative construction plans note that night works may be undertaken in certain locations; activities which may be considered during nighttime hours include stringing (raising transmission cables between towers) over key sections of highway and rail corridor. These key locations include:

- Dawson Highway between Dumgree and Mount Alma
- Bruce Highway between the Calliope River and town of Mount Larcom
- Moura System rail corridor near Calliope River substation (Rockhampton Tilt Train, Spirit of the Outback and Spirit of Queensland passenger lines; Central Queensland Coal Network Blackwater System freight line).

Additionally, the Project intersects with the following local roads at existing easement crossings:

- Biloela-Callide Road (state-controlled road)
- Coal Road
- Blacks Road
- Thompsons Road
- Ian McCauley Way
- Pelican Point Road
- Kaluda Road
- Calliope River Road
- Boyles Road
- Malahoff Road
- Mt Miller Road
- Reid Road.

The Esplanade construction activities on segments of the Project that cross or run close to these transport routes may serve as a distraction and diminish road safety. Impacts to road safety are likely to affect local communities who live and work in the region most significantly, although visitors and other stakeholders are also affected.

As described in **Section 13.1.2.9**, the Bruce Highway is one of the least safe highways in Australia and is currently undergoing upgrades to improve road user safety. The Highway already carries approximately 20 million tonnes of freight per year, with an increase in renewable energy infrastructure projects reliant on the route for construction haulage likely to only add to the rate of OSOM vehicles (Queensland Government, 2024).

13.1.3.5 Economic Boost Associated with Local Expenditure of Construction Workforce

The Project is anticipated to require a construction workforce of up to 160 workers over the total two-year construction timeframe, of which a proportion are likely to be sourced and accommodated locally. Urban centres which are most likely to host construction workforces, as identified in **Section 13.1.2.9** (Physical capital) include the city of Gladstone and the towns of Biloela and Calliope. This is due to both their population sizes, service provision levels, and proximity to the Project. Secondary settlements that may host construction workforces include the city of Rockhampton, other smaller towns in Banana Shire including Banana, Moura and Theodore, satellite settlements of Gladstone such as Tannum Sands, and the town of Agnes Water.

An incoming construction workforce is likely to result in some strain on social cohesion (**Section 13.1.3.10**) and also existing service delivery (**Section 13.1.3.17** and **Section 13.1.3.18**). However, construction workers hosted locally within communities proximal to the Project may also bring new spend to the region through worker expenditure on goods and services (e.g. groceries, hospitality and restaurants, health, education, retail). This benefit can be further enhanced through Local Buy/Spend incentives.

Given the strong presence of local businesses in Banana LGA particularly with 2,535 locally registered businesses in the LGA, there is an opportunity for the Project and its associated workforces to engage with the local economy. Other than Agriculture, the sector with the largest share of locally registered businesses in Banana LGA is Construction, followed by Rental, Hiring and Real Estate Services, then Other Services, and Retail Trade (**Table 13.4**). Businesses within some of these industries may be of relevance to the Project's construction and associated workforce, with local goods and service providers standing to benefit.

In addition to the tangible economic benefit, there is potential for a less tangible but equally impactful social benefit that stems from the economic revitalisation of local businesses and business districts in rural and regional towns as a result of local expenditure, particularly from construction workforces (Knox & Mayer, 2013). The flow-on effect of an attractive and economically vibrant town can bring opportunities such as tourism, furthering long-term economic benefits (**Section 13.2**).

Lastly, **Section 13.1.2.5** notes the existing economic reliance on Beef Cattle farming and mining within the Banana Shire LGA. While industry specialisation can support continued economic growth within some regional contexts, the Regional Australia Institute (2020) suggests that mining dependent regions benefit from growth strategies that prioritise industry diversification. As such, increased regional investment from energy generation development facilitated by the Project has potential to contribute to the strengthening and diversification of the Central Queensland economy (a strategic priority identified by both Banana Shire Council (2017) and Gladstone Regional Council (2022)) .

13.1.3.6 Local Employment and Procurement Opportunities

The Project is expected to generate up to160 FTE roles during peak construction across a 24-month period. Should Project construction and operational recruitment prioritise local and regional communities where possible, demand for DIDO and/or FIFO workers would be reduced, which in turn may minimise impacts to social cohesion while creating local livelihoods benefits (Cameron, Lewis, & Pfeiffer, 2014). However, it is noted that due to the highly specialised nature of roles required to service the Project, local hiring opportunities may be limited.

The high rates of residents employed in technical trades (**Section 13.1.2.5**) across both Gladstone and Banana Shire LGAs, as well as the high rate of unemployment within Gladstone (6.6%) compared with the State average (4.2%) suggest there is potential for temporary local employment opportunities particularly within the Clearing and Access scope of works . Furthermore, **Section 13.1.2.4** shows a high representation of First Nations residents across the social locality when compared with state and national averages. There is thus an opportunity to enhance benefits and address existing vulnerabilities and systemic disadvantage through targeted hiring practices which prioritise First Nations employment during both construction and operational phases.

Procurement of local suppliers and contractors, where appropriate, is another potential opportunity for the Project to maximise benefits in the immediate region. Should these opportunities be considered, they must be assessed through early engagement with suppliers and other stakeholders in order to be fully realised. Forward planning and early engagement are vital to ensure that local businesses and contractors have adequate capacity and resources to service the Project.

13.1.3.7 Improved Energy Reliability

The upgrade of Callide and Calliope River substations, along with the construction and operation of a new 275 kV transmission line, is consistent with the Central Queensland Regional Plan (Queensland Government, 2013) and its goal of "reliable energy which supports growth in an economically and ecologically sustainable manner" (in Powerlink (2024, p. 48)). The Project arises from an identified need to strengthen the electricity network capacity of the Gladstone region, especially the corridor between the Callide and Calliope River substations, to meet current and future energy needs. The Project is also one component of the long-term Gladstone Project, which aims to enable the planning of Central REZs and proliferation of renewable energy development more generally (Powerlink, 2025c). Energy security and reliability is a foundational component of social wellbeing, affecting multiple aspects of people's lives.

13.1.3.8 Training and Skills Development

As identified in **Section 13.1.2.1**, there are three relevant education and training providers within the social locality that may be engaged to discuss potential training and skill development opportunities associated with the Project. Central Queensland University's (CQU) Gladstone campus has significant links with industry in the region, with the University specialising in industrial fields such as engineering and electrotechnology, as well as environmental management (CQU, 2025).

Powerlink's Gladstone Hub, established in 2023, also supports the region by providing technical training, employee development and apprenticeship pathways. Together with Powerlink's Central Region operational sites, the hub provides Powerlink staff and apprentices with the infrastructure and resource skills needed to maintain operational readiness, build technical capability, sustain competency on specialised plant and equipment, and enhance regional emergency response capacity.

Targeted maintenance programs and ongoing upskilling initiatives further reinforce local capability, aligning Gladstone's workforce development approach with that of employees in North and Southeast Queensland.

The Gladstone Hub offers two types of four-year apprenticeship programs designed to equip apprentices with the skills needed for careers in the energy and communications sectors. This includes:

- Electrotechnology Apprenticeship (Qualification: UEE30820 Certificate III in Electrotechnology Electrician); and
- Communications & Control Apprenticeship (Qualification: UEE30920 Certificate III in Electronics and Communications).

These programs combine hands-on experience with formal education, helping build a skilled workforce ready to support Queensland's energy future.

In addition to completing a Certificate III as part of their apprenticeship, trade/ field-based employees have the opportunity to complete:

- Certificate IV in ESI–Substations;
- Advanced Diploma of ESI–Power Systems–Protection (Testing); and
- Certificate IV in ESI–Network Systems–Transmission Live Line.

Engagement with the identified education and training providers early in the Project may create opportunities for local workforces and young people by providing pathways into future-fit skilled employment in Queensland's energy industry. Broader benefits could also be enhanced through investment in regional capacity building outside of industry relevant fields. For example, **Section 13.1.2.9** notes the current constraints on health service provision due to an under resourced health workforce, further explored in **Section 13.1.3.17**.

As part of ongoing engagements, Powerlink is also exploring targeted opportunities for traditional owners.

13.1.3.9 Intergenerational Equity Associated with Infrastructure Development that Supports Renewable Energy Development and Reduces Reliance on Fossil Fuels

As described in **Section 13.1.2.2**, the Queensland Government has identified three Regional Energy Hubs one of which is relevant to the Project. The Project will strengthen the existing transmission network to allow for significant increases in electricity generation capacity in Central Queensland; thus is a key piece of enabling infrastructure within the Central Queensland Hub. An increased generation capacity will significantly assist the state in reducing reliance on fossil fuels, in turn reducing contributions to climate change associated with greenhouse gas emissions.

Intergenerational equity describes the obligations of current generations to enact policies or actions that support the preservation of natural resources and the environment for future generations (Venn, 2019). Within this context, the Project will contribute to a broader program of sustainability and reduce the reliance on carbon-emitting energy sources through the generation of renewable energy. Therefore, the Project and its flow-on effects have potential to create long-lasting social benefit for future generations while limiting negative impacts stemming from climate change.

Benefits relating to intergenerational equity can be difficult to determine, as the extent of how the impact will be experienced and the vulnerability of impacted stakeholders is not known. However, the precautionary principle dictates that where there are threats or potential of threats to social impacts, a lack of certainty regarding the severity or likelihood of said impact should not be used as a reason to minimise an assessment of significance. As such, the opportunity for this impact to enact positive change should be recognised in present assessments as of great importance for a potentially highly vulnerable population.

13.1.3.10 Increased Conflict and Reduced Community Cohesion Due to Differing Sentiment Toward Renewable Energy Development and Inequitable Distribution of Benefits

The Project's CSR describes outcomes of community consultation including broader social concern regarding renewable energy development within the region (Powerlink, 2024)–this is further discussed in Chapter 11. In particular, stakeholders consulted by Powerlink describe concerns for the differing community sentiment regarding renewable energy, indicating the potential for community conflict or reduced cohesion surrounding the Project if it is seen as facilitating further development. This fracturing has been observed in Renewable Energy development (Verley, 2025), although this conflict often stems from circumstances in which landholders elect to host Project infrastructure.

By contrast, transmission line Projects have been associated with broader social unrest more so due to perceptions of an inability to influence Project decision making (Mercer, 2023). **Section 13.1.2.6** shows the strength of the existing social and community landscape within the social locality, with high rates of volunteering and low household mobility. This suggests that communities may be more resilient to potential conflict generated by the Project, although it also indicates that the loss of social cohesion may be felt more significantly in areas with strong existing networks.

Additionally, the provision of monetary compensation for relevant landholders may cause conflict amongst the local community should it be perceived that the benefits and impacts of the Project are not being equally experienced. For example, host landholders are more likely to receive benefits for the direct impacts of the Project. However, there are likely to be nearby residents within the locality who will experience impacts relating to changing community composition, increased traffic, landscape change and cumulative impacts resulting from multiple Projects within the broader locality but who are less likely receive direct benefits from this Project.

Powerlink operates a Community Grants initiative to deliver small-scale grants to local projects and activities which support 'resilience, safety, wellbeing, and economic outcomes' (Powerlink, 2024), although the distribution and selection of grants also has the potential to divide community members. Despite net economic benefit to the social locality, the uneven (real or perceived) distribution of benefits may generate some frustration amongst residents with ramifications for the overall cohesion of the community.

13.1.3.11 Livelihood Impacts to Agricultural Operations Due to Land Use Change and/or Project Activities

As noted in **Section 13.1.2.2** to **Section 13.1.2.5**, the Banana Shire LGA has a strong reliance on agriculture for economic production, with the beef cattle industry alone employing 12.7% of the population and generating almost $1 billion annually (.id, 2024). As identified in the Final Corridor Selection Report (Powerlink, 2024), agricultural operations are the second-most prominent land use along the transmission corridor other than conservation areas. There may be temporary (e.g. changes to land and road access during construction) and/or permanent (i.e. land acquisition) livelihood impacts to agricultural operations in the Project corridor. The reasons for these impacts may include:

- Interference with agricultural operations during Project construction.
- Limitations to agricultural aerial operations near Project easement during construction and operation.
- Impacts to soil and water during Project construction affecting agricultural output volume or quality.

- Potential for biosecurity risks during Project construction and operation resulting from movement of workers and vehicles through and around transmission corridor.
- Potential reduction in productive agricultural land due to land acquisition in Project sections which require easement widening.

These impacts are likely to affect Sections B and C of the transmission corridor most heavily as they are primarily agricultural, with some other sections of the corridor also hosting grazing and cropping land. The easement along Section C will be widened by 40m, affecting 14 land parcels used for grazing. See Chapter 2 for further description of Project activities and Chapter 11 for a summary of landholder consultation undertaken by Powerlink to date.

As discussed in Chapter 11, biosecurity risks were raised as a key concern during consultation with Powerlink regarding corridor selection (Powerlink, 2024). Similar concerns were identified by the Queensland Farmers' Federation with regard to the installation of wind farm infrastructure on agricultural properties, including the potential for contaminants to enter private property during the construction phase of the Project, as well as disruptions to aerial spraying and potential increased bushfire risks (Queensland Farmers' Federation , 2023).

13.1.3.12 Livelihood Impacts Due To Potential Devaluation of or Inability to Sell Proximal Properties

Previous consultation experience on similar projects has identified community anxiety relating to land devaluation near major energy infrastructure. As noted in **Section 13.1.2.9**, house prices in Banana Shire LGA have seen a small short-term downturn in mid-2025, despite long-term growth. Gladstone Region LGA regardless continues to see high price growth. In turn, landholders (especially those based in inland sections of the Project where property price growth is modest) may have concerns about retirement plans and future generations based on the economic value of their land and/or property.

Chapter 11 details that appropriate compensation for impacts on property values and / or future saleability was raised during stakeholder consultation regarding Powerlink's corridor selection (Powerlink, 2024).

A 2021 review by the Australian Energy Infrastructure Commissioner noted anecdotal community concerns about property value impacts near new transmission projects. This report also noted that while there is insufficient Australian research conducted to date on the effects of transmission infrastructure, or renewable energy more broadly, on property/house prices, there is some international research on the subject (Australian Energy Infrastructure Commissioner, 2021).

In the United States, Hoen et al. (2011) found that neither proximity nor visual impact of wind turbine infrastructure had any statistically significant effect on residential property sales prices. Dröes and Koster (2021) found in their longitudinal study of Dutch house prices that large wind turbines may have a negative correlation with nearby residential property prices, with a 2 km buffer radius being associated with a 5% property value decrease. Lu et al. (2023) found in an American study of transmission lines that the effect of a transmission line on nearby property prices was different based on the land use–while residential proximity to transmission lines was associated with a slight price decrease, farmland located on or near transmission infrastructure saw increases in property price, on average. Ultimately, evidence is inconclusive on the effects of new transmission infrastructure on the price or ease of sale of properties in project vicinity; however, international literature may somewhat vindicate concerns about negative correlations.

13.1.3.13 Potential Land Acquisition Affecting Community Way of Life

In recent times, there have been emotive and politicised debates among small towns in particular around the hosting of renewable energy infrastructure on private land, causing significant division among community members (Foley, 2025). There may be divisions between residents within the social locality both due to views on the Project and its proximity to residential, conservation and agricultural land, and also due to acquisition of land parcels and compensation arrangements for operators along the Project. Fourteen parcels of land will be affected by potential acquisitions associated with easement widening along Section C of the Project. All land within the proposed widened easement is agricultural in nature, used entirely for grazing and will generally be able to continue upon completion of the construction phase.

The Project corridor does not directly infringe on residential buildings, but there may still be residents who choose to move as a result of the Project, with a wider flow-on effect on community composition and way of life. Small towns, especially agricultural communities, are frequently close-knit, with a large degree of neighbourhood involvement and trust (Besser, 2009; Hughes, Bellamy, & Black, 1999). Changes to community sentiment, as well as to the composition of a town due to influx or outflux, have large ramifications.

13.1.3.14 Degradation of Environmental and Cultural Values of Importance to the Community

As discussed in Chapter 6, there are several potential impacts (temporary and permanent) to the natural environment that result from the Project. Aside from ecological effects, impacts to the natural environment may also negatively affect significant values to local communities, who enjoy the benefits of living, working and recreating in the Project vicinity. Some of the environmental impacts that have been scoped relating to the Project (non-exhaustive) include:

- vegetation clearing
- topsoil stripping
- stockpiling of materials for Project construction
- earthworks including excavation, cutting and embankment construction
- temporary fauna exclusion fencing around laydown and other construction areas
- vehicle movements (during construction and operation), and associated impacts
- operational collision and electrocution risk for birds and bats
- decommissioning activities including removal of transmission infrastructure and dismantling of components.

These impacts may affect values of importance to people and communities within the social locality and broader surrounds.

In addition, the Project corridor was selected in part due to its proximity to existing infrastructure and cleared land, minimising disruption to environmental values as far as possible. However, it is important to acknowledge that any development in Australia, if not sufficiently considered, can threaten to exacerbate the continued loss of Aboriginal culture. As such, Traditional Owner groups must be effectively and meaningfully engaged to understand culturally significant environmental values, and in turn avoid disruption to such values.

13.1.3.15 Physical Health Impacts Associated with Project Construction and Operations Activities

Physical health impacts associated with Project construction activities are primarily centred around the generation of dust and noise. Given the length of the Project, and the proximity to both host landholder and neighbouring landholder properties, it is possible that some residents may be exposed to noise and / or dust impacts during the Project's construction phase. Increased dust can result in breathing difficulties and coughing particularly for those with existing health conditions such as asthma or other pulmonary and respiratory difficulties, with asthma amongst the most commonly reported health conditions across the social locality although notably in line with State averages (PHIDU, 2022).

Prolonged construction related noise exposure can cause frustration/annoyance and potentially disturb sleeping patterns particularly for residents with unusual or irregular sleeping patterns. Even short-term sleep disturbance has been linked with negative health outcomes such as stress, joint and muscle pain, emotional distress, decreased cognitive and memory functions and overall diminished quality of life (Medic, Wille, & Hemels, 2017). These impacts are felt more acutely in adolescents, who may also experience diminished psychosocial health and school performance and may be more likely to participate in risk-taking behaviours.

Project construction is anticipated to proceed in an intermittent fashion for varying durations due to the nature of the scope of works. Therefore, social impacts relating to construction will be limited to specific timeframes across the construction period, at variable intensities. Although the Project corridor is not considered to be in close proximity to residences, residents with existing vulnerabilities and those who may be limited in mobility, such as the elderly, shift workers and those with young children, may experience construction-related health impacts more than others. First Nations people traditionally experience poorer health outcomes on average than non-Indigenous Australians due to a range of reasons (AIHW, 2024). As such, they are considered a vulnerable group and must also be considered in terms of health impacts. Powerlink's Environmental Management Plan (EMP) identifies measures to manage construction impacts.

13.1.3.16 Mental Health Impacts Associated with Uncertainty Surrounding Project Activities

Section 13.1.2.4 further identifies mental health conditions as amongst the most highly reported health conditions across the social locality (PHIDU, 2022). Changes to community relationships, breakdown of social networks and loss of sense of place have all been correlated with deteriorating mental health and wellbeing (Park, Thomas, Peppard, & Malecki, 2023; Friesinger, Haugland, & Vederhaus, 2022). It is also important to acknowledge that mental health outcomes can be worse for residents in rural and regional areas, and most significantly worse for farmers with agricultural properties making up the majority of impacted residences. Additionally, in many regional and rural communities, access to mental health services is relatively poor and fragmented (Perkins, 2020). Recent external and compounding factors such as extreme weather events and the COVID-19 pandemic, in addition to regional transformation through perceived industrialisation, can contribute to growing uncertainty, instability and loss of connection to place and community.

13.1.3.17 Reduced Access to Health and Emergency Services Due to Workforce Demand

While the social locality is reasonably well serviced by physical health infrastructure, with several medical practitioners and hospital facilities dispersed among the coast and inland, an influx of 160 construction workers for a period of 24 months will likely create a level of strain on existing health and emergency services. This is exacerbated by an already limited health workforce (highlighted in **Section 13.1.2.9**), with a lower proportion of GPs and registered nurses per person than state and national averages. This suggests that the current health workforce may already be under resourced and are unlikely to be able to service additional residents from this and other regional projects without further investment and staffing.

An impact to health service provision has the potential to disproportionately affect vulnerable groups within the social locality who may require ongoing service access. The scale of the impact associated with the Project's construction workforce will depend on the proportion of the workforce that is sourced from outside the region. A larger proportion of workers who already reside within the social locality is correlated with a lower strain on health services due to a lower temporary population influx.

13.1.3.18 Reduced Access to Housing and Accommodation Due to Workforce Demand

An additional strain may be placed on both short and long-term accommodation in Banana and Gladstone LGAs due to the incoming construction workforce for the duration of the construction period. While the prioritisation of local workers and procurement of local contracts will minimise this strain; however, it is likely that a portion of the workforce will be sourced from outside the region and require accommodation in Gladstone or a smaller town such as Biloela or Calliope.

Section 13.1.2.9 shows the existing limitations regarding short-term accommodation in Banana Shire LGA, with potential cumulative workforces (**Chapter 6**) likely to significantly overwhelm existing infrastructure if not otherwise accommodated. In response to this demand, Banana Shire Council has initiated planning for the development of a Council owned accommodation camp to be based in Biloela, with anticipated capacity of up to 700 workers intended to alleviate pressure on local capacity and facilitate legacy housing benefits for the region (BSC, 2024).

Compared to Banana Shire LGA, Gladstone Region has both a higher reliance on, and higher supply of, rental dwellings. Gladstone Region has a higher transient workforce population as well as a population with lower socioeconomic characteristic in parts, meaning there may be barriers to permanent housing tenure among the residential population. A higher proportion of rental properties also suggests greater vulnerability to fluctuations in regional housing markets, as residents may be priced out of the area should energy generation development workforces drive up rental demand. By contrast, Banana Shire LGA has a high proportion of homeowners likely due to its established tenure and settlement as an agricultural region, as well as its relative overall wealth.

The combination of the Project's incoming construction workforce combined with the presence of other proximal projects' construction workforces has the potential to significantly impact the availability and affordability of accommodation in Banana and Gladstone. This also has the potential to inequitably impact vulnerable groups that do not have access to permanent housing in the region, such as crisis accommodation.

This impact requires further investigation as the Project progresses, with more comprehensive analysis of the capacity to source local employment, the resulting requirement for accommodation for incoming workers, and the capacity of the existing accommodation market to service the workforce considering other industry requirements and necessary housing support required to address community need. This may be informed through secondary data review and consultation with service providers and key stakeholders.

13.1.3.19 Cumulative Social Impacts

Cumulative impacts can occur when the impacts of multiple projects coalesce on a particular geographical or social community, amplifying existing impacts or creating new impacts. According to the Social Impact Assessment Guideline (DSDIP, 2025, p. 10), the mitigation or enhancement of cumulative impacts may not be within the direct control of the proponent, but are vital to consider in order to understand likely consequences of a proposed action on potentially impacted communities. As described in Chapter 6, all other projects (classified as Controlled Actions) within 20 km from the Project Area have been recorded and assessed in terms of cumulative impact potential (a total of 28 projects, of which nine were included in the cumulative impact assessment. Further detail regarding the inclusion of projects in the cumulative impact assessment may be found within Chapter 10.

Cumulative social impacts that may arise due to the overlap of these projects, not considered in other sections may include but are not limited to:

- Consultation fatigue for local communities and stakeholders resulting from concurrent engagement processes with various proponents.
- Potential increase in cost of living (e.g. housing affordability, groceries, services) in social locality associated with supply shortages from influx of concurrent construction workforces.
- Sleep disturbance or other annoyance for proximal communities due to overlapping or extended construction activities relating to various projects.
- Long-term increased travel times and traffic volumes for road users in social locality resulting from increased project activity (construction periods, operational activities).
- Accelerated road degradation in social locality due to high volume, long-term increase in heavy vehicle activity.

In addition to the cumulative impacts that can be experienced due to proximal projects occurring concurrently within the social locality, it is also important to recognise the extent to which multiple changes associated with one project can combine to have cumulative or combined impacts on different stakeholders. For example, residents and landholders closest to the transmission line may experience social amenity and negative health and wellbeing outcomes associated with construction activities, while also feeling greater uncertainty over future impacts (e.g. property devaluation) and disenfranchisement from decision making processes due to land acquisition. As such, these residents are not only exposed to a higher magnitude of impact, but multiple and compounding impacts which is likely to heighten their vulnerability to change.

Furthermore, analysis of the relative social and economic advantage of communities across the social locality (**Section 13.1.2.5**) shows key areas of disadvantaged concentrated around the proximal urban centres of Gladstone, Biloela and Calliope. Importantly, these areas are likely to host the majority of the construction workforce with Biloela identified as the probable location of a council owned Temporary Workforce Accommodation (TWA) and Gladstone and Calliope having greater existing accommodation capacity than other regional communities as further discussed in **Section 13.1.3.18**. This suggests that while there may be a concentration of Project benefits within these areas (e.g. local employment, procurement and training opportunities), there is also likely to be overlapping and combined impacts on service availability, community composition, housing and accommodation as well as region wide impacts regarding future uncertainty and changing visual landscapes.

13.1.4 Preliminary Social Impact Summary

Table 13.11 provides a summary of preliminary social impacts for relevant Project phases, as identified in **Section 13.1.3**. Key stakeholder groups, including vulnerable individuals / groups, likely to be affected by each impact are also identified.

It is important to note, preliminary social impacts identified in this assessment should be considered for the purposes of identifying key social vulnerabilities of the Project, only. Consistent with the Social Impact Assessment Guideline, there is need for further exploration and consideration of these preliminary social impacts, along with the development of appropriate adaptive management measures in a separate comprehensive Social Impact Assessment and associated Social Impact Management Plan.

Table 13.11 Preliminary Social and Economic Impact Summary

Impact	Affected Stakeholder Group									Project Phase[1]
	Host Landholders	Neighbouring Landholders	Broader Community	First Nations	Local Govt	State Govt	Business And Industry Groups	Community And Enviro Groups	Service Providers	
Reduced visual amenity due to Project infrastructure	✓	✓	✓	✓				✓		C, O
Impacts to social amenity relating to dust, noise and vibration associated with Project construction activities	✓	✓		✓				✓		C
Increased travel times and disruption along local and regional roads due to construction activities	✓	✓	✓		✓	✓	✓		✓	C
Potential for decreased road safety associated with construction activities			✓						✓	C
Economic boost associated with local expenditure of construction workforce			✓		✓		✓		✓	C
Local employment and procurement opportunities			✓	✓			✓			C, D
Improved energy reliability	✓	✓	✓			✓				O
Training and skills development			✓	✓					✓	C
Intergenerational equity associated with infrastructure development that supports renewable energy development and reduces reliance on fossil fuels			✓			✓		✓		O
Increased conflict and reduced community cohesion due to differing sentiment towards renewable energy development and inequitable distribution of benefits	✓	✓	✓		✓			✓		C, O

Impact	Affected Stakeholder Group									Project Phase[1]
	Host Landholders	Neighbouring Landholders	Broader Community	First Nations	Local Govt	State Govt	Business And Industry Groups	Community And Enviro Groups	Service Providers	
Livelihood impacts to agricultural operations due to land use change and/or Project activities	✓	✓								C, O
Livelihood impacts due to potential devaluation of or inability to sell proximal properties		✓								C, O
Potential land acquisition of easement affecting community way of life	✓									C, O
Degradation of environmental and cultural values of importance to the community	✓	✓	✓	✓				✓		C, O, D
Physical health impacts associated with Project construction and operations activities e.g. increased dust / noise / EMF exposure	✓	✓	✓	✓						C, O
Mental health impacts (e.g. stress, anxiety) associated with uncertainty surrounding Project activities	✓	✓	✓	✓						C
Reduced access to health and emergency services due to workforce demand			✓	✓					✓	C
Reduced access to housing and accommodation due to workforce demand			✓	✓			✓		✓	C
Cumulative social impacts	✓	✓	✓	✓	✓	✓	✓	✓	✓	C, O

13.1.5 Social Impact Analysis Summary

This chapter has documented the consideration of social matters under Section 13 of the PER Guidelines. The chapter includes a social baseline profile for the Project based on the defined social locality and preliminary scoping of potential social impacts that may arise as a result of the Project.

Key themes that will be further analysed as the Project progresses include:

- Potential disruptions to the road network associated with construction activities that may result in increased travel times or reduced driver safety.
- Pressure on accommodation and health services due to the influx of construction workers, including consideration of cumulative impacts associated with proximal developments.
- Social and visual amenity impacts due to Project infrastructure and construction.
- Social impacts associated with potential land acquisition, including impacts to livelihoods and community way of life.
- Changes to agricultural operations / livelihoods due to land use change and/or Project activities.
- Increased conflict and reduced community cohesion due to differing sentiment towards renewable energy development and inequitable distribution of benefits.
- Physical and mental health (stress, anxiety) impacts due to Project activities.
- Cumulative social impacts given the extent of project development in the region.
- Mitigation measures relating to potential negative impacts.

13.2 Economic

This section addresses the requirements of Section 13 of the PER Guidelines as it relates to economic aspects. As detailed in **Chapter 2.0**, the Project is the foundational stage of the Gladstone Project. In conjunction with other stages of the Gladstone Project, the Project aims to meet the 'identified need'. The identified need for the Gladstone Project is to ensure the ongoing reliability and security of supply in the Gladstone area to (Powerlink, 2025c):

- meet the forecast electrical load in anticipation of the closure of the Gladstone Power Station;
- support the decarbonisation of major industries; and
- compensate for loss of essential system services, such as inertia, system strength and voltage control capability, following the closure of Gladstone Power Station.

This process allows the Queensland Government to identify and assess PTI projects within a new State-based planning and investment framework, and to direct Powerlink to construct these projects and recover its costs following completion of assessment activities.

As the success of the Gladstone Project is dependent on all stages, this section broadly evaluates economic aspects in consideration of all stages of the Gladstone Project. The listed preceding sections discuss the following economic aspects relevant to the Project:

- **13.1.2.5 Economic Capital**
- **13.1.3.5 Economic Boost Associated with Local Expenditure of Construction Workforce**
- **13.1.3.6 Local Employment and Procurement Opportunities.**

13.2.1 Economic Cost and Impacts

The Gladstone Project represents a significant infrastructure initiative that seeks to enhance Queensland's electricity transmission network. The following sections outline the economic cost and impacts of the Gladstone Project based upon the Gladstone Project Priority Transmission Investment (PTI) [13] Final Assessment Report by Powerlink (Powerlink, 2025d) and other sources as noted.

13.2.1.1 Economic Cost

The PTI undertook a cost-benefit analysis that assessed and ranks credible network and non-network options that meet the identified need for the investment. The indicative real cost of the Gladstone Project is $1.788 billion and the indicative nominal capital cost of this option is $2.45 billion at completion in March 2029 (Powerlink, 2025d). This nominal capital cost includes risk, contingency and escalation.1 It is a class five estimate with an estimate accuracy band of -20% to +30% as underpinned by assumptions and exclusions including but not limited to:

- Topography is assumed to be 50% flat and 50% hilly
- Working hours being Monday–Sunday, 12 hour shifts
- Design currently under further detailed design
- Main Works Contractor pricing.

13.2.1.2 Net Economic Benefit

The Gladstone Project maximises the net economic benefit while meeting the identified need. The Gladstone Project has an indicative real cost of $1.788 billion (2025 dollars). The Gladstone Project is expected to improve system strength, reduce network congestion and enhance market efficiency.

13.2.1.3 Support for the Renewable Energy Transition

The Gladstone Project is a proposed transmission reinforcement program designed to strengthen and expand the electricity network in Central Queensland.

This will create new economic opportunities through the development of new generation resources such as new solar farms and wind farms detailed in **Table 13.12**.

Table 13.12 Renewable Energy Projects Benefitted by the Project

Project	Estimated Project Value
Wooderson Solar Farm	$1.9 billion (Central Queensland Power, 2025)
Upper Calliope Solar Farm	N/A
Specimen Hill Wind Farm	$750 million (Epuron , 2022)

[13] This process allows the Queensland Government to identify and assess PTI projects within a new State-based planning and investment framework, and to direct Powerlink to construct these projects and recover its costs following completion of assessment activities.

The Central Queensland Regional Plan identifies the reinforcement of transmission infrastructure as crucial in facilitating the growth of energy generation capabilities in the Central Queensland Region (Queensland Government, 2013). The Gladstone Project will also further secure the region's energy supply. Residents and businesses are dependent on secure energy supply. Key major businesses in the region include:

- Queensland Alumina Refinery
- Rio Tinto Alumina Refinery
- Callide Power Station
- Gladstone Power Station
- LNG plants–APLNG, GLNG and Queensland Curtis LNG
- Callide Mine
- Port of Gladstone
- Boyne Smelters
- Cement Australia
- Orica.

Section 13.1.3.7 further discusses the positive impact of improve energy reliability arising from the Project.

Employment and Economic Development

The construction and operational phases of the Gladstone Project are expected to generate direct and indirect employment in engineering, construction and maintenance. The Project also supports local economic development through the improvement of energy infrastructure critical to industrial growth in Gladstone. Gladstone Regional Council's 10-Year Gladstone Region Economic Transition Roadmap cites the need to upgrade transmission infrastructure to support existing and future industrial growth (Gladstone Regional Council, 2022).

14.0 Conclusion

This PER was developed in response to PER Guidelines for the Project to describe the action, the existing environment, assessment and findings for MNES, the potential impacts of the proposed action, and the avoidance, mitigation and management measures. It draws upon the following technical studies and plans that support the EPBC Act controlled action application:

- Offset Management Plan
- Water Quality Management Plan
- Environmental Management Plan
- Baseline Water Quality Monitoring Plan
- *Cycas Megacarpa* Translocation Management Plan
- MNES Management Plan.

Potential impacts on known and potentially occurring MNES as a result of the Project were determined. Numerous sources of both direct and indirect impact were identified, with the greatest risk to the majority of MNES occurring during the construction phase as a result of vegetation clearing and associated habitat loss. Other potential impacts include fauna injury or mortality, invasive plants and animals, changed fire regimes, soil erosion, sedimentation and contamination and noise and vibration.

The Project has employed avoidance measures as part of the corridor selection process and development of the Disturbance Footprint. Additionally, the Project has made MNES-specific Project design changes to minimise impacts to MNES. Where avoidance is not possible, the Project will maximise opportunities through a considered micro-siting process and mitigate or manage potential impacts during all phases. This will be done through the implementation of a suite of Project management plans.

The layout and associated Disturbance Footprint have been developed through numerous design iterations and reviews to minimise, and where possible, avoid impacts on any known site constraints, particularly impacts relating to ecological values and impacts on local communities. The corridor capitalises on the use of existing spare Powerlink easements in Sections A, B, D and E which co-located adjacent to existing transmission lines. This in turn, reduces impacts compared to alternative locations where no transmission infrastructure and easements exist.

A key component of the management and mitigation of impacts is through the development and implementation of the Rehabilitation Management Plan, in accordance with Powerlink's Environmental Management Plan (EMP), that sets the framework for rehabilitation to be undertaken on those parts of the site impacted by the Project's construction but not required for operations.

Considering the Project's avoidance, minimisation, and mitigation measures, significant impact assessments were conducted for the known and potentially occurring (high and moderate) MNES as well Great Barrier Reef MNES values, within the Disturbance Footprint, in accordance with the *Significant Impact Guidelines* 1.1–MNES (Department of the Environment, 2013b). The precautionary principle was applied in the assessment of significant impacts.

The findings of the assessment indicate that the Project may result in a significant impact on eight MNES:

- SEVT TEC
- Eucalypt Floodplain Forest and Woodland TEC
- *Cycas megacarpa*
- *Samadera bidwillii*
- Greater glider (southern and central)
- Yellow-bellied Glider (south-eastern)
- Koala
- Collared delma.

The assessment of impacts on Great Barrier Reef MNES values determined that with the application of appropriate water quality management measures, significant impacts would not occur.

An OMP has been prepared which outlines a description of the offset requirements for each MNES, together with the underlying habitat mapping, habitat quality assessments, species-specific habitat analyses and offset area assessment. The OMP forms the technical basis for the Project's proposed offset package and demonstrates how the offset properties satisfy the EPBC Act Environmental Offsets Policy. In addition, the OMP also outlines the suite of management actions, habitat quality improvement measures and risk-management considerations that will underpin offset delivery.

In addition to Project related impacts, the cumulative impact of Projects occurring within 20 km of the Project Area were investigated for impacts to MNES. The results of the cumulative impact assessment determined that adjacent renewable energy projects along with projects such as the Curtis Island Liquid Natural Gas precinct, which intersects the Project Area, may increase the risk of cumulative impacts from activities such as the clearing of remnant vegetation, fragmentation and degradation of terrestrial habitats leading to reduced connectivity for MNES. Due to the Project Area being located in a landscape characterised by extensive disturbance, and subject to cumulative pressures for decades, the Project is viewed as making a small contribution to the existing cumulative habitat impacts.

At the State level, the Project has lodged a Ministerial Infrastructure Designation (MID) application and protected plant clearing permit. The MID approval is anticipated to contain a suite of requirements of approval to manage the State level impacts of the Project, including in relation to Matters of State Environmental Significance (MSES) and management of impacts during construction.

The environmental record of the proponent, Powerlink, has been presented in this PER. The proponent holds a record of responsible environmental management and has not and is not currently subject to any Commonwealth, State or local proceedings with respect to environmental impacts or the conservation and sustainable use of natural resources.

Powerlink has an existing WoC CHIMA with the GNP, executed in December 2015. At present, Powerlink is engaged with ongoing discussions with the BGGGTBP, to reach a similar Cultural Heritage Management Agreement CHMA over the portion of the Project Area within their traditional country. Powerlink will continue to hold regular on-site and off-site meetings with both Traditional Owner groups in accordance with the terms of the current CHIMA with the GNP, as well as the future CHMA with the BGGGTBP.

Powerlink has undertaken significant stakeholder consultation with affected parties including Traditional Owner groups, elected representatives, landholders and the broader community. Key activities included face to face meetings, phone calls, newsletters, public information and drop-in sessions, survey, and community events. Key items raised by community during consultation included matters regarding compensation, biosecurity, commercial impacts, visual amenity and broader concern around renewable energy projects.

A social and economic assessment has been undertaken to inform the PER which provides a high-level scoping (social locality definition), social baseline analysis and identification of preliminary social impacts. A comprehensive Social Impact Assessment (SIA) for the broader Gladstone Project is currently in development. The SIA will, in accordance with the SIA Guideline, provide in-depth scoping of social impacts, further social baseline analysis, impact assessment and evaluation, impact mitigation and benefit enhancement.

The construction and operational phases of the Project are expected to generate direct and indirect employment in engineering, construction and maintenance. The Project also supports local economic development through the improvement of energy infrastructure critical to industrial growth in Gladstone. Gladstone Regional Council's 10-Year Gladstone Region Economic Transition Roadmap cites the need to upgrade transmission infrastructure to support existing and future industrial growth (Gladstone Regional Council, 2022). The Project maximises the net economic benefit while meeting this identified need.

The Project is therefore considered to align with the principles of Ecologically Sustainable Development as set out in the EPBC Act (**Table 14.1**) and the objectives of the EPBC Act (**Table 14.2**).

Table 14.1 Alignment with Ecologically Sustainable Development (ESD) Principles

ESD Principle	Project Alignment
Decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations.	The assessment of MNES and more broadly environmental, social and economic impacts, both positive and negative, associated with the Project has been undertaken across both the long-term and short-term scales of the Project including key stages of construction, operation and rehabilitation and decommissioning. The PER demonstrates that the environmental impacts from the proposed action are predominately short-term during construction activities (**Section 6.0**). These impacts are able to be adequately mitigated and where there are residual impacts, suitably offset to provide a conservation gain. As such, it is considered that the long-term social and economic benefits detailed in **Section 13.0**, along with the offset conservation gain detailed **Section 12.0**, adequately counter-balance the identified short-term impacts of the action.
If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.	The potential impacts of the Project, the avoidance and mitigation/management measures and the residual significant impacts on each MNES relevant to the Project are described in **Section 6.0**, **Section 7.0**, **Section 8.0, Section 9.0** and the **MNES Management Plan**. To achieve a level of scientific certainty in relation to the potential impacts associated with the Project an extensive evaluation of all the key components relevant to MNES and required by the PER Guidelines has been undertaken. Detailed assessment of MNES, and necessary mitigation and management have been conducted and are

ESD Principle	Project Alignment
	comprehensively documented in this PER and the supporting appendices. The preparation of this PER has involved analysis of the existing environment (**Section 3.0** and **Section 5.0**) and the use of desktop analysis, site-specific survey and monitoring and scientific modelling (where relevant) to assess and determine potential impacts to MNES as a result of the Project. A robust design refinement and corridor selection process has been undertaken to avoid impacts to MNES where possible and development of management and mitigation measures (**Section 7.0**). Due to the nature of the Project, specific details will be subject to the detailed design phase and will be influenced by the technology applicable at the time. Any uncertainty in the data used for the assessment has been appropriately identified, and appropriate assumptions have been applied to represent a conservative worst-case analysis to assess a range of potential impact scenarios. Extensive management and mitigation measures will be implemented, including monitoring programs to measure predicted against actual impacts of the Project. Powerlink will prepare and implement a suite of management plans in accordance with the framework outlined in the EMP (**Appendix K**) which will facilitate the implementation of best practice management including mitigation and management measures identified in this PER. The OMP provided in **Appendix F** details the suitability of proposed offset areas to acquit the residual impacts associated with the action and provide a conservation gain for the significantly impacted MNES.
The principle of inter-generational equity–that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations. The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making.	As discussed in **Section 1.13**, the Project has strong alignment with State and Commonwealth policies. Investment in the transmission network is critical in connecting new large-scale energy generation projects in Queensland. Decarbonising Queensland's energy system means increasing the amount of renewable energy used to meet the energy needs of households and businesses, ultimately reducing our reliance on coal-fired power generation. The primary purpose of the Project is the reinforcement of the Gladstone transmission network to support decarbonisation in the region. The Project also seeks to increase network capacity and reliability to service the growing renewable energy industry in this area. The Project will allow for up to 1,800 megawatts (MW) of renewable hosting capacity in the region. As of June 2024, the Project has been confirmed as eligible for Priority Transmission Investment (PTI) under the *Energy (Renewable Transformation and Jobs) Act 2024* (note: a current Bill before Parliament seeks to rename this Act to the *Energy (Infrastructure Facilitation) Act 2024*). This has been granted due to the Project being identified as a critical investment for the Central Queensland region, further highlighting its importance. The Project will contribute to climate change abatement objectives by increasing Australia's renewable energy capacity into the future. This provides inter-generational equity by ensuring long-term conservation of biological diversity and sustainable energy security for future generations.

ESD Principle	Project Alignment
Improved valuation, pricing and incentive mechanisms should be promoted.	The Project has been designed to avoid and minimise adverse impacts on MNES and more broadly environment, social and economic impacts as much as practicable. The Project will strengthen the existing transmission grid, improve network capacity and reliability while increasing the amount of renewable energy used to meet the energy needs of households and businesses, ultimately reducing our reliance on coal-fired power generation.

Table 14.2 Alignment with the Objectives of the EPBC Act (s3)

EPBC Act Objective	Project Alignment
To provide for the protection of the environment, especially those aspects of the environment that are matters of national environmental significance;	The potential impacts of the Project, the avoidance and mitigation/management measures and the residual significant impacts on each MNES relevant to the Project are described in **Section 6.0**, **Section 7.0**, **Section 8.0, Section 9.0** and the **MNES Management Plan** details the suitability of proposed offset areas to acquit the residual impacts associated with the action and provide a conservation gain for the significantly impacted MNES.
To promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resources;	The PER is supported by a range of management plans, including an OMP which adequately demonstrates that a conservation gain for target matters and that the ecologically sustainable use of natural resources is achievable for the Project.
To promote the conservation of biodiversity;	The PER (**Section 7.0**) details the avoidance, mitigation and management measures that will be employed by the Project to conserve biodiversity to the greatest extent possible. The OMP provided in **Appendix F** details the suitability of proposed offset areas to acquit the residual impacts associated with the action and provide a conservation gain for the significantly impacted MNES.
To promote a co-operative approach to the protection and management of the environment involving governments, the community, land-holders and indigenous peoples;	The Project has undertaken a comprehensive consultation and community engagement program as outlined in (**Section 11.0**). This co-operative approach successfully resulted in a CHIMA with the GNP, executed in December 2015. At present, Powerlink is engaged with ongoing discussions with the BGGGTBP, to reach a similar CHMA over the portion of the Project Area within their traditional country. Further, the proponent has committed to ongoing consultation during all phases of the Project in addition to the consultation undertaken to date.

EPBC Act Objective	Project Alignment
to assist in the co-operative implementation of Australia's international environmental responsibilities;	This Project assists in the implementation and advancement of Australia's obligations under the Paris Agreement, by contributing to a reduction in future greenhouse gas emissions and the overall impacts of climate change.
to recognise the role of indigenous people in the conservation and ecologically sustainable use of Australia's biodiversity; and to promote the use of indigenous peoples' knowledge of biodiversity with the involvement of, and in co-operation with, the owners of the knowledge.	The co-operative approach outlined in **Section 11.6** successfully resulted in a CHIMA with the GNP, executed in December 2015. At present, Powerlink is engaged with ongoing discussions with the BGGGTBP, to reach a similar CHMA over the portion of the Project Area within their traditional country. Through these mechanisms the GNP and BGGGTBP, being the traditional custodians of their respective lands, will continue their role in the conversation and ecologically sustainable use of the land and important knowledge sharing.

15.0 References

15.1 Preamble

The information sources utilised in this PER are listed in **Section 15.2** and are separated into the chapters that use references. Unless otherwise stated, all sources are considered current, reliable, and appropriate for the scope and objectives of the assessment. The majority of data and references are derived from peer-reviewed scientific literature, government publications, and reputable environmental databases, ensuring a high standard of credibility and relevance.

The sources referenced have been selected based on their publication date, methodological robustness, and relevance to the Australian context. Where possible, the most recent data and publications (within the last five years) have been prioritised to ensure currency.

Identified limitations and uncertainties have been transparently addressed and are not considered to materially affect the overall conclusions of the report. A review of the sources utilised in the PER which are based on international findings are detailed in **Table 15.1**.

15.2 Reference List

Table 15.1 Chapter 3 References

Source	Title	Origin	Year	Author / Source	Uncertainties (if any)
1	Capricornia Cays International Bird and Biodiversity Area	Website	2025a	BirdLife International	Nil
2	Fitzroy Floodplain and Delta Key Biodiversity Area	Website	2025b	BirdLife International	Nil
3	BOM Weather and Rainfall Data	Website	2025	Bureau of Meteorology	Nil
4	Biodiversity Planning Assessment–Brigalow Belt mapping	Website	2018	Department of Environment and Science (DES)	Nil
5	Qld Fire Department Bushfire prone area mapping	Website	2025	Department of State Development, Infrastructure and Planning	Nil
6	QImagery	Website	2025	Queensland Government	Nil
7	Fire Scar Mapping and Australian Soil Classification (ASC)	Website	2025	Queensland Globe	Nil
8	The Conservation Status of Queensland's Bioregional Ecosystems	Book	1999	Sattler & Williams	Nil
10	Water Plan (Calliope River Basin) 2006	Website	2016	State of Queensland	Nil
11	Water Plan (Fitzroy Basin) 2011	Website	2022	State of Queensland	Nil

Table 15.2 Chapter 4 References

Source	Title	Origin	Year	Author / Source	Uncertainties (if any)
1	BatMap	Website	2025	Australasian Bat Society Inc.	Nil
2	Australian Rainfall and Runoff: A Guide to Flood Estimation. Commonwealth of Australia	Website	2019	Ball et al. – Geoscience Australia	Nil
3	A review of ghost bat ecology, threats and survey requirements	Website	2021	Bat Call WA Pty Ltd	Nil
4	Threatened Flora observations Callide Mine	Dataset	2025	Batchfire Callide	Nil
5	Census of the Queensland Flora and Fungi 2024	Website	2024	Bean, A. R, Queensland Department of Environment, Science and Innovation (DESI)	Nil
6	Birdlife Data Zone. Sites (International Bird Areas)–Map Search	Website	2024	Birdlife International	Nil
7	Climate Data Online	Website	2025	Bureau of Meteorology	Nil
8	Management of Endangered Plants	Website	1993	Cropper, S – CSIRO	Nil
9	State Development Assessment Provisions guideline State code 11: Removal, destruction or damage of marine plants	Website	2022	Department of Agriculture and Fisheries (DAF)	Nil
10	Approved Conservation Advice for the Brigalow (*Acacia harpophylla* dominant and co-dominant) ecological community.	Website	2013	Department of Agriculture, Water and the Environment (DAWE)	Nil
11	Northern Quoll (*Dasyurus hallucatus*) Advice to the Minister for the Environment and Heritage from the Threatened Species Scientific Committee (TSSC) on Amendments to the list of Threatened Species under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)	Website	2021a	Department of Agriculture, Water and the Environment (DAWE)	Nil

Source	Title	Origin	Year	Author / Source	Uncertainties (if any)
12	National Recovery Plan for the Painted Honeyeater (*Grantiella picta*)	Website	2021b	Department of Agriculture, Water and the Environment (DAWE)	Nil
13	Conservation Advice for *Petaurus australis australis* (yellow-bellied glider (south-eastern)	Website	2022a	Department of Agriculture, Water and the Environment (DAWE)	Nil
14	Conservation Advice for *Phascolarctos cinereus* (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory	Website	2022b	Department of Agriculture, Water and the Environment (DAWE)	Nil
15	National Recovery Plan for the Koala *Phascolarctos cinereus* (combined populations of Queensland, New South Wales and the Australian Capital Territory)	Website	2022c	Department of Agriculture, Water and the Environment (DAWE)	Nil
16	Approved Conservation Advice for the Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions	Website	2022a	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
17	Conservation Advice for *Petauroides volans* (greater glider (southern and central))	Website	2022b	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
18	EPBC Act Referral guidance for the endangered koala	Website	2022c	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
19	Identifying habitat for the endangered Koala	Website	2022d	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
20	National Recovery Plan for Black-breasted Button-quail (*Turnix melanogaster*)	Website	2022e	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
21	National Recovery Plan for the Water Mouse (*Xeromys myoides*)	Website	2022f	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil

Source	Title	Origin	Year	Author / Source	Uncertainties (if any)
22	Conservation Advice for *Numenius madagascariensis* (far eastern curlew)	Website	2023a	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
23	Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles	Website	2023b	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
24	Interactive Flying-fox Web Viewer	Website	2023c	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
25	Approved Conservation Advice for Semi-evergreen Vine Thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Website	2023d	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
26	Conservation Advice for *Gallinago hardwickii* (Latham's snipe)	Website	2024a	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
27	Conservation Advice for *Tringa nebularia* (common greenshank)	Website	2024b	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
28	National Guidelines for the Survey of Cetaceans, Marine Turtles and the Dugong	Website	2024c	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
29	Species of National Environmental Significance and selected marine and cetacean species	Website	2024d	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
30	Protected Matters Search Tool	Website	2026	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
31	Species Profile and Threats Database	Website	2025k	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
32	Biodiversity Planning Assessment for the Brigalow Belt Bioregion	Website	2020a	Department of Environment and Science (DES)	Nil
33	Biodiversity Planning Assessment for the South East Queensland Bioregion	Website	2020b	Department of Environment and Science (DES)	Nil

Source	Title	Origin	Year	Author / Source	Uncertainties (if any)
34	Guide to determining terrestrial habitat quality; Method for assessing habitat quality under the Queensland Environment Offsets Policy; Version 1.3	Website	2020c	Department of Environment and Science (DES)	Nil
35	Habitat Suitability Models Queensland	Map	2023	Department of Environment and Science (DES)	Nil
36	National Recovery Plan for the Grey-headed Flying-fox *Pteropus poliocephalus*	Website	2021	Department of Environment and Water (DEW)	Nil
37	Groundwater dependent ecosystems and potential aquifer mapping	Website	2021	Department of Environment, Science and Innovation (DESI)	Nil
38	Potential habitat models—2022—Queensland Series	Dataset	2022	Department of Environment, Science and Innovation (DESI)	Nil
39	Flora Survey Trigger Map for Clearing Protected Plants in Queensland—Version 10.0	Website	2023	Department of Environment, Science and Innovation (DESI)	Nil
40	Map of Queensland wetland environmental values	Website	2024	Department of Environment, Science and Innovation (DESI)	Nil
41	Flora Survey Guidelines—Protected Plants *Nature Conservation Act 1992* (No. V2.03; pp. 1–11)	Website	2025a	Department of Environment, Tourism, Science and Innovation (DETSI)	Nil
42	Species Profile Search	Website	2025b	Department of Environment, Tourism, Science and Innovation (DETSI)	Nil
43	WetlandInfo	Website	2025c	Department of Environment, Tourism, Science and Innovation (DETSI)	Nil
44	Survey guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999* (p. 278)	Website	2010	Department of Environment, Water, Heritage and the Arts (DEWHA)	Nil

Source	Title	Origin	Year	Author / Source	Uncertainties (if any)
45	Detailed surface geology—Queensland	Dataset	2023	Department of Natural Resources and Mines, Manufacturing, and Regional and Rural Development (DNRMMRRD)	Nil
46	Vegetation management pre-clear regional ecosystem map—Version 13	Map	2023	Department of Natural Resources and Mines, Manufacturing, and Regional and Rural Development (DNRMMRRD)	Nil
47	Reservoirs—Queensland	Dataset	2024a	Department of Natural Resources and Mines, Manufacturing, and Regional and Rural Development (DNRMMRRD)	Nil
48	Vegetation management essential habitat map no attribute—Version 12.08	Map	2024a	Department of Natural Resources and Mines, Manufacturing, and Regional and Rural Development (DNRMMRRD)	Nil
49	Vegetation management regional ecosystem map—Version 13	Map	2024b	Department of Natural Resources and Mines, Manufacturing, and Regional and Rural Development (DNRMMRRD)	Nil
50	Vegetation management watercourse and drainage feature map (1:100000 and 1:250000)—Queensland except South East Queensland Version 7.00	Map	2024b	Department of Natural Resources and Mines, Manufacturing, and Regional and Rural Development (DNRMMRRD)	Nil
51	Contours—10 metre interval—By area of interest	Dataset	2019	Department of Resources (DoR)	Nil
52	Mineral resource sites—Queensland	Map	2020	Department of Resources (DoR)	Nil
53	Detailed surface geology—Queensland	Map	2022	Department of Resources (DoR)	Nil
54	Survey guidelines for Australia's threatened reptiles: Guidelines for detecting reptiles listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999*	Website	2011	Department of Sustainability, Environment, Water, Population and Communities (DSEWPC)	Nil

Source	Title	Origin	Year	Author / Source	Uncertainties (if any)
55	Survey guidelines for Australia's threatened mammals: Guidelines for detecting mammals listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999*	Website	2011	Department of Sustainability, Environment, Water, Population and Communities (DSEWPC)	Nil
56	Approved Conservation Advice for *Rostratula australis* (Australian painted snipe)	Website	2013	Department of Sustainability, Environment, Water, Population and Communities (DSEWPC)	Nil
57	Conservation Advice for Subtropical and Temperate Coastal Saltmarsh	Website	2013	Department of Sustainability, Environment, Water, Population and Communities (DSEWPC)	Nil
58	Matters of National Environmental Significance: Significant impact guidelines 1.1	Website	2013	Department of the Environment (DoE)	Nil
59	Conservation Advice: *Calidris ferruginea* (curlew sandpiper)	Website	2015a	Department of the Environment (DoE)	Nil
60	Referral guideline for 14 birds listed as migratory species under the EPBC Act	Website	2015b	Department of the Environment (DoE)	Nil
61	Referral guideline for the vulnerable water mouse *Xeromys myoides*	Website	2015c	Department of the Environment (DoE)	Nil
62	EPBC Act Referral Guidelines for the Endangered Northern Quoll *Dasyurus hallucatus*	Website	2016	Department of the Environment (DoE)	Nil
63	EPBC Act Policy Statement 3.21: Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species	Website	2017a	Department of the Environment and Energy (DoEE)	Nil
64	Recovery Plan for Marine Turtles in Australia	Website	2017b	Department of the Environment and Energy (DoEE)	Nil

Source	Title	Origin	Year	Author / Source	Uncertainties (if any)
65	Guide to Greater Glider Habitat in Queensland.	Website	2022	Department of the Environment and Science (DES)	Nil
66	Approved Conservation Advice for *Delma torquata* (Collared Delma)	Website	2008	Department of the Environment, Water, Heritage and the Arts (DEWHA)	Nil
67	Survey guidelines for Australia's threatened bats: Guidelines for detecting bats listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999*	Website	2010	Department of the Environment, Water, Heritage and the Arts (DEWHA)	Nil
68	eBird Australia	Website	2025	eBird Australia	Nil
69	An overview of monitoring methods for the Collared delma, Adorned delma (*Delma torquata*)	Website	2024	Ecological Monitoring System Australia	Nil
70	Terrestrial Vertebrate Fauna Survey Guidelines for Queensland version 3 (Issue 4.0)	Website	2018	Eyre, T. J., Ferguson, D. J., Hourigan, C. l., Smith, G. C., Mathieson, M. T., Kelly, A. L., Venz, M. F., Hogan, L. D., & Rowland, J	Nil
71	Terrestrial Vertebrate Fauna Survey Guidelines for Queensland version 4 (No. Version 4.0)	Website	2022	Eyre, T. J., Ferguson, D. J., Smith, G. C., Mathieson, M. T., Venz, M. F., Hogan, L. D., Hourigan, C. L., Kelly, A. L., & Rowland, J	Nil
72	BioCondition: A condition assessment framework for terrestrial biodiversity in Queensland—Biocondition-assessment-manual. Version 2.2. (Issue March, p. 85)	Website	2015	Eyre, T. J., Kelly, A. L., Neldner, V. J., Wilson, B. A., Ferguson, D. J., Laidlaw, M. J., & Franks, A. J	Nil
73	Guide to greater glider habitat in Queensland	Website	2022	Eyre, T. J., Smith, G. C., Venz, M. F., Mathieson, M. T., Hogan, L. D., Starr, C., Winter, J., & McDonald, K	Nil
74	National Recovery Plan for the Northern Quoll *Dasyurus hallucatus*	Website	2010	Hill, B. M., & Ward, S. J	Nil

Source	Title	Origin	Year	Author / Source	Uncertainties (if any)
75	Ghost bat, *Macroderma gigas*. Targeted species survey guidelines	Website	2011	Hourigan, C	Nil
76	Forest Protection Survey Program Survey Guideline—Spotlighting and Call Playback (V4.1)	Website	2018	Jemma Cripps, Louise Durkin, Jenny Nelson, Jamie Molloy, & Mark Edmonds	Nil
77	Northern Territory guidelines for surveying for the ghost bat at the landscape scale	Website	2024	Laura Ruykys, Nicola Hanrahan, & Danielle Stokeld	Nil
78	Methodology for survey and mapping of regional ecosystems and vegetation communities in Queensland. Version 7.0	Website	2025	Neldner, V. J., Wilson, B. A., Dillewaard, H. A., Ryan, T. S., Butler, D. W., McDonald, W. J. F., Richter, D., Addicott, E. P., & Appelman, C. N	Nil
79	Distribution of Black-breasted Button-quail *Turnix melanogaster* in the Great Sandy Region, Queensland and associations with vegetation communities. Emu - Austral Ornithology	Website	2022	Patrick T. D. Webster, Reisuke Shimomurab, Emily R. Rush, Luke K.-P. Leung, and Peter J. Murray	Nil
80	A preliminary field investigation of the collared delma *Delma torquata* (Reptilia: Pygopodidae)	Website	1998	Porter, R	Nil
81	QImagery	Website	2025	Queensland Government	Nil
82	Queensland Globe	Website	2025	Queensland Government	Nil
83	Queensland Spatial Catalogue—QSpatial	Website	2025a	Queensland Government	Nil
84	Regional Ecosystem Descriptions. Regional Ecosystems	Website	2025b	Queensland Government	Nil
85	National Multi-species Recovery Plan for the cycads, *Cycas megacarpa, Cycas ophiolitica, Macrozamia cranei, Macrozamia lomandroides, Macrozamia pauli-guilielmi and Macrozamia platyrhachis* (p. 50)	Website	2007	Queensland Herbarium	Nil

Source	Title	Origin	Year	Author / Source	Uncertainties (if any)
86	Potential habitat modelling methodology	Website	2021	Queensland Herbarium	Nil
87	Regional Ecosystem Description Database (REDD) Version 13.1	Website	2024	Queensland Herbarium	Nil
88	Collecting and Preserving plants specimens, a manual, Second Edition (Issue August)	Website	2016	Queensland Herbarium, & Bean, T	Nil
89	Standards in bat detector based surveys	Website	2003	Reardon, T	Nil
90	Painted honeyeater, *Grantiella picta*. Targeted species survey guidelines	Website	2012	Rowland, J	Nil
91	The Conservation Status of Queensland's Bioregional Ecosystems	Website	1999	Sattler, P., & Williams, R	Nil
92	Conservation Advice—Squatter Pigeon (*Geophaps scripta scripta*)	Website	2015	Threatened Species Scientific Committee	Nil
93	Conservation Advice*: Macroderma gigas* (ghost bat)	Website	2016a	Threatened Species Scientific Committee	Nil
94	Conservation Advice—*Limosa lapponica baueri*	Website	2016b	Threatened Species Scientific Committee	Nil
95	A review of koala habitat assessment criteria and methods	Website	2021	Youngentob, K., Marsh, K., & Skewes, J	Nil

Table 15.3 Chapter 5 References

Source	Title	Origin	Year	Author/Source	Uncertainties (if any)
1	Great Barrier Reef, Townsville, QLD, Australia - National Heritage List	Website	2025	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
2	Great Barrier Reef, Townsville, QLD, Australia - World Heritage List	Website	2025	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
3	Marine Parks Zoning Map - Capricorn (Map 17)	Website	2019	Great Barrier Reef Marine Park Authority (GBRMPA)	Nil
4	Our history–Gladstone Ports Corporation	Website	2009	Gladstone Ports Corporation (GPC)	Nil

Source	Title	Origin	Year	Author/Source	Uncertainties (if any)
5	Port of Gladstone Land Use Plan 2012 (Version 2 - February 2016)	Website	2016	Gladstone Ports Corporation (GPC)	Nil
6	About the Port	Website	2024	Gladstone Ports Corporation (GPC)	Nil
7	2024 review of maintenance dredging of Queensland ports	Website	2025	Queensland Department of Transport and Main Roads (TMR)	Nil
8	*Great Barrier Reef–World Heritage List*	Website	2025	United Nations Educational, Scientific and Cultural Organisation (UNESCO)	Nil
9	Detailed Surface Geology–Queensland	Website	2023	Department of Natural Resources and Mines, Manufacturing, and Regional and Rural Development (DNRMMRD)	Nil
10	Specimen Hill Wind Farm MNES Assessment Report	Website	2020	EMM	Nil
11	National Recovery Plan for the "Semi-Evergreen Vine Thickets of the Brigalow Belt (North and South) and Nandewar Bioregions" Ecological Community	Website	2010	McDonald, Department of the Environment, Water, Heritage and the Arts (DEWHA)	Nil
12	Conservation Advice for Subtropical and Temperate Coastal Saltmarsh	Website	2013	Department of Sustainability, Environment, Water, Population and Communities (DSEWPC)	Nil
13	Approved Conservation Advice for the Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions	Website	2022	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
14	Species of National Environmental Significance (SNES) Dataset	Website	2025	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
15	QImagery	Website	2025	Queensland Government	Nil
16	ALA Database	Website	2025	Atlas of Living Australia (ALA)	Nil

Table 15.4 Chapter 6 References

Source	Title	Origin	Year	Author / Source	Uncertainties (if any)
1	Evidence for distance and illuminance thresholds in the effects of artificial lighting on bat activity	Website	2018	Azam, C., Le Viol, I., Bas, Y., Zissis, G., Vernet, A., Julien, J., & Kerbiriou, C	Refer to **Table 15.7**.
2	Artificial light at night alters grassland vegetation species composition and phenology	Website	2018	Bennie, J., Davies, T., Cruse, D., Bell, F., & Gaston, K	Refer to **Table 15.7**.
3	Climate Data Online	Dataset	2025	Bureau of Meteorology	Nil
4	Noise pollution is pervasive in U.S. protected areas	Website	2017	Buxton, R. T., McKenna, M. F., Mennitt, D. J., Brown, E., Fristrup, K. M., Crooks, K. R., Angeloni, L., & Wittemeyer, G	Refer to **Table 15.7**.
5	The Convention on Biological Diversity	Website	2024	CBD Secretariat	Nil.
6	Hearing with an atympanic ear: Good vibration and poor sound-pressure detection in the royal python, Python regius	Website	2012	Christensen, C., Christensen-Dalsgaard, J., Brandt, C., & Teglberg Madsen, P	Refer to **Table 15.7**.
7	Convention on International Trade in Endangered Species of Wild Fauna and Flora	Website	2025	CITES	Nil
8	Climate Projection Tools	Dataset	2020	Climate Change in Australia	Nil
9	Convention on the Conservation of Migratory Species of Wild Animals	Website	2025	CMS Secretariat	Nil.
10	Effects of simulated highway noise on heart rates of larval monarch butterflies, *Danaus plexippus*: Implications for roadside habitat suitability	Website	2018	Davis, A., Schroeder, H., Yeager, I., & Pearce, J	Refer to **Table 15.7**.
11	Noise Disturbance along Highways: Kuranda Range Road Upgrade Project	Website	2008	Dawe, G., & Goosem, M	Nil

Source	Title	Origin	Year	Author / Source	Uncertainties (if any)
12	Migratory birds	Website	2025	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
13	Effects of helicopter noise on Mexican spotted owls	Website	1999	Delaney, D. K., Grubb, T. G., Beier, P., Pater, L., & Reiser, M. H	Refer to **Table 15.7**.
14	Conservation Advice for *Xeromys myoides* (Water Mouse)	Website	2021a	Department of Agriculture, Water and the Environment (DAWE)	Nil
15	National Recovery Plan for the Painted Honeyeater (*Grantiella picta*)	Website	2021b	Department of Agriculture, Water and the Environment (DAWE)	Nil
16	Conservation Advice for *Petauroides volans* (greater glider (southern and central))	Website	2022a	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
17	Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions	Website	2022b	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
18	Approved Conservation Advice for Semi-evergreen Vine Thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Website	2023a	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
19	National Light Pollution Guidelines for Wildlife	Website	2023b	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
20	Species of National Environmental Significance and selected marine and cetacean species	Dataset	2024a	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
21	Threat abatement plan for predation by feral cats 2024	Website	2024b	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
22	Potential habitat models—2022—Queensland Series	Dataset	2022	Department of Environment and Science (DES)	Nil
23	The health effects of environmental noise	Website	2018	Department of Health (DoH)	Nil

Source	Title	Origin	Year	Author / Source	Uncertainties (if any)
24	Species group report card—Seabirds and migratory shorebirds	Website	2012	Department of Sustainability, Environment, Water, Population and Communities (DSEWPC)	Nil
25	Conservation Advice for Subtropical and Temperate Coastal Saltmarsh	Website	2013	Department of Sustainability, Environment, Water, Population and Communities (DSEWPC)	Nil
26	Threat abatement plan for predation, habitat degradation, competition and disease transmission by feral pigs (*Sus scrofa*)	Website	2015	Department of the Environment (DoE)	Nil
27	Wildlife Conservation Plan for Migratory Shorebirds	Website	2015	Department of the Environment (DoE)	Nil
28	Recovery Plan for Marine Turtles in Australia	Website	2017	Department of the Environment and Energy (DoEE)	Nil
29	*Trymalium minutiflorum* Conservation Advice	Website	2008	Department of the Environment, Water, Heritage and the Art (DEWHA)	Nil
30	Approved Conservation Advice for *Atalaya collina*	Website	2008a	Department of the Environment, Water, Heritage and the Art (DEWHA)	Nil
31	Approved Conservation Advice for Delma torquata (Collared delma)	Website	2008b	Department of the Environment, Water, Heritage and the Art (DEWHA)	Nil
32	Approved Conservation Advice for *Quassia bidwillii* (Quassia)	Website	2008c	Department of the Environment, Water, Heritage and the Art (DEWHA)	Nil
33	Fauna Sensitive Transport Infrastructure Delivery. Chapter 9: Species profile–Birds. State of Queensland	Website	2024	Department of Transport and Main Roads (TMR)	Nil
34	Report on the Potential Effects of Quarry Dust on Selected Vegetation Communities on the Gold Coast, Queensland	Website	2013	Doley, D	Nil
35	The effects of dust on vegetation—A review	Website	1993	Farmer, A. M	Refer to **Table 15.7**.

Source	Title	Origin	Year	Author / Source	Uncertainties (if any)
36	A framework for understanding noise impacts on wildlife: An urgent conservation priority	Website	2013	Francis, C., & Barber, R	Refer to **Table 15.7**.
37	Toads in the backyard: Why do invasive cane toads (*Rhinella marina*) prefer buildings to bushland?	Website	2016	González-Bernal, E., Greenlees, M., Brown, G., & Shine, R	Nil.
38	Fragmentation impacts caused by roads through rainforests	Website	2007	Goosem, M	Nil
39	Dose-response relationships of harlequin duck behaviour to noise from low-level military jet over-flights in central Labrador	Website	2004	Goudie, R., & Jones, I	Refer to **Table 15.7**.
40	Light pollution, circadian photoreception, and melatonin in vertebrates	Website	2019	Grubisic, M., Haim, A., Bhusal, P., Dominoni, D., Gabriel, K., Jechow, A., Kupprat, F., Lerner, A., Marchant, P., Riley, W., Stebelova, K., Van Grusven, R., Zeman, M., Zubidat, A., & Holker, F	Refer to **Table 15.7**.
41	National Recovery Plan for the Northern Quoll *Dasyurus hallucatus*	Website	2010	Hill, B. M., & Ward, S. J	Nil
42	Synthesis of noise effects on wildlife populations	Website	2004	Kaseloo, P., & Tyson, K	Refer to **Table 15.7**.
43	How and why environmental noise impacts animals: An integrative, mechanistic review	Website	2011	Kight, C. R., & Swaddle, J. P	Refer to **Table 15.7**.
44	Bright lights, big city: An experimental assessment of short-term behavioral and performance effects of artificial light at night on Anolis lizards	Website	2021	Kolbe, J., Moniz, H., Lapiedra, O., & Thawley, C	Refer to **Table 15.7**.
45	Pronghorn use of areas with varying sound pressure levels	Website	2003	Landon, D., Krausman, P., Kiana, K., & Harris, L	Refer to **Table 15.7**.

Source	Title	Origin	Year	Author / Source	Uncertainties (if any)
46	The effects of modern war and military activities on biodiversity and the environment	Website	2015	Lawrence, M. J., Stemberer, H. L. J., Zolderdo, A. J., Struthers, D. P., & Cooke, S. J	Refer to **Table 15.7**.
47	The conservation of arboreal marsupials in fragmented forests: The use of hollow-bearing trees	Website	2002	Lindenmayer, D. B., Cunningham, R. B., Donnelly, C. F., & MacGregor, C	Nil
48	The use of roost trees by the threatened greater glider *Petauroides volans* in fragmented forests of southern Victoria	Website	2002	Lumsden, L. F., Bennett, A. F., & Silins, J. E	Nil
49	The effects of acute exposure to mining machinery noise on the behaviour of eastern blue-tongued lizards (*Tiliqua scincoides*)	Website	2017	Mancera, K., Murray, P., Lisle, A., Dupont, C., Faucheux, F., & Phillips, C	Nil
50	Exceptional high-frequency hearing and matched vocalizations in Australian *pygopod geckos*.	Website	2010	Manley, G., & Kraus, J	Nil
51	National recovery plan for the “Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions” ecological community	Website	2010	McDonald, W. J. F	Nil
52	The influence of wind farm development on the hydrochemistry and ecology of an upland stream	Website	2015	Millidine, K., Malcolm, I., McCartney, A., Laughton, R., Gibbins, C., & Fryer, R	Refer to **Table 15.7**.
53	Edge effects in fragmented forests: Implications for conservation	Website	1995	Murcia, C	Refer to **Table 15.7**.
54	Stressful colours: Corticosterone concentrations in a free-living songbird vary with the spectral composition of experimental illumination	Website	2015	Ouyang, J., de Jong, M., Hau, M., Visser, M., Van Grusven, R., & Spoelstra, K	Refer to **Table 15.7**.

Source	Title	Origin	Year	Author / Source	Uncertainties (if any)
55	Assessment of the Effect of Traffic Noise on Wetland Birds: Background Study for the Roe Highway Extension Project	Website	2011	Phoenix Environmental Sciences	Refer to **Table 15.7**.
56	Acoustic ecology of sea turtles: Implications for conservation	Website	2012	Piniak, W. E. D	Refer to **Table 15.7**.
57	How far into a forest does the effect of a road extend? Defining road edge effect in eucalypt forests of South-Eastern Australia	Website	2005	Pocock, Z., & Lawrence, R	Nil
58	Differential effects of artificial lighting on flight and foraging behaviour of two sympatric bat species in a desert	Website	2011	Polak, T., Korine, C., Yair, S., & Holderied, M	Refer to **Table 15.7**.
59	Edge-Effect Interactions in Fragmented and Patchy Landscapes	Website	2013	Porensky, L. M., & Young, T. P	Refer to **Table 15.7**.
60	National Multi-species Recovery Plan for the cycads, *Cycas megacarpa*, *Cycas ophiolitica*, *Macrozamia cranei*, *Macrozamia lomandroides*, *Macrozamia pauli-guilielmi* and *Macrozamia platyrhachis* (p. 50)	Website	2007	Queensland Herbarium	Nil
61	Marine Mammals and Noise	Website	2021	Richardson, W. J., Greene, C. R., Malme, C. I., & Thomson, D. H	Refer to **Table 15.7**.
62	A synthesis of two decades of research documenting the effects of noise on wildlife	Website	2016	Shannon, G., McKenna, M. F., Angeloni, M. L., Crooks, K. R., Fristrup, K. M., Brown, E., Warner, K. A., Nelson, M. D., White, C., Briggs, J., McFarland, S., & Wittemyer, G	Refer to **Table 15.7**.
63	Apia Convention	Website	2025	SPREP	Nil
64	AS 2187.2-2006 Explosives—Storage, transport and use—Part 2: Use of explosives	Website	2006	Standards Australia	Nil

Source	Title	Origin	Year	Author / Source	Uncertainties (if any)
65	Australia's biodiversity and climate change	Website	2009	Steffan, W., Burbidge, A., Hughes, L., Kitching, R., Lindenmayer, D., Musgrave, W., Stafford Smith, M., & Werner, P	Nil
66	Conservation Advice—Squatter Pigeon (*Geophaps scripta scripta*)	Website	2015	Threatened Species Scientific Committee	Nil
67	Conservation Advice *Bertya opponens*	Website	2016	Threatened Species Scientific Committee	Nil
68	Behavioral reactions of harbor porpoises to impact pile driving noise are predicted by the auditory frequency weighted sound pressure level	Website	2025	Tougaard, J	Refer to **Table 15.7**.
69	Environmental Guidelines for Construction and Operation of Roads	Website	2016	VicRoads	Nil
70	Global impacts of edge effects on species richness	Website	2022	Willmer, J. N. G., Püttker, T., & Prevedello, J. A	Refer to **Table 15.7**.
71	A review of koala habitat assessment criteria and methods	Website	2021	Youngentob, K. N., Marsh, K. J., & Skewes, J	Nil
72	Sound garden: How snakes respond to airborne and groundborne sounds	Website	2023	Zdenek, C., Staples, T., Hay, C., Bourke, L., & Candusso, D	Nil

Table 15.5 Chapter 8 References

Source	Title	Origin	Year	Author / Source	Uncertainties (if any)
1	Appendix 11–Terrestrial Ecology Supplementary EIS Study Arrow LNG Plant	Website	2012	3D Environmental	Nil
2	Atlas of Living Australia	Website	2025	Atlas of Living Australia (ALA)	Nil
3	Fisheries Guidelines for Fish Habitat Buffer Zones	Dataset	2000	Bavins, M., Couchman, D., and Beumer, J	Nil

Source	Title	Origin	Year	Author / Source	Uncertainties (if any)
4	Conservation Genetics of the Water Mouse, *Xeromys myoides* Thomas, 1889	Website	2014	Benfer, David, Andrew Baker, Tina Ball, Ian Gynther, Heather Janetzki, and Susan Fuller	Nil
5	"Sharp-Tailed Sandpiper (*Calidris acuminata*)." Handbook of Australian, New Zealand and Antarctic Birds. Volume 1 to 7	Website	2023	BirdLife Australia	Nil
6	"Birdlife Data Zone." Sites (International Bird Areas) - Map Search	Dataset	2024	Birdlife International	Nil
7	Species Factsheet: Oriental Cuckoo (*Cuculus Optatus*)	Website	2024	BirdLife International	Nil
8	Proceedings from the Workshop for the Nine Listed Reptiles of the Brigalow Belt Bioregions	Website	2010	Brigalow Belt Reptiles Workshop	Nil
9	New Locality Records for *Xeromys myoides* False Water-Rat within the Great Sandy and Wide-Bay-Burnett Management Areas: Results from Surveys Conducted February to April 1999 and March to May 2000	Website	2000	Burnham, M	Nil
10	Wetland and Stream Buffer Size Requirements—a Review	Website	1994	Castelle, AJ, Johnson AW, and Conolly C	Nil
11	Home Ranges, Time Budgets and Food Tree Use in a High Density Tropical Population of Greater Gliders, *Petauroides Volans Minor* (Pseudocheiridae: Marsupialia)	Website	1996	Comport, S.S, S.J Ward, and W.J Foley	Nil
12	Recovery Plan for the Collared Legless Lizard (*Delma Torquata*)	Website	1993	Davidson, C	Nil
13	Approved Conservation Advice for *Quassia Bidwillii* (Quassia)	Website	2008	Department of Agriculture, Water and the Environment (DAWE)	Nil

Source	Title	Origin	Year	Author / Source	Uncertainties (if any)
14	Conservation Advice for *Xeromys myoides* (Water Mouse)	Website	2021a	Department of Agriculture, Water and the Environment (DAWE)	Nil
15	National Recovery Plan for the Grey-Headed Flying-Fox *Pteropus poliocephalus*	Website	2021b	Department of Agriculture, Environment and Water (DAWE)	Nil
16	National Recovery Plan for the Painted Honeyeater (*Grantiella picta*)	Website	2021c	Department of Agriculture, Water and the Environment (DAWE)	Nil
16	Northern Quoll (*Dasyurus hallucatus*) Advice to the Minister for the Environment and Heritage from the Threatened Species Scientific Committee (TSSC) on Amendments to the List of Threatened Species under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)	Website	2021d	Department of Agriculture, Water and the Environment (DAWE)	Nil
17	Approved Conservation Advice for the Subtropical Eucalypt Floodplain Forest and Woodland of the New South Wales North Coast and South East Queensland Bioregions	Website	2022a	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
18	Conservation Advice for *Petaurus australis australis* (Yellow-Bellied Glider (South-Eastern)	Website	2022b	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
19	Conservation Advice for *Petauroides volans* (Greater Glider (Southern and Central))	Website	2022c	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
20	Conservation Advice for *Phascolarctos cinereus* (Koala) Combined Populations of Queensland, New South Wales and the Australian Capital Territory	Website	2022d	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil

Source	Title	Origin	Year	Author / Source	Uncertainties (if any)
21	National Recovery Plan for the Australian Painted Snipe (*Rostratula australis*)	Website	2022e	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
22	National Recovery Plan for Black-Breasted Button-Quail (*Turnix melanogaster*)	Website	2022f	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
23	National Recovery Plan for the Koala *Phascolarctos cinereus* (Combined Populations of Queensland, New South Wales and the Australian Capital Territory)	Website	2022g	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
24	National Recovery Plan for the Water Mouse (*Xeromys myoides*)	Website	2022h	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
25	Approved Conservation Advice for Semi-Evergreen Vine Thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Website	2023a	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
26	Conservation Advice for *Calidris acuminata* (Sharp-Tailed Sandpiper).	Website	2023b	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
27	Conservation Advice for *Calidris ferruginea* (Curlew Sandpiper)	Website	2023c	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
28	Conservation Advice for *Charadrius leschenaultii* (Greater Sand Plover)	Website	2023d	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
29	Conservation Advice for *Numenius madagascariensis* (Far Eastern Curlew)	Website	2023e	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil

Source	Title	Origin	Year	Author / Source	Uncertainties (if any)
30	Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles	Website	2023f	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
31	Conservation Advice for *Gallinago hardwickii* (Latham's Snipe)	Website	2024g	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
32	Conservation Advice for *Arenaria interpres* (Ruddy Turnstone)	Website	2024h	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
33	Conservation Advice for *Calidris canutus* (Red Knot)	Website	2024i	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
34	Conservation Advice for *Limosa lapponica baueri* (Alaskan Bar-tailed Godwit)	Website	2024j	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
35	Conservation Advice for *Tringa nebularia* (Common Greenshank)	Website	2024k	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
36	*Cycas Megacarpa* in Species Profile and Threats Database	Website	2024l	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
37	*Xenus cinereus* (Terek Sandpiper) Conservation Advice	Website	2024m	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
38	"*Arenaria interpres* — Ruddy Turnstone." Species Profile and Threats Database	Website	2025a	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
39	"*Calidris acuminata* — Sharp-Tailed Sandpiper." Species Profile and Threats Database	Website	2025b	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil

Source	Title	Origin	Year	Author / Source	Uncertainties (if any)
40	"*Calidris canutus* — Red Knot." Species Profile and Threats Database	Website	2025c	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
41	"*Calidris tenuirostris* — Great Knot." Species Profile and Threats Database	Website	2025d	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
42	"*Caretta caretta* in Species Profile and Threats Database." Species Profile and Threats Database	Website	2025e	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
43	"*Charadrius leschenaultii* — Greater Sand Plover, Large Sand Plover." Species Profile and Threats Database	Website	2025f	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
44	*Chelonia mydas* in Species Profile and Threats Database	Website	2025g	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
45	*Dasyurus hallucatus* in Species Profile and Threats Database	Website	2025h	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
46	Draft National Recovery Plan for Greater Gliders Petauroides Minor (Northern) *Petauroides volans* (Southern and Central)	Website	2025i	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
47	"*Geophaps scripta scripta* — Squatter Pigeon (Southern). Species Profile and Threats Database	Website	2025j	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
48	"*Hirundapus caudacutus* — White-Throated Needletail." Species Profile and Threats Database	Website	2025k	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
49	"*Pandion haliaetus* — Osprey." Species Profile and Threats Database	Website	2025l	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil

Source	Title	Origin	Year	Author / Source	Uncertainties (if any)
50	"*Petaurus australis australis* — Yellow-Bellied Glider (South-Eastern)." Species Profile and Threats Database	Website	2025m	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
51	Species Profile and Threats Database	Website	2025n	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
52	Species Profile – *Cossinia australiana*	Website	2022	Department of Environment and Science (DES)	Nil
53	Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles	Website	2011	Department of Sustainability Environment Water Population and Communities (DSEWPC)	Nil
54	Conservation Advice for Subtropical and Temperate Coastal Saltmarsh	Website	2013	Department of Sustainability Environment Water Population and Communities (DSEWPC)	Nil
55	Commonwealth Listing Advice on Semi-Evergreen Vine Thickets of the Brigalow Belt (North and South) and Nandewar Bioregion	Website	2001	Department of the Environment (DoE)	Nil
56	Matters of National Environmental Significance: Significant Impact Guidelines 1.1	Website	2013	Department of the Environment (DoE)	Nil
57	Referral Guideline for 14 Birds Listed as Migratory Species under the EPBC Act	Website	2015a	Department of the Environment (DoE)	Nil
58	Referral Guideline for the Vulnerable Water Mouse *Xeromys myoides*	Website	2015b	Department of the Environment (DoE)	Nil
59	Wildlife Conservation Plan for Migratory Shorebirds	Website	2015c	Department of the Environment (DoE)	Nil
60	EPBC Act Referral Guidelines for the Endangered Northern Quoll *Dasyurus hallucatus*	Website	2016	Department of the Environment (DoE)	Nil

Source	Title	Origin	Year	Author / Source	Uncertainties (if any)
62	EPBC Act Policy Statement 3.21: Industry Guidelines for Avoiding, Assessing and Mitigating Impacts on EPBC Act Listed Migratory Shorebird Species	Website	2017a	Department of the Environment and Energy (DoEE)	Nil
63	Recovery Plan for Marine Turtles in Australia	Website	2017b	Department of the Environment and Energy (DoEE)	Nil
64	WildNet Database	Website	2025	Department of the Environment, Tourism, Science and Innovation (DETSI)	Nil
65	Approved Conservation Advice for *Atalaya Collina*	Website	2008a	Department of the Environment, Water, Heritage and the Art (DEWHA)	Nil
66	Approved Conservation Advice for *Cossinia australiana* (Cossinia)	Website	2008b	Department of the Environment, Water, Heritage and the Art (DEWHA)	Nil
67	Approved Conservation Advice for *Delma torquata* (Collared Delma)	Website	2008c	Department of the Environment, Water, Heritage and the Art (DEWHA)	Nil
68	Approved Conservation Advice for *Quassia bidwillii* (Quassia)	Website	2008d	Department of the Environment, Water, Heritage and the Art (DEWHA)	Nil
69	Approved Conservation Advice for *Trymalium minutiflorum*	Website	2008e	Department of the Environment, Water, Heritage and the Art (DEWHA)	Nil
70	Guide to Greater Glider Habitat in Queensland	Website	2022	Eyre, T.J., G.C. Smith, M.F. Venz, et al	Nil
71	Floristics and Environmental Relations of Inland Dry Rainforest in North Queensland, Australia	Website	1995	Fensham, R	Nil
72	The Action Plan for Australian Birds 2020	Website	2022	Garnett, S.T., T. Baker, and G. Barry	Nil
73	The Action Plan for Australian Birds 2010	Website	2011	Garnett, Stephen, J Szabo, and G Dutson	Nil
74	Handbook of Australian, New Zealand and Antarctic Birds. Volume 4: Parrots to Dollarbird	Website	1999	Higgins, P.J	Nil

Source	Title	Origin	Year	Author / Source	Uncertainties (if any)
77	Handbook of Australian, New Zealand & Antarctic Birds. 3: 104–13	Website	1996	Higgins, P.J., and S.J.J.F. Davies	Nil
78	National Recovery Plan for the Northern Quoll *Dasyurus hallucatus*	Website	2010	Hill, B.M., and S.J. Ward	Nil
79	National Recovery Plan for the "Semi-Evergreen Vine Thickets of the Brigalow Belt (North and South) and Nandewar Bioregions" Ecological Community	Website	2010	McDonald, W.J.F	Nil
80	Genetic Evidence Supports Three Previously Described Species of Greater Glider, *Petauroides volans*, *P. minor*, and *P. armillatus*	Website	2020	McGregor, D.C, A Padovan, A Georges, A Krockenberger, H-J Yoon, and K.N Youngentob	Nil
81	Conservation Ecology, Genetics and Propogation of the Threatened Species *Samadera bidwillii*	Website	2016	Naik, V., Ashwath, N., Lamont, R., Shapcott, A.	Nil
82	Bertya Sp. Cobar-Coolabah (Cunningham & Milthorpe s.n., 2/8/73) Recovery Plan	Website	2002	NSW National Parks and Wildlife	Nil
83	East Asian-Australasian Flyway Site Network: October 2008	Website	2008	Partnership for the East Asian-Australasian Flyway	Nil
84	Survey Results and Management Options for the Collared Delma (*Delma torquata*) along the Proposed Toowoomba Bypass, Toowoomba Range, South-East Queensland, November 2006	Website	2007	Peck, S, and R Hobson	Nil
85	A Preliminary Field Investigation of the Collared Delma *Delma torquata* (Reptilia: Pygopodidae)	Website	1998	Porter, R	Nil
86	Species Profile—*Polianthion minutiflorum*	Website	2012	Queensland Government	Nil

Source	Title	Origin	Year	Author / Source	Uncertainties (if any)
87	National Multi-Species Recovery Plan for the Cycads, *Cycas megacarpa*, *Cycas ophiolitica*, *Macrozamia cranei*, *Macrozamia lomandroides, Macrozamia pauli-guilielmi* and *Macrozamia platyrhachis*	Website	2007	Queensland Herbarium	Nil
88	Conservation Management Profile: Collared Delma *Delma torquata*	Website	2006	Ryan, S	Nil
89	Status of the White-Throated Needletail *Hirundapus caudacutus* in Australia: Evidence for a Marked Decline	Website	2014	Tarburton, M.K	Nil
90	Conservation Advice - Squatter Pigeon (*Geophaps scripta scripta*)	Website	2015a	Threatened Species Scientific Committee	Nil
91	Conservation Advice*, Grantiella picta*, Painted Honeyeater	Website	2015b	Threatened Species Scientific Committee	Nil
92	Conservation Advice *Turnix melanogaster* Black-Breasted Button-Quail	Website	2015c	Threatened Species Scientific Committee	Nil
93	Conservation Advice *Bertya opponens* Conservation	Website	2016	Threatened Species Scientific Committee	Nil
94	Conservation Advice *Charadrius mongolus* Lesser Sand Plover	Website	2016	Threatened Species Scientific Committee	Nil
95	Conservation Advice: *Hirundapus caudacutus* (White-Throated Needletail)	Website	2019	Threatened Species Scientific Committee	Nil
98	Gladstone Ports Corporation Report for Migratory Shorebird Monitoring - Port Curtis and the Curtis Coast Annual Report–2019. Report produced for the Ecosystem Research and Monitoring Program Advisory Panel as part of Gladstone Ports Corporation's	Website	2020	Wildlife Unlimited	Nil

Source	Title	Origin	Year	Author / Source	Uncertainties (if any)
	Ecosystem Research and Monitoring Program				
99	A Complete Guide to Reptiles of Australia. Seventh	Website	2025	Wilson, Steve K, and Gerry Swan	Nil
100	Petaurus Australis. The IUCN Red List of Threatened Species 2016	Website	2016	Woinarski, J., A.A. Burbidge, and C.N Johnson	Nil
101	Surviving the Toads: Patterns of Persistence of the Northern Quoll *Dasyurus hallucatus* in Queensland	Website	2008	Woinarski, J.C.Z., M. Oakwood, J. Winter, et al	Nil
102	A Review of Koala Habitat Assessment Criteria and Methods	Website	2021	Youngentob, Kara N, Karen J Marsh, and James Skewes	Nil

Table 15.6 Chapter 10 References

Source	Title	Origin	Year	Reliability	Uncertainties (if any)
1	Species of National Environmental Significance and selected marine and cetacean species	Website	2024	Department of Climate Change, Energy, the Environment and Water (DCCEEW)	Nil
2	Potential habitat models—2022—Queensland Series	Dataset	2022	Department of Environment and Science (DES)	Nil

Table 15.7 Source Review

Source	Title	Origin	Uncertainties and Considerations	Justification
Azam, C., Le Viol, I., Bas, Y., Zissis, G., Vernet, A., Julien, J., & Kerbiriou, C	Evidence for distance and illuminance thresholds in the effects of artificial lighting on bat activity	France	Its findings are based on French species, which may differ from Australian species.	**Reliability:** Published in *Landscape and Urban Planning*, a peer-reviewed journal, relies on rigorous methodology and credibility. **Currency:** Published in 2018, reflects contemporary scientific understanding of light pollution's effects on bats, and remains relevant

Source	Title	Origin	Uncertainties and Considerations	Justification
				given ongoing concerns about artificial lighting and wildlife. **Relevance:** The research establishes distance and illuminance thresholds for artificial lighting impacts on bat activity. Provides essential baseline data.
Bennie, J., Davies, T., Cruse, D., Bell, F., & Gaston, K	Artificial light at night alters grassland vegetation species composition and phenology.	United Kingdom	UK species composition, climate and soils differ from Australia.	**Reliability:** Published in *Journal of Applied Ecology*, peer-reviewed journal in ecology with methodological and scientific credibility. **Currency:** Published in 2017, insights remain relevant amid ongoing research on ecological impacts of light pollution **Relevance:** provides foundational insights into management of light impacts on grasslands.
Buxton, R. T., McKenna, M. F., Mennitt, D. J., Brown, E., Fristrup, K. M., Crooks, K. R., Angeloni, L., & Wittemeyer, G	Noise pollution is pervasive in U.S. protected areas.	United States	US protected areas differ in from Australian	**Reliability:** Published in *Science*, peer-reviewed scientific journals globally, obtains rigorous methodology and high credibility. **Currency:** Published in 2017, findings remain relevant for understanding anthropogenic noise as a widespread ecological stressor. **Relevance:** provides foundational insights into the scale and ecological implications of noise

Source	Title	Origin	Uncertainties and Considerations	Justification
Christensen, C., Christensen-Dalsgaard, J., Brandt, C., & Teglberg Madsen, P	Hearing with an atympanic ear: Good vibration and poor sound-pressure detection in the royal python, Python regius.	Danish	Study based on non-australian species.	**Reliability:** Published in *Journal of Experimental Biology*, peer-reviewed journal that maintains high standards in experimental zoology and physiological research. **Currency:** Published in 2012, the study offers foundational and baseline data on snake auditory mechanics. **Relevance:** findings on vibration sensitivity are directly relevant to ecological assessments involving groundborne disturbances.
Davis, A., Schroeder, H., Yeager, I., & Pearce, J	Effects of simulated highway noise on heart rates of larval monarch butterflies, Danaus plexippus: Implications for roadside habitat suitability.	United States	This study is based on US butterflies and highway conditions, which may differ from Australian contexts.	**Reliability:** Published in *Environmental Pollution*, peer-reviewed journal that ensures high scientific standards for research on environmental stressors and their biological impacts. **Currency:** Published in 2023, recent and highly relevant to current understanding of anthropogenic noise impacts on wildlife physiology. **Relevance:** examines how simulated highway noise affects the heart rates of monarch butterfly larvae, providing insights into physiological stress responses to noise. Provides insights into potential impacts of noise on other taxa in roadside habitats.

Source	Title	Origin	Uncertainties and Considerations	Justification
Delaney, D. K., Grubb, T. G., Beier, P., Pater, L., & Reiser, M. H	Effects of helicopter noise on Mexican spotted owls.	United States	Mexican spotted owls differ from Australian raptors in ecology, physiology, and sensitivity to noise.	**Reliability:** Published in *Journal of Wildlife Management*, peer-reviewed journal that ensures high scientific standards for wildlife ecology and management research. **Currency:** Published in 1999, while not recent, it remains a key study on noise impacts on sensitive bird species and is still cited in contemporary literature on anthropogenic noise effects. **Relevance:** Provides evidence into behavioural and physiological responses of owl species. Uniquely examines helicopter noise, providing foundational insights into how aircraft noise can affect avian species.
Farmer, A. M	The effects of dust on vegetation—A review.	International publication	Ages research and based on foreign context.	**Reliability:** Published in *Environmental Pollution*, peer-reviewed international journal that ensures rigorous scientific standards for environmental impact research. **Currency**: Published in 1993, while some newer studies exist, this review remains a foundational reference summarising mechanisms and impacts of dust deposition on vegetation. **Relevance**: The paper provides background from synthesising global research on how dust affects plant

Source	Title	Origin	Uncertainties and Considerations	Justification
				physiology, growth, and community composition.
Francis, C., & Barber, R	A framework for understanding noise impacts on wildlife: An urgent conservation priority.	United States	Based on US species which may differ from Australian species.	**Reliability**: Published in *Frontiers in Ecology and the Environment*, peer-reviewed journal known for synthesiSing ecological research into actionable frameworks. **Currency**: Published in 2013, this paper remains influential because it provides a conceptual framework widely cited in noise impact research. **Relevance**: Provides insight into mitigating noise impacts on wildlife, offering principles which can be applies to environmental assessments where anthropogenic noise is a concern.
Goudie, R., & Jones, I	Dose-response relationships of harlequin duck behaviour to noise from low-level military jet over-flights in central Labrador.	Canada	Study conducted in Labrador on harlequin ducks. Species not present in Australia. Behavioral responses may differ for local avi-fauna.	**Reliability**: Published in a peer-reviewed scientific journal by recognised researchers in wildlife ecology and noise impact studies. **Currency**: The publication year unknown. Considering this, relied upon appropraitely. **Relevance**: insight into wildlife behavioral responses to anthropogenic noise.
Grubisic, M., Haim, A., Bhusal, P., Dominoni, D., Gabriel, K., Jechow, A., Kupprat, F., Lerner, A.,	Light pollution, circadian photoreception, and melatonin in vertebrates.	Eurpoean study	Research is based on data from Europe and Israel, so species-specific responses and	**Reliability**: Peer-reviewed article published in *Sustainability* by MDPI with authors from reputable international institutions.

Source	Title	Origin	Uncertainties and Considerations	Justification
Marchant, P., Riley, W., Stebelova, K., Van Grusven, R., Zeman, M., Zubidat, A., & Holker, F			environmental conditions may differ from those in Australia.	**Currency**: Published in November 2019, making it relatively recent and still relevant for light pollution research. **Relevance**: Directly addresses artificial light impacts on vertebrates, which is applicable to environmental planning and biodiversity protection in Queensland.
Kaseloo, P., & Tyson, K	Synthesis of noise effects on wildlife populations.	United States	Based on U.S. context and species, findings may not fully apply to Australian fauna or regulatory frameworks.	**Reliability**: Published by the U.S. Department of Transportation. **Currency**: Publication date 2004, still widely cited as a foundational review. **Relevance**: Directly addresses noise effects on wildlife populations, which is highly relevant for assessing impacts to fauna.
Kight, C. R., & Swaddle, J. P	How and why environmental noise impacts animals: An integrative, mechanistic review.	United States	Based on global literature rather than Australian-specific studies, species responses and regulatory context may differ.	**Reliability**: Peer-reviewed article published in *Biological Reviews*, a highly respected journal in the biological sciences. **Currency**: Published in 2011, widely cited as a foundational review. **Relevance**: Provides a comprehensive mechanistic framework for understanding noise impacts on animals.
Kolbe, J., Moniz, H., Lapiedra, O., & Thawley, C	Bright lights, big city: An experimental assessment of short-term behavioral and performance effects of	United States	Study focuses on Anolis lizards, which are native to th America and not found in Australia.	**Reliability**: Peer-reviewed article published in the *Urban Ecosystems*, a reputable scientific journal.

Source	Title	Origin	Uncertainties and Considerations	Justification
	artificial light at night on Anolis lizards.			**Currency**: Published in 2021, highly relevant for current research on artificial light at night. **Relevance**: Directly examines behavioral and performance effects of artificial light on lizards, which is useful for understanding ALAN impacts on reptiles near development sites.
Landon, D., Krausman, P., Kiana, K., & Harris, L	Pronghorn use of areas with varying sound pressure levels.	United States	Based on U.S. context and species, findings may not fully apply to Australian environment. Australian aero or road use may produce different acoustic profiles.	**Reliability**: The study is peer-reviewed, appearing in The *Southwestern Naturalist*, using objective fieldwork using radiocollared animals. **Currency**: Published in 2003, while not recent, its findings are still valid for baseline comparisons in sound disturbance research. **Relevance**: Investigates wildlife behaviour in relation to sound pressure levels.
Lawrence, M. J., Stemberer, H. L. J., Zolderdo, A. J., Struthers, D. P., & Cooke, S. J	The effects of modern war and military activities on biodiversity and the environment.	Canada	The ecosystems and military operations examined are based on North American and European environments which may differ from Australian context.	**Reliability**: Published in a peer-reviewed scholarly journal, *Environmental Reviews*, backed by Canadian Science Publishing. **Currency**: Published in September 2015, it remains relatively recent within environmental science contexts. **Relevance**: provides insights into recovery mechanisms from exclusion zones or reduced human presence,

Source	Title	Origin	Uncertainties and Considerations	Justification
				potentially informing mitigation strategies.
Millidine, K., Malcolm, I., McCartney, A., Laughton, R., Gibbins, C., & Fryer, R	The influence of wind farm development on the hydrochemistry and ecology of an upland stream.	United Kingdom	Australian ecosystems have different geological, climatic, and biological characteristics, to those examined in the study (Scotland).	**Reliability**: Published in *Environmental Monitoring and Assessment*, a peer-reviewed journal with a strong focus on environmental impacts. **Currency**: Data collected during five years spanning wind farm construction, published in July 2015. **Relevance**: methodology and identification of directional changes provide a foundational framework and baseline for comparative analysis in Australian environments.
Murcia, C	Edge effects in fragmented forests: Implications for conservation.	Columbia	The review uses edge effects primarily in tropical and temperate forests outside Australia.	**Reliability**: Published in *Trends in Ecology & Evolution*, a peer-reviewed journal. **Currency:** Published in 1995, while foundational, newer research may refine these concepts, especially under climate change and modern land-use patterns. **Relevance**: Highly relevant for understanding edge effects and fragmentation impacts..
Ouyang, J., de Jong, M., Hau, M., Visser, M., Van Grusven, R., & Spoelstra, K	Stressful colours: Corticosterone concentrations in a free-living songbird vary with the spectral composition	Netherlands	The study focuses on European songbirds (great tits) in temperate forests. Australian species differ in physiology and ecology, so stress responses to artificial light may differ.	**Reliability**: Published in a peer-reviewed journal, *Biology Letters*. **Currency**: Published in 2015, still relevant for light pollution and wildlife stress research.

Source	Title	Origin	Uncertainties and Considerations	Justification
	of experimental illumination.			**Relevance**: Highly relevant for understanding artificial light impacts on wildlife, especially physiological stress.
Piniak, W. E. D	Acoustic ecology of sea turtles: Implications for conservation.	United States	The study focuses on sea turtle species and habitats in the U.S., which differ from Australian marine environments and species	**Reliability**: Produced by NOAA, a reputable government scientific agency. **Currency**: Published in 2012, relevant for baseline understanding of acoustic ecology. **Relevance**: assessment of underwater noise impacts on marine turtles, as it addresses hearing sensitivity, behavioral responses, and conservation implications.
Polak, T., Korine, C., Yair, S., & Holderied, M	Differential effects of artificial lighting on flight and foraging behaviour of two sympatric bat species in a desert.	Israel	Focuses on desert ecosystems in Israel, which differ from Australian habitats.	**Reliability**: Published in *Journal of Zoology*, a peer-reviewed journal. **Currency**: Published in 2011, still relevant for understanding light pollution effects on bats. **Relevance**: provides insights into artificial light impacts on nocturnal wildlife.
Porensky, L. M., & Young, T. P	Edge-Effect Interactions in Fragmented and Patchy Landscapes.	United States	North American savanna and grassland systems, which differ from Australian ecosystems.	**Reliability**: Published in *Conservation Biology*, a peer-reviewed journal. **Currency**: Published in 2013, making it relatively recent and still relevant for fragmentation and edge-effect research. **Relevance**: Highly relevant for understanding edge-effect

Source	Title	Origin	Uncertainties and Considerations	Justification
				interactions and their implications for conservation planning.
Richardson, W. J., Greene, C. R., Malme, C. I., & Thomson, D. H	Marine Mammals and Noise.	United States	The authors and publisher are based in the United U.S, therefrore the research is not within an Australian context.	**Reliability**: Published by Academic Press, a reputable scientific publisher. **Currency**: Published in 1995, making it older. Provides foundational data on noise levels, species sensitivity, and mitigation technologies. **Relevance**: provides baseline knowledge on hearing, behaviour, and conservation implications.
Shannon, G., McKenna, M. F., Angeloni, M. L., Crooks, K. R., Fristrup, K. M., Brown, E., Warner, K. A., Nelson, M. D., White, C., Briggs, J., McFarland, S., & Wittemyer, G	A synthesis of two decades of research documenting the effects of noise on wildlife.	United States	The synthesis draws heavily on studies from North America and Europe, where species, habitats, and anthropogenic noise sources differ from those in Australia.	**Reliability**: Published in *Biological Conservation*, peer-reviewed journal. **Currency**: Published in 2015, making it relatively recent and still relevant for noise impact assessments. **Relevance**: provides a broad range of documented effects and management implications.
Tougaard, J	Behavioral reactions of harbor porpoises to impact pile driving noise are predicted by the auditory frequency weighted sound pressure level	Denmark	Study focuses on harbor porpoises in Danish waters, which differ from Australian marine environments and species.	**Reliability**: Published in *The Journal of the Acoustical Society of America*, a peer-reviewed. **Currency**: Published in 2015, making it relatively recent and still relevant for understanding pile-driving noise impacts. **Relevance**: provides insights into behavioural responses and sound weighting.

Source	Title	Origin	Uncertainties and Considerations	Justification
Willmer, J. N. G., Püttker, T., & Prevedello, J. A	Global impacts of edge effects on species richness	Brazil	Global study, most underlying datasets come from regions outside Australia.	**Reliability**: Published in *Biological Conservation*, peer-reviewed journal. **Currency**: Published in 2023, making it very recent and highly relevant for current conservation science. **Relevance**: involving fragmentation and edge effects, as it quantifies global patterns and drivers of species richness changes near edges.

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