Appendix E

Ecology Technical Report (Substation)

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Kidston Connection Project
Powerlink Queensland
13-Sep-2018

Terrestrial Ecology Assessment

Mount Fox Substation

Terrestrial Ecology Assessment

Mount Fox Substation

Client: Powerlink Queensland

ABN: 82 078 849 233

Prepared by

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13-Sep-2018

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Executive Summary

AECOM Australia Pty Ltd (AECOM) has been engaged by Powerlink Queensland (Powerlink) to undertake a terrestrial ecology assessment of a potential location for a new electricity substation associated with its Genex Kidston Connection Project (the Project). The substation site is located at Mount Fox, Queensland.

The aim of the terrestrial ecology assessment was to document the species and habitat types within the Project site, with particular reference to the occurrence of conservation significant species, and to recommend mitigation measures to minimise potential impacts from the Project.

The terrestrial ecology assessment was a two stage process involving a desktop assessment followed by a field survey in July 2018. The desktop assessment analysed existing data to identify conservation significant flora and fauna species, vegetation communities and potential habitat values present. This review formed the basis of the field survey, in which habitat for potentially present conservation significant species was assessed and ecological values documented.

Key findings of the assessment include the following.

- The majority of the Project site contains Of Concern remnant vegetation. Non-remnant vegetation occurs underneath the existing Ergon easement.
- No conservation significant flora or fauna species, or migratory species were identified within the Project site.
- Five conservation significant fauna species are considered to have a moderate or high likelihood of occurring within the Project site.
- Mitigation measures to minimise potential impacts to conservation significant fauna and flora species have been provided where practical. Agreed measures will be incorporated into the design process and may include:
    - Vegetation clearing to be minimised (where possible) due to the high number of tree hollows that may provide habitat for conservation significant fauna species.
    - Appropriate erosion and sediment control measures should be installed and maintained.
    - A Biosecurity Management Plan should be developed and implemented which will cover the construction and operation periods of the Project.
    - Pre-clearance surveys to identify shelters and breeding places potentially utilised by Least Concern species, colonial breeders and conservation significant fauna should be undertaken.

The findings from this report are now being incorporated into the Project Draft Environmental Assessment Report which will potentially be released in the second half of 2018. Once finalised and subject to the Project proceeding, the report will be submitted to the Queensland Department of State Development, Manufacturing, Infrastructure and Planning for approval by the Minister under the Infrastructure Designation provisions of the *Planning Act 2016*.

1.0 Introduction

AECOM Australia Pty Ltd (AECOM) has been engaged by Powerlink Queensland (Powerlink) to undertake a terrestrial ecology assessment of a potential location for a new electricity substation associated with its Genex Kidston Connection Project (the Project). The substation site is located at Mount Fox, Queensland (Figure 1).

1.1 Aims and Objectives

The aim of the terrestrial ecology assessment was to document the terrestrial ecological values within and adjacent to the site with particular reference to the occurrence of conservation significant ecological values (Section 2.3). In meeting this aim the objectives were as follows.

- Undertake a desktop assessment of existing terrestrial ecology data for the site.
- Complete a field survey during the post-wet season (July 2018), specifically considering:
  - Flora:
    - "Ground truthing" representative sample sites within targeted mapped regional ecosystems (REs).
    - Identification of weed species, including those declared noxious under State legislation and local policy.
    - Targeted surveys to confirm the presence of populations and suitable habitat for conservation significant flora species identified on the desktop assessment.
  - Fauna:
    - Habitat assessments describing landform characteristics, habitat size, shape, integrity and connectivity with other habitats, and important habitat features (e.g. vegetation structure, water sources, food plant availability, cliffs, rocks, tree hollows, fallen timber).
    - Surveys for animal signs (e.g. diggings, scats, tracks, tree-scratchings, remains) within representative habitat.
    - Visual and auditory identification surveys of birds.
    - Direct searches under leaf litter, bark and rocks for reptiles and amphibians.
    - Opportunistic observations of all faunal groups (including feral or exotic animals).
- Identify potential impacts of the Project on ecological values and provide recommendations for measures to avoid or mitigate adverse impacts at the construction and operational phases of the Project.

1.2 Project Site

The Project site assessed in this report is a 7.5 hectare (ha) plot located on Lot 59/SP237064 (freehold). A clearing buffer of 50 metres (m) is included in the plot to allow for earthworks, site offices, parking and other temporary structures. The Project site is within the Hinchinbrook Shire Council Local Government Area. The nearest population centre is Ingham, approximately 80 kilometres (km) north-east of the Project site (Figure 1).

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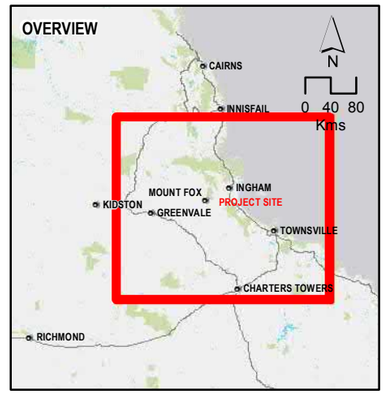
Legend

- Places
- Highways
- Project Site



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Substation Ecology Report

Project Context

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Figure
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2.0 Regulatory Framework

2.1 Commonwealth

2.1.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) establishes a process for environmental assessment and approval of proposed actions that have, will have or are likely to have a significant impact on Matters of National Environmental Significance (MNES) or on Commonwealth land.

MNES are outlined in the EPBC Act to include:

- World Heritage Properties
- National Heritage Places
- Wetlands of International Importance (listed under the Ramsar Convention)
- Listed Threatened Species and Ecological Communities
- Migratory Species (listed under international agreements)
- Commonwealth Marine Areas
- Great Barrier Reef Marine Park
- A Water Resource, in relation to coal seam gas development and large coal mining development.

Under the EPBC Act, a referral to the Department of the Environment and Energy (DoEE) would be required if the Project had the potential to cause a 'significant impact' on MNES. The determination is made with reference to the *Matters of National Environmental Significance Significant Impact Guidelines 1.1* (DoE, 2013) and other EPBC Act policy statements including significant impact guidelines for individual threatened species, groups of species and threatened ecological communities.

2.1.2 Weeds of National Significance

Thirty two (32) Weeds of National Significance (WoNS) have been agreed by Australian governments using an assessment process that prioritised these weeds based on their invasiveness, potential for spread and environmental, social and economic impacts. For the existing 32 WoNS, customised and targeted plans have been developed. The presence of WoNS within the Project site was assessed during the field survey.

2.2 Queensland

2.2.1 Nature Conservation Act 1992

The object of the *Nature Conservation Act 1992* (NC Act) is "the conservation of nature" (Section 4, NC Act). In support of the NC Act, the *Nature Conservation (Wildlife) Regulation 2006* lists 'protected wildlife' (flora and fauna species), which are considered to be 'Extinct in the Wild', 'Endangered', 'Vulnerable', 'Near Threatened' and 'Least Concern' wildlife. Under Sections 88 and 89 of the NC Act, it is an offense to take or use protected wildlife, which is outside a 'protected area', unless exemptions apply or an approval (e.g. clearing permit) is obtained from the Department of Environment and Science (DES). The presence of conservation significant flora and fauna species was assessed during the survey.

2.2.1.1 Protected Plants Flora Survey Trigger Map

In Queensland, all plants that are native to Australia are protected plants under the NC Act to prevent whole plants or protected plant parts from being illegally removed from the wild or illegally traded. The protected plants flora survey trigger map shows high risk areas for protected plants and is used to help determine flora survey and clearing permit requirements for a particular location. High risk areas represent areas where Endangered, Vulnerable or Near Threatened plants are known to exist or are likely to exist.

Where clearing occurs within a high risk area, a flora survey is required to determine the presence of protected plants within the clearing impact area. The flora survey must then be lodged with DES to either obtain an approval, or an exemption notice (if none present).

2.2.2 Environmental Protection Act 1994

The object of the *Environmental Protection Act 1994* (EP Act) is to protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends (ecologically sustainable development) (refer Section 3, EP Act).

The EP Act provides the key legislative framework for the protection of the environment in Queensland. Section 319 of the EP Act imposes a 'general environmental duty', which specifies that a person must not undertake any activity that may harm the environment without taking reasonable and practical measures to prevent or minimise the harm.

2.2.3 Vegetation Management Act 1999

The Queensland *Vegetation Management Act 1999* (VM Act) regulates the clearing of native vegetation in Queensland. The purpose of the VM Act is to regulate the clearing of vegetation in a way that: (a) conserves remnant vegetation; (b) conserves vegetation in declared areas; (c) ensures that clearing does not cause land degradation; (d) prevents the loss of biodiversity; (e) maintains ecological processes; (f) manages the environmental effects of the clearing to achieve the matters mentioned in paragraphs (a) to (e); and (g) reduces greenhouse gas emissions (refer Section 3(1) of the VM Act).

The VM Act protects and regulates the clearing of native vegetation including 'remnant' and 'high value regrowth' (HVR) vegetation (shown as Category B and C on the Regulated Vegetation Management Map) on freehold land, Indigenous land and State tenures. The VM Act also protects and regulates the clearing of areas designated for offsets or compliance.

2.2.3.1 Essential Habitat

Essential habitat is regulated under the VM Act and is vegetation in which threatened species listed under the NC Act have been known to occur. Clearing of essential habitat is assessed through the development assessment process under the *Planning Act 2016*. Where clearing cannot be reasonably avoided or minimised, an offset may occur.

2.2.4 Biosecurity Act 2014

The *Biosecurity Act 2014* is administered by the Department of Agriculture and Fisheries (DAF). The Act provides management measures to protect agricultural and tourism industries and the environment from pests, diseases and contaminants.

Under the Act, invasive plants and animals are categorised as either a 'Prohibited Matter' or a 'Restricted Matter' and replace the 'Declared' status under the superseded *Land Protection (Pest and Stock Route Management) Act 2002*.The *Biosecurity Act 2014* also requires every local government in Queensland to develop a biosecurity plan for their area.

Invasive plants and animals will be further assessed through secondary surveys and the Environmental Assessment Report prepared in support of the Infrastructure Designation process. Biosecurity Management Plans will be developed to support construction of the Project and to achieve requirements under the *Biosecurity Act 2014*.

2.2.5 Electricity Act 1994

The *Electricity Act 1994* sets out the requirements which all electricity industry participants must follow to ensure a safe, efficient and reliable supply of electricity. It also requires that the supply of electricity is undertaken in an environmentally sound manner. Under Section 31(b) of the *Electricity Act 1994*, a transmission entity is required to properly take into account the environmental effects of its activities under the transmission authority.

Section 112A of the *Electricity Act 1994* makes clearing of native vegetation on freehold land accepted development if the clearing is for operating works for a transmission entity on land designated for the operating works by a Minister under the *Planning Act 2016*.

2.3 Classifications of Conservation Values

Conservation significant flora and fauna are assigned status according to Queensland or Commonwealth legislation as described in the:

- NC Act and the subordinate *Nature Conservation (Wildlife) Regulation 2006*
- EPBC Act.

Conservation significant species are listed under the NC Act in the following categories:

- Extinct in the Wild
- Endangered
- Vulnerable
- Near Threatened
- Special Least Concern (Least Concern species of special cultural significance: the short-beaked echidna (*Tachyglossus aculeatus*) and the platypus (*Ornithorhynchus anatinus*)).

Conservation significant species are listed under the EPBC Act in the following categories:

- Extinct
- Extinct in the Wild
- Critically Endangered
- Endangered
- Vulnerable.

The EPBC Act also identifies and protects Threatened Ecological Communities (TECs). Types of TECs listed under the EPBC Act include woodlands, grasslands, shrublands, forests, wetlands, marine, ground springs and cave communities.

Additionally, the EPBC Act and NC Act include a list of bird species (listed as Migratory under the EPBC Act and Special Least Concern under the NC Act), comprising:

- Migratory species which are native to Australia and are included in the appendices to the Bonn Convention
- Migratory species included in annexes established under the Japan-Australia Migratory Bird Agreement (JAMBA) and the China-Australia Migratory Bird Agreement (CAMBA)
- Native, migratory species identified in a list established under an international agreement such as the Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA).

3.0 Methodology

3.1 Desktop Assessment

A desktop assessment was undertaken to characterise and identify potential flora and fauna species and their habitat that may be present in the Project site. The desktop assessment included a review of literature, and searches of publicly available datasets and online mapping. The following information sources were reviewed as part of this assessment:

- EPBC Act Protected Matters Search Tool (PMST) to identify MNES that may occur within the Project site.
- DES Wildlife Online database to identify flora and fauna species recorded from or surrounding the Project site.
- Atlas of Living Australia database to identify locations of previously recorded flora and fauna species within and adjacent to the Project site.
- Department of Natural Resources, Mines and Energy (DNRME) Regulated Vegetation Management Map to determine the extent of Category A, Category B and Category R vegetation within and surrounding the Project site.
- DNRME Vegetation Management Regional Ecosystems Map including Essential Habitat mapping.
- DES Protected Plants Flora Survey Trigger Map to identify the high risk areas for protected plants and determine whether a flora survey and a clearing permit is required.
- DES certified Biodiversity Planning Assessment (BPA) mapping to identify significant wildlife corridors and areas of State, regional and local biodiversity significance.
- The Queensland Herbarium Regional Ecosystem Description Database (REDD) for current regional ecosystem (RE) descriptions and geological and land zone descriptions.
- Species distribution maps from various current field guides.

Information collected as part of the desktop assessment was reviewed and used in the preparation of the field survey.

3.2 Field Survey

3.2.1 Flora

The flora survey was undertaken to classify and map REs and to identify flora species, including conservation significant and introduced flora, and included one tertiary site and five quaternary sites (Figure 2). The survey was undertaken in accordance with the methodology developed by the Queensland Herbarium, *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland* (Neldner *et al.*, 2017).

The vegetation was sampled using one tertiary level transect as defined in Neldner et al. (2017). A full species list and vegetation structural description was recorded including strata, height and cover values for each species. Quaternary sites were used to mark the transition between REs, or confirm the RE either by recording the dominant over storey species or noting the RE code. At both the tertiary and quaternary sites, a GPS location and photos were taken.

Each site was attributed to an RE based on the land zone and dominant species data, using the RE descriptions in the *Regional Ecosystem Description Database* (REDD) (Queensland Herbarium, 2016). The Queensland Herbarium RE mapping was then adjusted based on the field verification. During the course of the survey, opportunistic flora species not observed at the tertiary and observation sites were recorded. At each tertiary site, searches for threatened flora were performed for approximately 20 minutes within a 50 m radius of the survey location.

3.2.2 Fauna

The baseline sampling of fauna species was undertaken using standard methodologies for the systematic survey of terrestrial fauna in Queensland (Eyre *et al.*, 2014) as well as a number of non-standard observational methods. Methods employed during the field program included:

- Fauna habitat assessments.
- Active searches.
- Visual and auditory identification surveys of birds.
- Incidental observations.

The above methods are further described below, and documented survey locations are shown in Figure 2.

3.2.2.1 Fauna Habitat Assessments

Habitat assessments were undertaken to characterise the fauna habitat values within the Project site. These assessments provide an indication of likely fauna utilisation, and suitability for fauna species, including conservation fauna. Habitat attributes recorded during the assessment include:

- Vegetation structure and dominant species, including a description of canopy, shrub and ground layer structure and composition.
- Presence and abundance of tree hollows and stags.
- Presence and abundance of woody debris such as habitat logs and ground timber.
- Rocky habitat such as surface rocks, boulders, crevices, overhangs and caves.
- Proximity to water (both permanent and ephemeral).
- Disturbance from invasive weeds/pests.
- Other disturbances such as grazing pressure, clearing, thinning or fire.
- Any other significant habitat features or values present.

Included in the habitat assessments were searches for signs of animal activity, including tracks, scats, scratches, bones, fur, feathers, nests, foraging holes and diggings.

3.2.2.2 Active Searches

Active searches were undertaken for reptiles, amphibians, small mammals and cryptic or ground-dwelling bird species. This 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. Active searches were undertaken at each habitat assessment site.

3.2.2.3 Visual and Auditory Identification Surveys of Birds

Roaming/meandering bird surveys were undertaken using both visual and auditory identification. Surveys were conducted at each habitat assessment site and during transit between sites. At least 15 minutes was spent at each survey site with an average time of approximately 30 minutes at each site.

3.2.2.4 Incidental Observations

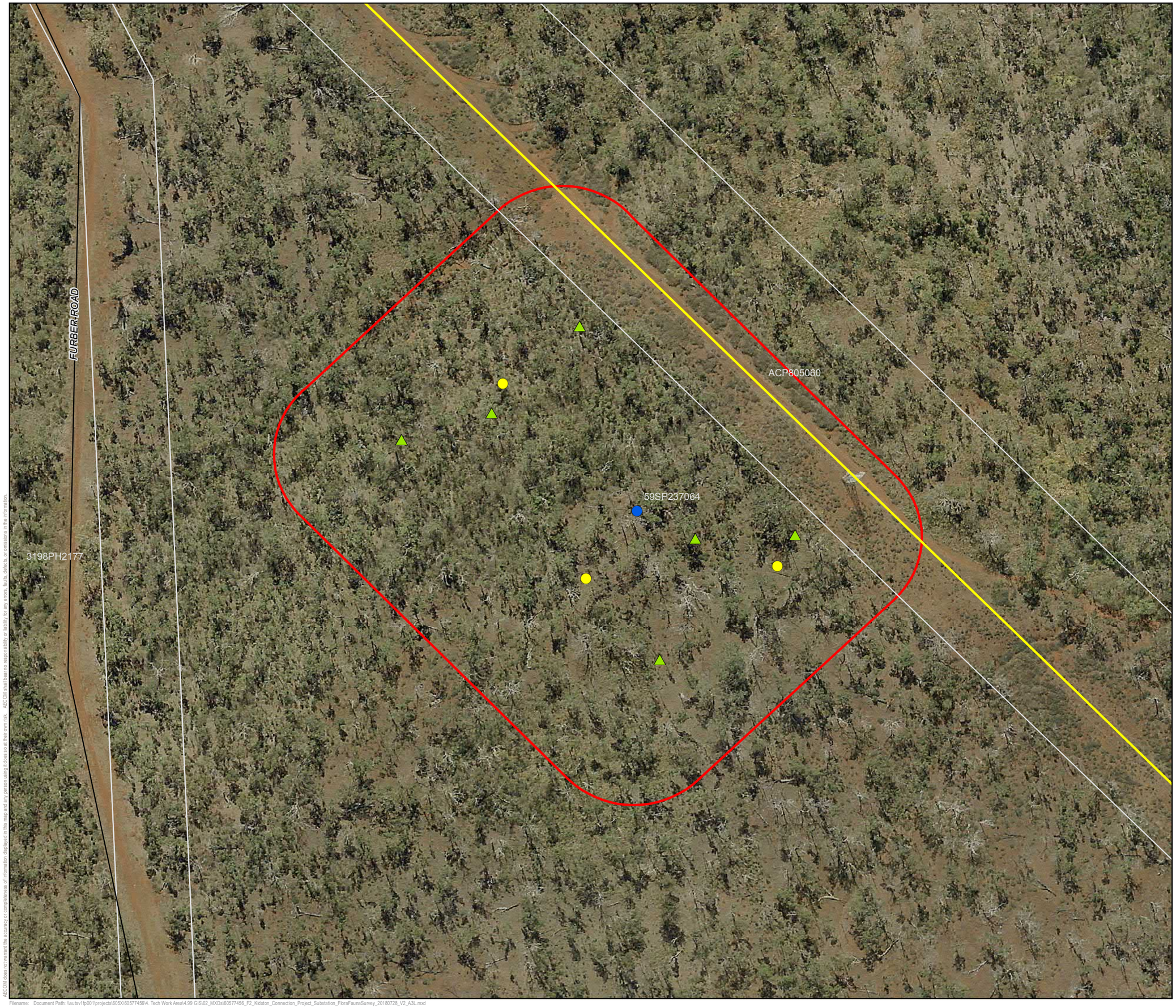
All fauna observed incidentally within or in close proximity to the Project site were recorded, including those seen while travelling along roads and tracks.

3.3 Likelihood of Occurrence Assessment

A likelihood of occurrence assessment for conservation significant flora and fauna species and communities identified during the desktop review was undertaken. The assessment considered known habitat and ecological requirements of the threatened species against the vegetation communities and habitat values identified in the field survey.

Each species was assessed against the categories defined below.

- Unlikely: The species has no recent historical records, has no preferred habitat in the Project site and is considered unlikely to be present in the Project site.
- Low: Some of the preferred habitat present in the Project site. Species may infrequently visit the site en-route for foraging but will not roost or otherwise be dependent on habitats on the site for their survival. Migratory and aerial foraging birds may overfly the site.
- Moderate: Project site contains some of the preferred habitat to support a population of the species and/or the species has been recorded within the vicinity of Project site.
- High: Species has previously been recorded in the Project site. The site contains significant preferred habitat which is likely to support a population of the species, including roost sites.
- Known: Species directly observed or recently recorded in the Project site.



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Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator

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Meters

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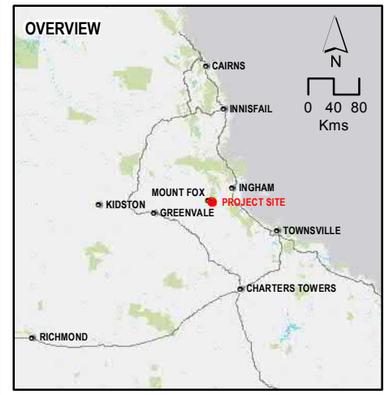
Legend

- Flora Quaternary
- Flora Tertiary
- Fauna Habitat Assessment
- Existing Transmission Line
- Roads
- Cadastral Boundaries
- Mt Fox Substation



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FLORA AND FAUNA FIELD SURVEY LOCATIONS

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Figure F2

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4.0 Results

4.1 Desktop Assessment

4.1.1 Regional Context

The Project site is within the Wet Tropics bioregion, approximately 550 m from the border of the Einasleigh Uplands bioregion. The Wet Tropics bioregion is dominated by rugged, rainforest mountains as well as extensive plateau areas and low lying coastal plains (Sattler and Williams, 1999).

4.1.2 Flora

4.1.2.1 Regional Ecosystems

In Queensland, remnant vegetation is described and mapped by the Queensland Herbarium as REs. REs are broad plant communities within a bioregion that consistently occur in association with a particular combination of geology, landform and soil (Neldner *et al.*, 2017).

One RE is mapped across the entire Project site. This RE is described in Table 1 and is illustrated in Figure 3.

Table 1 Mapped Regional Ecosystems (Queensland Herbarium)

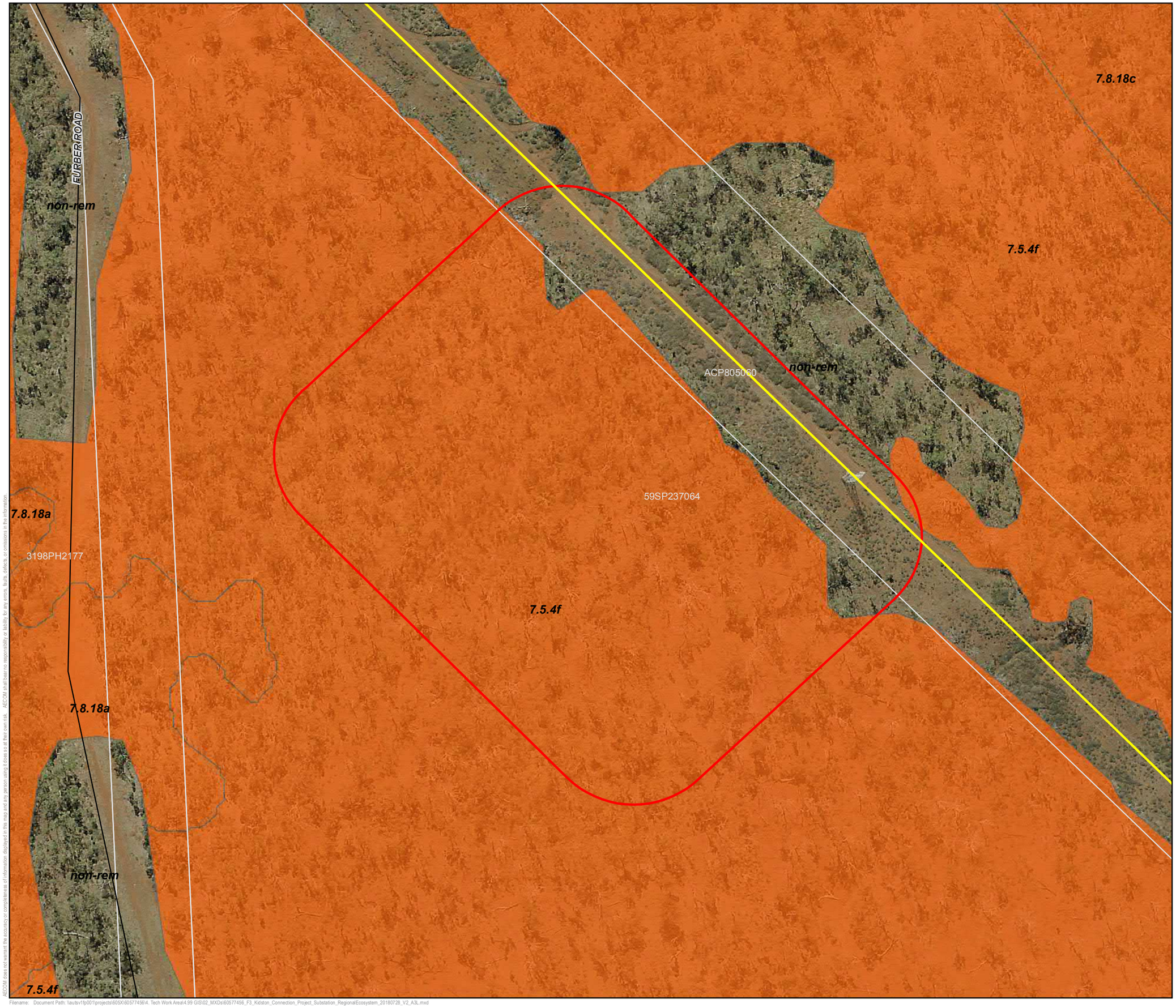
RE ID	Short Description[1]	VM Act Status	Biodiversity Status
7.5.4f	*Corymbia intermedia*, *Allocasuarina torulosa*, *Lophostemon suaveolens* open forest and woodland. Deep weathered soils of basalt origin.	Of Concern	Of Concern

1 Description of REs as contained in the REDD Version 10.0 (Queensland Herbarium, 2016)

4.1.2.2 Threatened Ecological Communities

One Endangered (EPBC Act) Threatened Ecological Community (TEC) was identified as having potential to occur within the Project site. This TEC is: broad leaf tea-tree (*Melaleuca viridiflora*) woodlands in high rainfall coastal north Queensland.

In Queensland, this TEC corresponds to the following REs: 7.3.8a, 7.3.8b, 7.3.8c, 7.3.8d, 7.5.4g, 8.3.2a, 8.5.2c and 8.5.6.



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Coordinate System: GDA 1994 MGA Zone 55
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Meters

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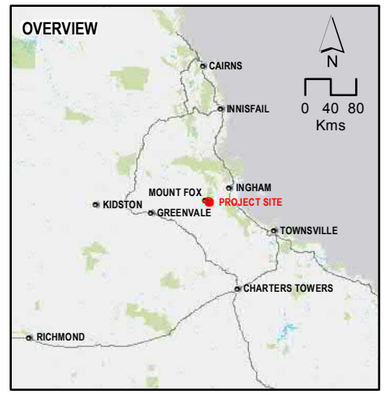
Legend

- Ergon Transmission Lines
- Roads
- Cadastral Boundaries
- Project Site

Regional Ecosystem

- Category A or B area containing endangered
- Category A or B area containing of concern
- Category A or B area that is least concern



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Mapped Regional Ecosystems (Queensland Herbarium)

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Figure F3

A3 size

4.1.2.3 Conservation Significant Flora

The desktop assessment identified five conservation significant flora species with the potential to occur within the Project site. These species and their respective conservation status under the EPBC Act and NC Act are detailed in Table 2 below.

Table 2 Desktop Results for Conservation Significant Flora

Common Name	Scientific Name	EPBC Act	NC Act
Ferns			
No common name	*Lindsaea pulchella var. blanda*	Vulnerable	Extinct in the Wild
Higher Dicots			
No common name	*Cajanus mareebensis*	Endangered	-
No common name	*Marsdenia brevifolia*	Vulnerable	Vulnerable
Monocots			
Bluegrass	*Dichanthium setosum*	Vulnerable	-
Lesser swamp-orchid	*Phaius australis*	Endangered	Endangered

4.1.2.4 Essential Habitat

No essential habitat is mapped within the Project site.

4.1.2.5 Protected Plants

The Project site is not within a high risk area on the protected plants flora survey trigger map.

4.1.3 Fauna

4.1.3.1 Conservation Significant Fauna

The desktop assessment identified 25 conservation significant fauna species with the potential to occur within the Project site, including 8 bird, 13 mammal, 2 reptile and 2 amphibian species. These species and their respective conservation status under the EPBC Act and NC Act are detailed in Table 3 below.

Table 3 Desktop Results for Conservation Significant Fauna

Common Name	Scientific Name	EPBC Act	NC Act
Birds			
Curlew sandpiper	*Calidris ferruginea*	Critically Endangered	Endangered
Southern cassowary	*Casuarius casuarius johnsonii*	Endangered	Vulnerable
Red goshawk	*Erythrotriorchis radiatus*	Vulnerable	Endangered
Grey falcon	*Falco hypoleucos*	-	Vulnerable
Eastern curlew	*Numenius madagascariensis*	Critically Endangered	Endangered
Black-throated finch (southern)	*Poephila cincta cincta*	Endangered	Endangered
Australian painted snipe	*Rostratula australis*	Endangered	Vulnerable
Masked owl (northern)	*Tyto novaehollandiae kimberli*	Vulnerable	Vulnerable

Common Name	Scientific Name	EPBC Act	NC Act
Mammals			
Northern bettong	*Bettongia tropica*	Endangered	Endangered
Northern quoll	*Dasyurus hallucatus*	Endangered	-
Semon's leaf-nosed bat	*Hipposideros semoni*	Vulnerable	Endangered
Ghost bat	*Macroderma gigas*	Vulnerable	Endangered
Black-footed tree-rat	*Mesembriomys gouldii rattoides*	Vulnerable	-
Greater glider	*Petauroides volans*	Vulnerable	Vulnerable
Sharman's rock-wallaby	*Petrogale sharmani*	Vulnerable	Vulnerable
Koala	*Phascolarctos cinereus*	Vulnerable	Vulnerable
Spectacled flying-fox	*Pteropus conspicillatus*	Vulnerable	Vulnerable
Grey-headed flying-fox	*Pteropus poliocephalus*	Vulnerable	-
Large-eared horseshoe bat	*Rhinolophus philippinensis*	Vulnerable	Endangered
Bare-rumped sheath-tailed bat	*Saccolaimus saccolaimus nudicluniatus*	Vulnerable	Endangered
Short-beaked echidna	*Tachyglossus aculeatus*	-	Special Least Concern
Reptiles			
Common death adder	*Acanthophis antarcticus*	-	Vulnerable
Yakka Skink	*Egernia rugosa*	Vulnerable	Vulnerable
Amphibians			
Australian lace-lid	*Litoria dayi*	Endangered	Endangered
Waterfall frog	*Litoria nannotis*	Endangered	Endangered

4.1.3.2 Migratory Fauna

The desktop assessment identified 15 migratory species with the potential to occur within the Project site, including 1 migratory marine bird, 9 migratory terrestrial and 5 migratory wetland species. These species and their respective conservation status under the EPBC Act and NC Act are detailed in Table 4 below.

Table 4 Desktop Results for Migratory Fauna

Common Name	Scientific Name	EPBC Act	NC Act
Migratory Marine Birds			
Fork-tailed swift	*Apus pacificus*	Migratory	Special Least Concern
Migratory Terrestrial Species			
Oriental cuckoo	*Cuculus optatus*	Migratory	Special Least Concern
White-throated needletail	*Hirundapus caudacutus*	Migratory	Special Least Concern
Barn swallow	*Hirundo rustica*	Migratory	Special Least Concern
Black-faced monarch	*Monarcha melanopsis*	Migratory	Special Least Concern
Grey wagtail	*Motacilla cinerea*	Migratory	Special Least Concern

Common Name	Scientific Name	EPBC Act	NC Act
Yellow wagtail	*Motacilla flava*	Migratory	Special Least Concern
Satin flycatcher	*Myiagra cyanoleuca*	Migratory	Special Least Concern
Rufous fantail	*Rhipidura rufifrons*	Migratory	Special Least Concern
Spectacled monarch	*Symposiarchus trivirgatus*	Migratory	Special Least Concern
Migratory Wetland Species			
Common sandpiper	*Actitis hypoleucos*	Migratory	Special Least Concern
Sharp-tailed sandpiper	*Calidris acuminata*	Migratory	Special Least Concern
Pectoral sandpiper	*Calidris melanotos*	Migratory	Special Least Concern
Latham's snipe	*Gallinago hardwickii*	Migratory	Special Least Concern
Osprey	*Pandion haliaetus*	Migratory	Special Least Concern

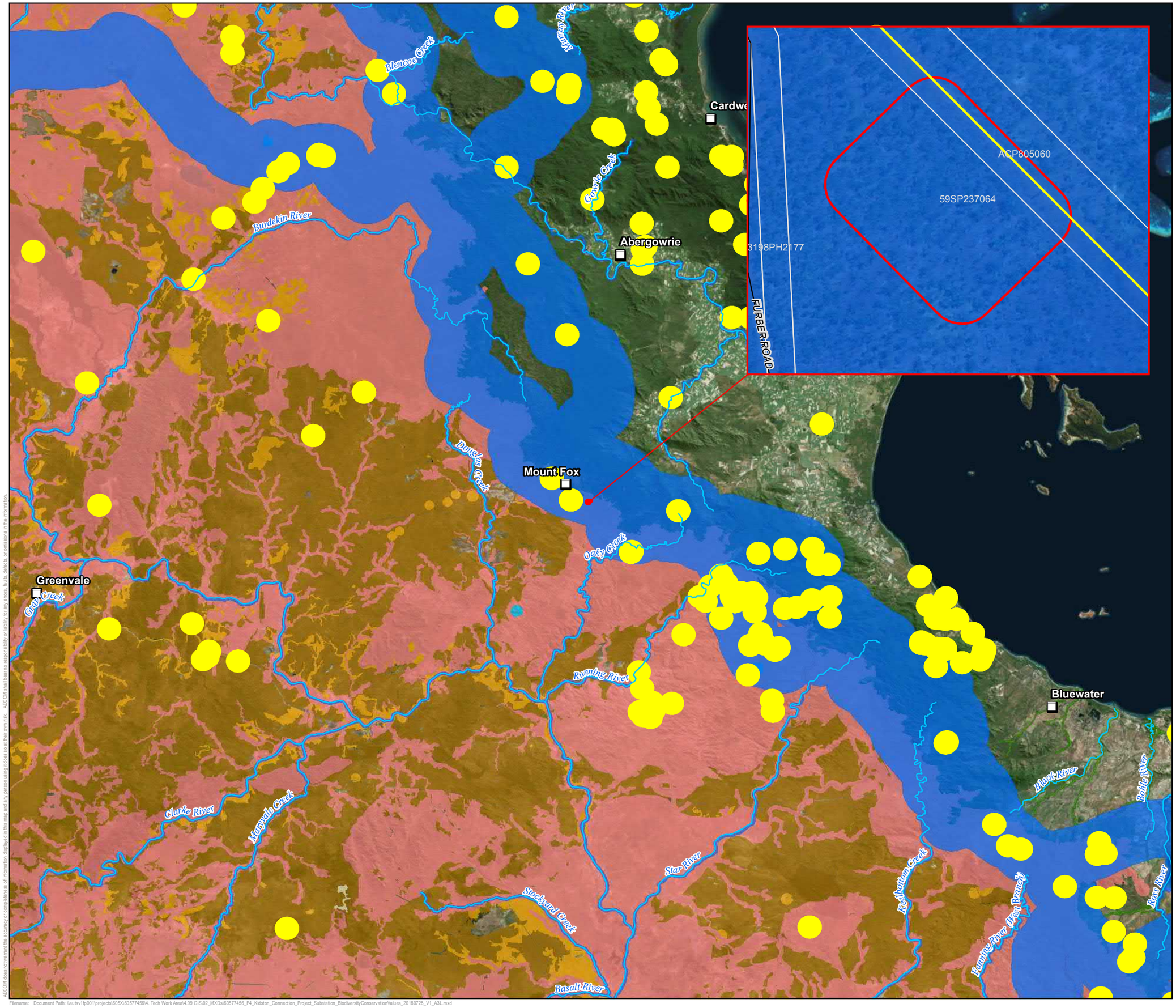
4.1.3.3 Essential Habitat

No essential habitat is mapped within the Project site.

4.1.3.4 Biodiversity and Conservation Values

There is currently no Biodiversity Planning Assessment (BPA) for the Wet Tropics bioregion. DES is currently undertaking a BPA assessment for this bioregion which is expected to be released in November 2018.

The Queensland Government has identified Bioregional State Wildlife Corridors across Queensland. These are not statutory areas, but are priority conservation areas to be accorded special consideration when development applications are lodged. The Project site is within a state-wide ecological corridor that runs along the east coast of Queensland, from Lakefield to Mackay (Figure 4).



AECOM
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Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator

0 5 10 15 20 25
Kilometers

1:600,000 (when printed at A3)

Legend

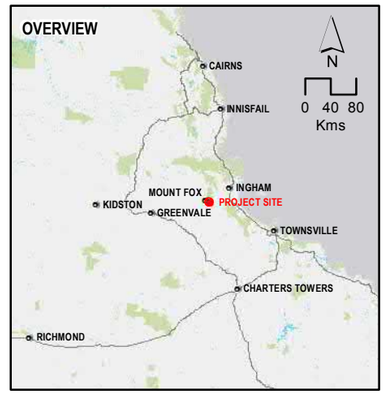
- Major Watercourse
- Project Site
- Flora Survey Trigger Area

Statewide Ecological Corridors

- State
- Regional

Biodiversity Significance Einasleigh Uplands

- State Habitat for EVR taxa
- State
- Regional
- Local or Other Values
- Non Bioregion Ecosystem



Data sources:
DCDB, Roads, Watercourses, Flora Trigger Area, Corridors - DNRM 2018
Site Features and Layout - AECOM 2018
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Kidston Connection Project Substation Ecology Report

Biodiversity and Conservation Values

PROJECT ID:	60577456
CREATED BY:	CFS
LAST MODIFIED:	CFS - 12/09/2018
VERSION:	1

Figure F4

A3 size

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4.2 Field Survey

4.2.1 Survey Timing and Climatic Conditions

A half-day flora and fauna field survey was undertaken on 15 July 2018 by four AECOM ecologists. The weather during the survey was clear skies with a maximum temperature of 25.6°C (recorded at the Ingham Composite Station, located approximately 85 km north-east of the Project site). No rainfall occurred during the field survey (Bureau of Meteorology, 2018).

4.2.2 Flora

4.2.2.1 Species Diversity

The field survey identified 15 flora species from 10 families and 14 genera (Appendix A). The dominant plant family recorded was Myrtaceae, comprising *Corymbia*, *Eucalyptus* and *Lophostemon* species.

4.2.2.2 Regional Ecosystems

One RE was identified across the majority of the Project site during the field survey (Table 5, Figure 5). This RE is listed as Of Concern under the VM Act. Non-remnant vegetation occurs underneath the existing Ergon easement.

The vegetation within the Project site was uniform, and was dominated by *Corymbia intermedia* (pink bloodwood), with *Lophostemon suaveolens* (swamp mahogany) and occasional *Corymbia tessellaris* (Moreton Bay ash). The shrub layer contained occasional *Corymbia* and *Eucalypt* spp., *Acacia flavescens* (yellow wattle), and majority of the Project site contained very dense *Lantana camara* (lantana) in both the shrub and ground layers.

Table 5 Ground-truthed REs within the Project Site

RE ID	Short Description[1]	VM Act Status	Biodiversity Status
7.8.18	*Corymbia intermedia* and/or *Lophostemon suaveolens* +/- *Allocasuarina torulosa* open forest to woodland on basalt	Of Concern	Of Concern

1 Description of REs as contained in the REDD Version 10.0 (Queensland Herbarium, 2016)

The Project site has been modified for agricultural purposes. Retained vegetation has been affected by tree thinning, the introduction of cattle for grazing, and the spread of exotic weeds. Evidence of a recent fire was also observed, with a number of large remaining trees containing fire scars, as well as a high number of burnt fallen trees.

4.2.2.3 Threatened Ecological Communities

No TECs were encountered during the field survey. The RE confirmed during the field survey does not correspond to the Endangered TEC identified in the desktop assessment: broad leaf tea-tree (*Melaleuca viridiflora*) woodlands in high rainfall coastal north Queensland.

4.2.2.4 Conservation Significant Flora

No conservation significant flora species were identified within the Project site during the field survey.

4.2.2.5 Introduced Flora

The field survey identified four introduced flora species (Appendix A):

- *Lantana camara* (lantana); listed as a Category 3 restricted invasive plant under the *Biosecurity Act 2014*
- *Praxelis clematidea*
- *Sida acuta* (common wireweed)
- *Bidens pilosa* (Black-jack).

Lantana camara (lantana) is also listed as a WoNS by the Australian government.

4.2.2.6 Likelihood of Occurrence

No conservation significant flora species are considered likely to occur within the Project site. The likelihood of occurrence assessments for all conservation significant flora species is presented in Appendix B.

4.2.3 Fauna

4.2.3.1 Species Diversity

The field survey recorded 10 avian species within the Project site (Appendix A).

4.2.3.2 Conservation Significant Fauna

No conservation significant fauna species were identified within the Project site during the field survey.

4.2.3.3 Introduced Fauna

No introduced fauna species were recorded within the Project site during the field survey; however introduced species considered likely to occur include:

- European rabbit (*Oryctolagus cuniculus*) – Listed as a category 3, 4, 5, 6 restricted matter under the *Biosecurity Act 2014*
- Feral cat (*Felis catus*) - Listed as a category 3, 4, 6 restricted matter under the *Biosecurity Act 2014*
- Feral pig (*Sus scrofa*) – Listed as a category 3, 4, 6 restricted matter under the *Biosecurity Act 2014*
- Wild dog/dingo (*Canis lupus*) – Listed as a category 3, 4, 6 restricted matter under the *Biosecurity Act 2014*
- Cane toad (*Rhinella marina*)
- European fox (*Vulpes vulpes*)
- Black rat (*Rattus rattus*)
- House mouse (*Mus musculus*).

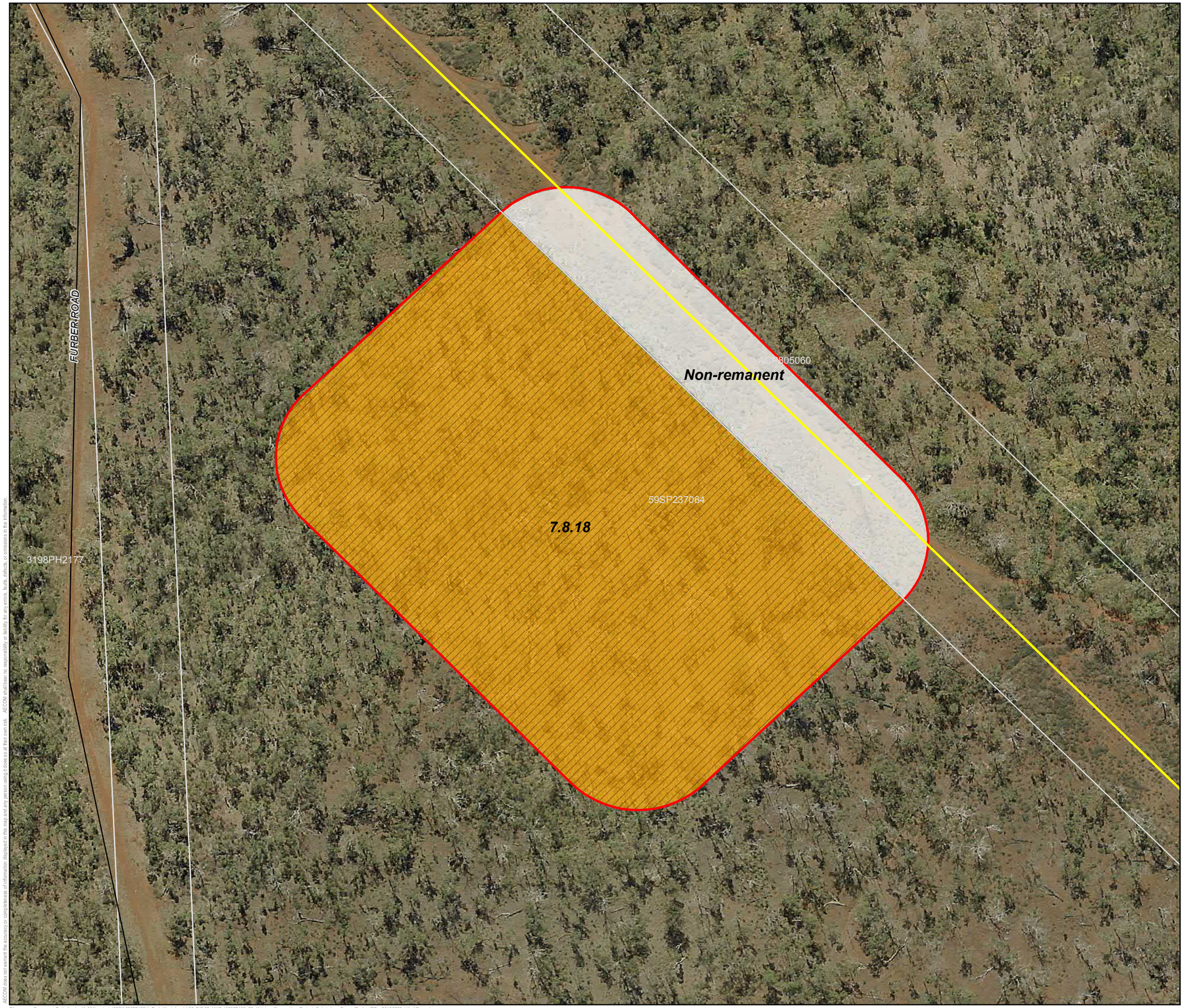
4.2.3.4 Habitat Values

Two dominant fauna habitat types were recorded within the Project site (Table 6).

Table 6 Fauna Habitat Types within the Project Site

Habitat Type	Habitat Summary	Analogous REs	Area (ha) within Project Site
1	Open forest of *Corymbia intermedia*, *Lophostemon suaveolens* and *Corymbia tessellaris* on basalt	7.8.18	6.1
2	Non-remnant vegetation	-	1.4

The occurrence of these habitat types within the Project site is illustrated on Figure 5 and a description is presented in Table 7 and Table 8.



AECOM

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Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator

0 50 100
Meters

1:2,000 (when printed at A3)

Legend

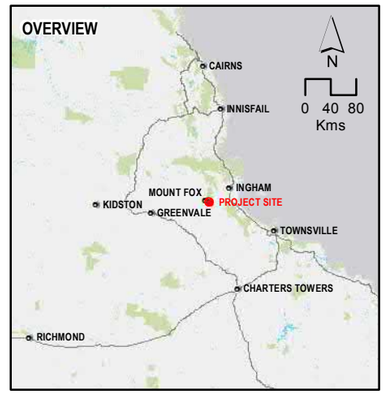
- Ergon Transmission Lines
- Roads
- Cadastral Boundaries
- Project Site

Ground-Truthed Regional Ecosystems

- Category A or B Area Containing of Concern
- Non-remanent

Habitat Type

- Open forest of *Corymbia intermedia, Lophostemon suaveolens and Corymbia tessellaris* on basalt



Data sources:
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Kidston Connection Project
Substation Ecology Report

Ground-Truthed Regional Ecosystems and Fauna Habitat Types

PROJECT ID:	60577456
CREATED BY:	CFS
LAST MODIFIED:	CFS - 13/09/2018
VERSION:	1

Figure F5

A3 size

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Table 7 Description of Fauna Habitat Type 1

Habitat Type 1 **Open forest of *Corymbia intermedia*, *Lophostemon suaveolens* and *Corymbia tessellaris* on basalt**
Analogous REs
7.8.18
Vegetation Description
This habitat type contained a canopy of *Corymbia intermedia* (pink bloodwood), *Lophostemon suaveolens* (swamp mahogany) and *Corymbia tessellaris* (Moreton Bay ash). The shrub layer was sparse with native species; however very dense *Lantana camara* (lantana) was present over the majority of the site. The ground layer was sparse, and contained a mixture of exotic and native species.
Habitat Features
Habitat features in this community include an abundance of tree hollows and stags, a dense shrub layer and plenty of ground timber. Bare ground was common throughout the Project site.
Possible Habitat for Conservation Significant Species
• Koala (*Phascolarctos cinereus*) – high abundance of food species present. • Greater glider (*Petauroides volans*) – high abundance of tree hollows present. • Ghost bat (*Macroderma gigas*) – foraging habitat present. • Red goshawk (*Erythrotriorchis radiatus*) – foraging habitat present. • Short-beaked echidna (*Tachyglossus aculeatus*).

Plate 1 Habitat Type 1

Plate 2 Fallen log showing evidence of fire

Table 8 Description of Fauna Habitat Type 2

Habitat Type 2 Non-remnant vegetation
Analogous REs
-
Vegetation Description
This habitat type occurs underneath the existing Ergon easement and contains dense *Lantana camara* (lantana).
Habitat Features
Habitat features in this community are limited; however the dense shrub layer may provide protection to fauna moving between the woody vegetation on either side of the easement.
Possible Habitat for Conservation Significant Species
• Short-beaked echidna (*Tachyglossus aculeatus*).

Plate 3 Habitat Type 2

4.2.3.5 Likelihood of Occurrence

The likelihood of occurrence assessment identified five conservation significant fauna species with a moderate to high likelihood of occurring within the Project site based on the habitat encountered during the field survey (Table 9). The likelihood of occurrence assessments for all conservation significant fauna and migratory species is presented in Appendix B.

Table 9 Fauna Likelihood of Occurrence Assessment Results

Value	Likelihood of Occurrence		
	Moderate	**High**	**Known**
Conservation Significant Fauna	• Ghost bat (*Macroderma gigas*) • Red goshawk (*Erythrotriorchis radiatus*)	• Koala (*Phascolarctos cinereus*) • Greater glider (*Petauroides volans*) • Short-beaked echidna (*Tachyglossus aculeatus*)	-
Migratory Fauna	-	-	-

5.0 Potential Impacts and Mitigation Measures

Potential impacts to flora and fauna values may occur in the following phases of the Project:

1. Construction Phase
2. Operation and Maintenance Phase.

Further information on the potential impacts associated with the Project is outlined below, as well as mitigation measures to minimise the potential impacts on flora and fauna values. Potential impacts to conservation significant species are detailed in Section 5.3.

5.1 Construction Phase

The most significant impacts on ecological values will occur during the Project's construction phase, when vegetation and habitat removal will occur.

5.1.1 Vegetation Clearance

Vegetation clearing for the Project will be limited to that only where there is a statutory requirement under the *Electricity Act 1994* and *Electrical Safety Regulation 2013*.

The Project site is a 7.5 ha plot containing the Of Concern RE 7.8.18 across 6.1 ha. Removal of Of Concern RE can pose a risk to bioregional species diversity and long term resilience of the RE in question. However, considering the degraded nature of this RE within the site, the low species diversity recorded, and the relatively small area to be cleared (6.1 ha), it is unlikely that the vegetation clearing will pose a significant risk to bioregional species diversity and long term resilience of this RE.

There are a range of measures that are proposed be taken to minimise the level of impact from clearing vegetation. These include the following.

- The Construction Environmental Management Plan should include vegetation management to provide clear guidance on areas to be cleared and retained; methods for clearing; and other relevant environmental protection measures.
- Areas for clearing should be clearly delineated to avoid inadvertent clearing.
- Workers will be made aware of vegetation management requirements in induction training, Environmental Work Plans (EWPs) and through work instructions.
- Appropriate erosion and sediment control measures should be installed and maintained.

5.1.2 Loss of Fauna Habitat

The clearance of native vegetation can adversely affect native fauna species. Potential impacts resulting from clearing native vegetation can include the following.

- Loss of habitat causing a reduction of biological diversity or loss of local populations and genotypes.
- Fragmentation of populations, which can reduce gene flow between small isolated populations, reduce the potential for species to adapt to environmental change and loss or severe modification of the interactions between species.
- Disturbance which can permit the establishment and spread of exotic species that may displace native species.
- Loss of leaf litter, removing habitat for a wide variety of vertebrates and invertebrates.
- Loss of food resources such as foliage, flowers, nectar, fruit and seeds.

The Project site contains an abundance of large trees containing hollows, which may provide habitat opportunities for up to 300 vertebrate species (including conservation significant fauna species). Due to the long time period required for trees to form hollows (100+ years); hollow-bearing trees are considered to be an important habitat feature in the landscape.

A range of mitigation measures will be taken to minimise the level of impact, including the following.

- Micro-siting of the substation site will aim to clear as few large habitat trees with hollows where possible.
- Suitably qualified fauna spotter catchers must be engaged to undertake pre-clearance habitat searches and be present during vegetation clearing activities to minimise fauna harm.
- The Construction Environmental Management Plan will be prepared to provide clear guidance on areas to be cleared and retained, methods for clearing, role of the spotter catcher and other relevant environmental protection matters.
- Identify and map clear no-go zones to avoid unauthorised disturbance of areas of sensitive vegetation and habitat.
- Habitat features such as felled trees and logs will be considered for relocation to other areas where practical to provide microhabitat for fauna.

5.1.3 Fauna Mortality or Injury

Clearing of vegetation can result in injury or mortality of fauna, particularly ground dwelling fauna that may be crushed by machinery or struck by vehicles. Arboreal mammals (such as the Vulnerable koala (*Phascolarctos cinereus*)) may be trapped in trees as they are felled. Mitigation measures to reduce the likelihood of injury or mortality to fauna include the following.

- Pre-clearance surveys to identify shelters and breeding places potentially utilised by Least Concern species, colonial breeders and conservation significant fauna will be undertaken.
- Fauna spotter-catchers will be used to capture and relocate fauna prior to clearing.
- No unauthorised off-track driving.
- Any injured, sick and dead vertebrate fauna will be recorded before (by fauna spotter catchers), during and after construction and operation.

5.1.4 Increased Spread of Weeds

Indirect impacts to vegetation through the construction phase of the Project include the potential introduction or exacerbation of weeds. The risk of these potential impacts can be appropriately mitigated and managed, with potential mitigation measures including the adoption of a Biosecurity Management Plan. The Plan will include the following.

- Staff and contractors must be equipped with information on the location of biosecurity threats, which enables them to move within ‘clean areas’ without the need to wash-down.
- When moving from a ‘dirty area’ to a clean area, a vehicle hygiene inspection will be required to determine whether a wash-down is necessary. Vehicle hygiene practices (including records) will be undertaken applying risk management principles in consultation with landholders.
- Known WoNS, Restricted Invasive or Regionally Declared weeds will be identified in the Project area.
- The origin of high risk construction materials, machinery and equipment will be identified to mitigate introduction of weed species.
- Management methods to control spread of weeds considered to be Restricted Matters must be in keeping with regional management practice or Queensland Department of Agriculture and Fisheries pest control prescriptions.
- Promote the awareness of weed management, by inclusion of weed issues, pictures and procedures into the Project’s site induction program.
- Appropriate weed monitoring to identify any new incidence of weeds.

The Australian Weeds Strategy 2017 - 2027 outlines the principles that underpin weed management in Australia, including the control of WoNS. The vision, goals and priorities of the Strategy should be incorporated into the Project’s Biosecurity Management Plan.

Additionally, Local Government Pest Management Plans identify current and potential pest species and includes well-planned strategies for their control, containment and eradication. The Hinchinbrook Local Government Area Biosecurity Plan should be considered during the Project. Pest species managed in this plan include *Parthenium hysterophorus* (parthenium) and *Lantana camara* (lantana). An annual treatment and community awareness program for *Parthenium hysterophorus* (parthenium) is ongoing in the Mount Fox area. Obligations under the plan are as follows.

- Ensure best practice weed hygiene measures are in place to reduce the risk of spread to new locations.
- Maintain weed free areas.
- Ensure any machinery or vehicles moving from the infested areas are free from plant material and soil.
- Identify high value assets and protect them from impacts where possible.

The Project site is within three biosecurity zones, including:

- Cattle Tick Biosecurity Zone
- Northern Banana Biosecurity Zone
- Sugar Cane Biosecurity Zone 1.

Generally, a biosecurity certificate is required to move risk items (including machinery and soil) into and around Queensland. The Queensland Biosecurity Manual sets out how to treat, inspect, source and/or pack materials that present a biosecurity risk in order to receive a biosecurity certificate.

5.1.5 Increased Dust

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 photosynthesise due to physical effects may result in reduced growth rates of vegetation and decreases in floral vigour and overall community health. The potential effects of dust deposition on vegetation are determined by a number of factors including the following.

- The characteristics of leaf surfaces, such as surface roughness, influencing the rate of dust deposition on vegetation.
- Concentration and size of dust particles in the ambient air and its associated deposition rates.
- Local meteorological conditions and the degree of penetration of dust into vegetation.

The dominant flora species in the Project site generally exhibit physiological qualities that are not sensitive to dust deposition. The sclerophyllous foliage of *Eucalyptus* and *Corymbia* species is generally pendulous (i.e. points down), with a thick smooth cuticle that does not encourage particulate matter to remain on the surface. The dominant woodland species are also generally hardy and well adapted to adverse conditions (e.g. extended dry conditions and low nutrient soils).

To minimise the deposition of dust on adjacent vegetation, dust generation from Project activities will be minimised by engineering controls and dust suppression measures will be used, such as water trucks and sprinklers.

5.1.6 Edge Effects

Edge effects are zones of changed environmental conditions (e.g. altered light levels, wind speed, temperature) occurring along the edges of habitat fragments. Examples of edge effects include weed invasion and altered community assemblage. Clearing in remnant, high ecological value areas can promote the growth of different vegetation types (Moenting and Morris, 2006) and allow invasion by introduced species specialising in edge habitats.

To minimise edge effects within the Project site, the following measures will be implemented.

- Clear demarcation of remnant vegetation at the boundary of the clearing footprint that must not be disturbed, to avoid inadvertent clearing and disturbance.
- Measures associated with weed management.

5.1.7 Activity and Noise

During the construction phase, there will be an increase in noise and activity in the Project site. When activity and noise is occurring in areas adjoining retained habitat, potential impacts may include the following.

- Reduced foraging ability by auditory predators due to increased background noise.
- Increased risk of predation by visual predators due to increased background noise.
- Increased potential for collisions with vehicles.
- Human visitation causing disturbance to foraging or breeding behaviours.

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.

Sudden loud, impulsive or impact noises are capable of causing birds and other fauna to become startled, which if occurring over the longer term, may affect feeding and breeding behaviour in some species.

It is expected that excavation, construction and earthmoving associated with the Project will potentially cause disturbance to all groups of fauna, especially birds. This will most likely result in avoidance of the area for the duration of these activities. As alternative habitats are available elsewhere, an overall loss of avian diversity as a result of construction is considered unlikely. Upon the cessation of peak noise levels and construction activity, many, if not all species are likely to resume activities around the site. Therefore, few long-term impacts are expected.

5.2 Operation and Maintenance Phases

As a distribution entity, Powerlink is obligated to manage electricity infrastructure to ensure the safe and reliable provision of electricity. Impacts associated with the maintenance and access during the operational phase of the Project is similar to those identified for the construction phase. Impacts will be temporary, and mitigation measures outlined above will apply.

5.3 Conservation Significant Species

Three conservation significant fauna species are considered to have a high likelihood of occurring within the Project site. Impacts of the Project on these species are outlined below. Species-specific mitigation measures, in addition to those discussed in Sections 5.1 and 5.2, are recommended to reduce and/or avoid impacts to the species.

5.3.1 Koala (*Phascolarctos cinereus*)

Potential impacts of the Project on the koala (*Phascolarctos cinereus*) are associated with habitat loss and fragmentation.

Koala (*Phascolarctos cinereus*) habitat is found surrounding the Project site, and this species may need to move through the Project site to reach these habitat areas. In cleared areas, koalas (*Phascolarctos cinereus*) are vulnerable to vehicle strike and dog attack.

If an individual is found prior to or during clearing activities, it must not be forcibly relocated. Any tree that has a koala (*Phascolarctos cinereus*) present, as well as any tree with its crown overlapping that tree, must not be removed and remain in place until the koala (*Phascolarctos cinereus*) vacates the tree of its own accord.

5.3.2 Greater glider (*Petauroides volans*)

Potential impacts from the Project include the loss and/or fragmentation of habitat, particularly from the loss of hollow-bearing trees.

The greater glider (*Petauroides volans*) is considered to be particularly sensitive to forest clearance and to intensive logging, although responses vary according to landscape context and the extent of tree removal and retention. Notwithstanding relatively small home ranges (1 – 4 ha), but in part because of low dispersal ability, this species may be sensitive to fragmentation, have relatively low persistence in small forest fragments, and disperse poorly across vegetation that is not native forest.

As this species is highly dependent on forest connectivity and large mature trees, it is recommended that the Project aims to clear as few large habitat trees with hollows where possible.

5.3.3 Short-beaked echidna (*Tachyglossus aculeatus*)

The short-beaked echidna (*Tachyglossus aculeatus*) has broad habitat requirements and is anticipated to occur across the entire Project site. Potential impacts include habitat loss and direct mortality from vehicle strike.

Due to the ground dwelling nature of this species, recommended mitigation measures include:

- Identified habitat areas will be located on the EWPs.
- All vehicles, plant, equipment and machinery to remain within the designated access tracks in identified habitat areas, and speed limits should be restricted to 40 km/hr.

6.0 Conclusion

This report documents the findings of a post-wet season, terrestrial ecological survey undertaken in July 2018.

Flora

Remnant vegetation is mapped across the majority of the Project site. The field surveyed identified the Of Concern RE 7.8.18 across 6.1 ha, and non-remnant vegetation underneath the existing Ergon easement (1.4 ha).

The flora survey recorded a total of 15 species, representing 10 families and 14 genera.

No conservation significant flora species were identified during the field survey, and none are considered likely to occur within the Project site.

The field survey identified four introduced flora species:

- *Lantana camara* (lantana); listed as a Category 3 restricted invasive plant under the *Biosecurity Act 2014*, and as a WoNS.
- *Praxelis clematidea*.
- *Sida acuta* (common wireweed).
- *Bidens pilosa* (Black-jack).

Fauna

The fauna survey identified two habitat types, suitable to support both conservation significant and Least Concern species. The field survey recorded 10 avian species within the Project site.

No conservation significant fauna or migratory species were identified during the field survey; however five conservation significant fauna species are regarded as having a moderate or high likelihood of occurrence within the Project site. No migratory species are considered likely to occur.

Potential Impacts

A number of potential impacts to flora and fauna may occur as a result of the Project. Potential impacts with the greatest risk to ecological values are associated with the direct clearing of vegetation during the construction phase of the Project. Mitigation and management measures are recommended to ensure the potential impact on ecological values are minimised or avoided.

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Appendix A

Species List

Appendix A Species List

Table 10 Flora and Fauna Species List

Species Name	Common Name
Flora	
*Bidens pilosa**	Black-jack
*Praxelis clematidea**	-
Denhamia disperma	Orangebush
Scleria brownii	-
Lomandra longifolia	Spiny-head mat-rush
*Sida acuta**	Common wireweed
Acacia flavescens	Yellow wattle
Corymbia intermedia	Pink bloodwood
Corymbia tessellaris	Moreton Bay ash
Eucalyptus tereticornis	Grey gum
Lophostemon suaveolens	Swamp mahogany
Digitaria parviflora	-
Imperata cylindrica	Cogon grass
Alphitonia excelsa	Red ash
*Lantana camara**	Lantana
Fauna	
Trichoglossus moluccanus	Rainbow lorikeet
Climacteris picumnus	Brown treecreeper
Lichmera indistincta	Brown honeyeater
Rhipidura albiscapa	Grey fantail
Pardalotus striatus	Striated pardalote
Neochmia temporalis	Red-browed finch
Gerygone olivacea	White-throated gerygone
Strepera graculina	Pied currawong
Corvus orru	Torresian crow
Eopsaltria australis	Eastern yellow robin

* Invasive species

Appendix B

Likelihood of Occurrence Assessments

Appendix B Likelihood of Occurrence Assessments

Table 11 Likelihood of Occurrence Assessment - TEC

Value	Status (EPBC Act)	Preferred Habitat	Likelihood of Occurrence
TEC			
Broad leaf tea-tree (*Melaleuca viridiflora*) woodlands in high rainfall coastal north Queensland	Endangered	*Melaleuca viridiflora* (broad leaf tea-tree) woodlands in high rainfall coastal north Queensland ecological community represents occurrences of woodland where *Melaleuca viridiflora* (broad leaf tea-tree) is dominant in the canopy and a diversity of grasses, sedges and forbs occupy the ground layer. The ecological community is restricted to the Wet Tropics and Central Mackay Coast bioregions in Queensland. The ecological community is typically woodland but can have a forest structure in some areas. It generally consists of two clear structural layers: a canopy of *Melaleuca viridiflora* (broad leaf tea-tree) and a diverse ground layer of grasses, sedges and forbs. Epiphytes are often conspicuous in the canopy trees. Shrubs may be present but are generally sparse although some sites have an obvious layer of *Xanthorrhoea* spp. (grass trees) (Threatened Species Scientific Committee, 2012). In Queensland, this TEC corresponds to the following REs: 7.3.8a, 7.3.8b, 7.3.8c, 7.3.8d, 7.5.4g, 8.3.2a, 8.5.2c and 8.5.6.	**Unlikely** *Melaleuca viridiflora* (broad leaf tea-tree) and the REs corresponding to this TEC were not identified within the Project site.

Table 12 Likelihood of Occurrence Assessment - Conservation Significant Flora

Species	Status (EPBC Act, NC Act)	Preferred Habitat	Likelihood of Occurrence
Ferns			
Lindsaea pulchella var. blanda	Vulnerable, Extinct in the Wild	*Lindsaea pulchella var. blanda* is known from a single specimen collected in 1926 in Rockingham. It is epiphyte that tends to grow on mosses on trees and on tree ferns from between 1500 - 2750 m altitude. It is very rarely terrestrial (Department of the Environment, 2018).	**Unlikely** No epiphytic mosses or tree ferns were detected during the flora survey. *Lindsaea pulchella var. blanda* is known from a single specimen collected in 1926 and is currently listed as extinct in Queensland under the NC Act.
Higher Dicots			
Cajanus mareebensis	Endangered, -	*Cajanus mareebensis* is a prostrate, trailing annual herb that occurs in grassy woodlands composed of *Melaleuca-Acacia*, *Eucalyptus-Callitris* and *Eucalyptus-Corymbia* on mostly sandy, granite-derived soils. Before 2002, it was known only from two sites but it has recently been located at a further eight sites near Musgrave on Cape York Peninsula; at three sites from the Irvinebank to Petford area; and at one site south-west of Mount Garnet (Department of the Environment, 2018).	**Unlikely** The Project site does not contain granite derived soils (Land zone 12) supporting *Eucalyptus-Corymbia* woodland.
Marsdenia brevifolia	Vulnerable, Vulnerable	*Marsdenia brevifolia* occurs on serpentine outcrops of crumbly black soils in eucalypt woodlands, often in association with *Eucalyptus fibrosa* or *Corymbia xanthope.* *Marsdenia brevifolia* occurs in north and central Queensland where it is known from near Townsville, Springsure and north of Rockhampton (Department of the Environment, 2018).	**Unlikely** The Project site does not contain granite-derived soils (Land zone 12) supporting woodlands.

Species	Status (EPBC Act, NC Act)	Preferred Habitat	Likelihood of Occurrence
Monocots			
Bluegrass *Dichanthium setosum*	Vulnerable, -	*Dichanthium setosum* occurs in heavy cracking clay or alluvial soils, often gilgaied, in brigalow or eucalypt communities in tropical or subtropical climates with marked seasonal drying. In Queensland the species has been reported from the Leichhardt, Morton, North Kennedy and Port Curtis regions (Department of the Environment, 2018).	**Unlikely** The preferred habitat (heavy cracking clays or alluvial soils) for this species does not occur within the Project site.
Lesser swamp-orchid *Phaius australis*	Endangered, Endangered	The lesser swamp orchid is restricted to the margins of swamps surrounded by dry sclerophyll, swampy rainforest or fringing open forest. It is often associated with rainforest communities and tends to be restricted to the coastal areas of Queensland. In North and Central Queensland, *Phaius australis* tends to be restricted to areas that are permanently wet (Department of the Environment, 2018).	**Unlikely** There was no swamp habitat detected during the field survey. The nearest known sighting of *Phaius australis* is 167 km to the north of the Project site in the Atherton Tablelands. The vast majority of occurrences are within 70 km of the coastline due to the water requirements of the species.

Table 13 Likelihood of Occurrence Assessment - Conservation Significant Fauna

Species	Status (EPBC Act, NC Act)	Preferred Habitat	Likelihood of Occurrence
Birds			
Australian painted snipe *Rostratula australis*	Endangered, Vulnerable	Preferred habitat includes shallow inland wetlands, brackish or freshwater, that are permanently or temporarily inundated. Breeding habitat requirements may be quite specific: shallow wetlands with areas of bare wet mud and both upper and canopy cover nearby. Has been recorded from wetlands in all Australian states, however is most common in eastern Australia, especially the Murray-Darling Basin. Individuals are nomadic, and there is some evidence of partial migration from south-eastern wetlands to coastal central and northern Queensland in autumn and winter (Department of the Environment, 2018).	**Unlikely** There are no wetlands within close proximity to the Project site.
Black-throated finch (southern) *Poephila cincta cincta*	Endangered, Endangered	The black-throated finch's (southern) preferred habitat is grassy open woodland/forest dominated by *Eucalyptus*, *Melaleuca* or *Acacia*, but they are also known from pandanus flats and scrubby plains. The black-throated finch (southern) feeds on the seed of native grasses from the ground. Three resources are required for the species to persist: water, grass seeds and trees providing suitable habitat. If any of these three resources are not available, black-throated finch (southern) is unlikely to be present. Perennial grasses which are thought to dominate the black-throated finch's (southern) diet include: *Urochloa mosambicensis*, *Enteropogon acicularis*, *Panicum decompositum*, *Panicum effusum*, *Dichanthium sericeum*, *Alloteropsis semialata*, *Eragrostis sororia* and *Themeda triandra*. Additional species eaten by the black-throated finch (southern) include: *Schizachyrium* spp, *Echinopogon* sp, *Sorghum* spp and *Paspalum* sp (Department of the Environment, Water, 2009). The black-throated finch's (southern) primary stronghold is the region surrounding Townsville; however it is also known to occur in scattered locations across central-eastern Queensland (Department of the Environment, 2018).	**Unlikely** The Project site is characterised by a low abundance of grass cover, and no water is available within close proximity to the Project site.

Species	Status (EPBC Act, NC Act)	Preferred Habitat	Likelihood of Occurrence
Curlew sandpiper *Calidris ferruginea*	Critically Endangered, Endangered	Curlew sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They occur in both fresh and brackish waters. In Australia, curlew sandpipers occur around the coasts and are also quite widespread inland, though in smaller numbers (Department of the Environment, 2018).	**Unlikely** There are no wetlands or mudflats within close proximity to the Project site.
Eastern curlew *Numenius madagascariensis*	Critically Endangered, Endangered	During the non-breeding season in Australia, the eastern curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass (*Zosteraceae*). Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. Within Australia, the eastern curlew has a primarily coastal distribution, they are rarely recorded inland (Department of the Environment, 2018).	**Unlikely** There are no wetlands or mudflats within close proximity to the Project site.
Grey falcon *Falco hypoleucos*	-, Vulnerable	The grey falcon occurs very sparsely in the interior and north of the Australian mainland, where it prefers timbered lowland plains (especially those that are *Acacia*-dominated) which are interspersed with tree-lined watercourses or wetland areas where surface water attracts prey. The majority of its habitat has an average annual rainfall of less than 500 mm (Australian Wildlife Conservancy, 2018).	**Low** No watercourses or wetlands are found within close proximity to the Project site. The Project site is characterised by an average annual rainfall of ~1,000 mm.
Masked owl (northern) *Tyto novaehollandiae kimberli*	Vulnerable, Vulnerable	The masked owl is known to use a range of habitat types in Queensland including riparian woodland, rainforest, open forests, *Melaleuca* swamps and mangrove edges. They roost and nest in large tree hollows near foraging areas. In Queensland, there are historical records of the masked owl from the Normanton region, and from Pascoe, Archer, Chester and Watson Rivers on Cape York Peninsula. It occurs along the southern rim of the Gulf of Carpentaria, Cape York Peninsula and south to Atherton Tablelands and the Einasleigh-Burdekin divide (Department of the Environment, 2018).	**Low** The Project site is likely to support some preferred habitat; however is considered a low likelihood of occurrence given the absence of recent historical records, west of the Great Dividing Range.

Species	Status (EPBC Act, NC Act)	Preferred Habitat	Likelihood of Occurrence
Painted honeyeater *Grantiella picta*	Vulnerable, Vulnerable	The 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. It is also known to occur in riparian woodland communities dominated by eucalypt species such as *Eucalyptus camaldulensis,* although its breeding distribution is dictated by the presence of mistletoes which are largely restricted to older trees. The species is sparsely 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 (Department of the Environment, 2018).	**Unlikely** The Project site is located outside the distribution of this species. No mistletoe species were identified within the Project site.
Red goshawk *Erythrotriorchis radiatus*	Vulnerable, Endangered	The red goshawk occurs mostly in extensive areas of coastal and subcoastal open forest and woodland that support a mosaic of vegetation types. Permanent water (watercourses and wetlands) is usually present in close proximity (within 1 km), with tall emergent trees used for nesting. The red goshawk is thought to have a very large home range covering between 50 and 220 square kilometres. Sparsely distributed across coastal and sub-coastal Australia, from the western Kimberly to northern New South Wales. Appears to have been a contraction in range in recent years. Occasionally recorded from gorge country in central Australia and western Queensland (Department of the Environment, 2018).	**Moderate** The Project site contained large trees, a mosaic of vegetation types and preferred density of forest with reasonable high diversity of bird species for prey. Suitable nesting habitat is not found within 1 km of the Project site; however this species may forage in the Project site. Records are available approximately 40 km south-east of the Project site at Paluma.

Species	Status (EPBC Act, NC Act)	Preferred Habitat	Likelihood of Occurrence
Southern cassowary *Casuarius casuarius johnsonii*	Endangered, Vulnerable	While cassowaries live in and depend on tropical rainforest they will also utilise a mosaic of associated habitats when these are available as intermittent food sources and as connecting habitat between more suitable sites (Crome & Moore, 1990). Associated habitats utilised include mangroves, *Melaleuca*, eucalypt woodlands, swamps and swamp forests. Cassowaries rely upon a year round supply of fleshy fruit and these associated habitats can provide crucial food resources at certain times of year. The cassowary is the only member of the cassowary family in Australia and occurs in three populations in north Queensland. In the Wet Tropics it is distributed widely from Cooktown to just north of Townsville. Core habitat is coastal lowlands between Ingham and Mossman, and uplands in the southern Atherton Tablelands and other ranges (Department of the Environment, 2018).	**Unlikely** The fleshy fruits of rainforest trees and shrubs required for foraging were not recorded within the Project site. No rainforest elements were detected during the field survey, indicating the Project site is highly unlikely to support cassowary habitation.
Mammals			
Bare-rumped sheath-tailed bat *Saccolaimus saccolaimus nudicluniatus*	Vulnerable, Endangered	The bare-rumped sheath-tailed bat occurs mostly in lowland areas, typically in a range of woodland, forest and open environments, and possibly rainforest. In Queensland, the bare-rumped sheath-tailed bat occurs from Ayr to the Iron Range, including Magnetic and possibly Prince of Wales Islands. Most records are near-coastal, but one record (at Jasper Gorge, Northern Territory) has been found 150 km inland (Department of the Environment, 2018).	**Unlikely** This species is known from lowland coastal areas in Queensland, and favours woodland communities dominated by *Eucalyptus platyphylla* and *Eucalyptus tetrodonta*.
Black-footed tree-rat *Mesembriomys gouldii rattoides*	Vulnerable, -	In north Queensland, this species mostly occurs in eucalypt forests and woodlands, especially where hollows are relatively plentiful. The distribution of the black-footed tree rat (north Queensland) is poorly known. It has been recorded mostly from eucalypt forests and woodlands (but not rainforests) around Mareeba, but there are records sparsely across Cape York Peninsula (Department of the Environment, 2018).	**Low** Suitable habitat for this species was identified during the field survey; however all recent records of this species are approximately 200 km north of the Project site.

Species	Status (EPBC Act, NC Act)	Preferred Habitat	Likelihood of Occurrence
Ghost bat *Macroderma gigas*	Vulnerable, Endangered	The ghost bat currently occupies habitats ranging from the arid Pilbara to tropical savanna woodlands and rainforests. Their diet includes insects, frogs, birds, lizards and small mammals, including other bats. The species' current range is discontinuous, with geographically disjunct colonies occurring in the Pilbara, Kimberley, Northern Territory, the Gulf of Carpentaria, coastal and near coastal eastern Queensland from Cape York to near Rockhampton, and western Queensland (Department of the Environment, 2018).	**Moderate** Caves and old mines that may provide roosting habitat for this species exist surrounding the Project site, and potential foraging habitat is found within the Project site.
Greater glider *Petauroides volans*	Vulnerable, Vulnerable	The greater glider is largely restricted to eucalypt forests. It is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows. The greater glider is restricted to eastern Australia, occurring from the Windsor Tableland in north Queensland through to central Victoria, with an elevational range from sea level to 1200 m above sea level. An isolated inland subpopulation occurs in the Gregory Range west of Townsville, and another in the Einasleigh Uplands (Department of the Environment, 2018).	**High** The Project site supports old trees and large hollows. This species has been identified surrounding the Project site.
Grey-headed flying-fox *Pteropus poliocephalus*	Vulnerable, -	The grey-headed flying-fox requires foraging resources and roosting sites. It is a canopy-feeding frugivore and nectarivore, which utilises vegetation communities including rainforests, open forests, closed and open woodlands, *Melaleuca* swamps and *Banksia* woodlands. The primary food source is blossom from *Eucalyptus* and related genera but in some areas it also utilises a wide range of rainforest fruits. Grey-headed flying-foxes occupy the coastal lowlands and slopes of south-eastern Australia from Bundaberg to Geelong and are usually found at altitudes < 200 m. Areas of repeated occupation extend inland to the tablelands and western slopes in northern New South Wales and the tablelands in southern Queensland (Department of the Environment, 2018).	**Low** Suitable foraging habitat was identified during the field survey. However, no known grey-headed flying-fox roosts are mapped in the Project site, and no recent records exist in close proximity to the site. The closest known mixed colony flying-fox roost is at Ingham.

Species	Status (EPBC Act, NC Act)	Preferred Habitat	Likelihood of Occurrence
Koala *Phascolarctos cinereus*	Vulnerable, Vulnerable	Koalas inhabit a range of temperate, sub-tropical and tropical forest, woodland and semi-arid communities dominated by species from the genus *Eucalyptus*. In North Queensland, the koala's distribution extends inland from the east coast: from the Wet Tropics interim biogeographic regionalisation of Australia bioregion, into the Einasleigh Uplands bioregion in the north of the state (Department of the Environment, 2018).	**High** The Project site supports habitat for the koala and records of this species occur surrounding the Project site.
Large-eared horseshoe bat *Rhinolophus philippinensis*	Vulnerable, Endangered	The primary habitat of the large-eared horseshoe bat is rainforests. Daytime roosting habitat for this species includes caves and underground mines located in rainforest, and open eucalypt forest and woodland. The large-eared horseshoe bat occurs only in northern Queensland, from the Iron Range southwards to Townsville and west to the karst regions of Chillagoe and Mitchell-Palmer (Department of the Environment, 2018).	**Low** The Project site lacks the preferred habitat of rainforest and gallery forest-lined creeks. All records of this species are found within tropical habitat.
Northern quoll *Dasyurus hallucatus*	Endangered, -	The northern quoll occupies a diversity of habitats across its range which includes rocky areas, eucalypt forest and woodlands, rainforests, sandy lowlands and beaches, shrubland, grasslands and desert. Northern quoll are also known to occupy non rocky lowland habitats such as beachscrub communities in central Queensland. Northern quoll 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. In Queensland, the northern quoll is known to occur as far south as Gracemere and Mount Morgan, south of Rockhampton, as far north as Weipa in Queensland and extends as far west into central Queensland to the vicinity of Carnarvon Range National Park (Department of the Environment, 2018).	**Low** The Project site does not contain rocky areas, and the open forest vegetation does not contain high structural diversity for hunting and denning.

Species	Status (EPBC Act, NC Act)	Preferred Habitat	Likelihood of Occurrence
Semon's leaf-nosed bat *Hipposideros semoni*	Vulnerable, Endangered	Semon's leaf-nosed bat is found in tropical rainforest, monsoon forest, wet sclerophyll forest and open savannah woodland. The known broad-scale distribution for Semon's leaf-nosed bat includes coastal Queensland from Cape York to just south of Cooktown (Department of the Environment, 2018).	**Unlikely** This species is known from coastal areas and the closest records are approximately 375 km north of the Project site.
Sharman's rock-wallaby *Petrogale sharmani*	Vulnerable, Vulnerable	The species occurs in a variety of rocky habitats (including rocky outcrops, boulder piles, gorges, cliff lines and rocky slopes) within open forests or grassy woodlands. It shelters during the day in rocky refuges or dense vegetation, emerging at dusk to feed. The range of Sharman's rock-wallaby is limited. It is known from only about 20 colonies scattered within a 2,000 km^2 area of the Seaview and Coane Ranges, west of Ingham in north-eastern Queensland (Department of the Environment, 2018).	**Unlikely** Suitable habitat (rocky outcrops, boulders, etc.) are not found within the Project site.
Short-beaked echidna *Tachyglossus aculeatus*	- Special Least Concern	The short-beaked echidna lives in forests and woodlands, heath, grasslands and arid environments. This species can live anywhere with a good supply of food, and regularly feast on ants and termites. The short-beaked echidna is found throughout Australia, including Tasmania (WetlandInfo, 2018).	**High** Suitable habitat exists within the Project site, and this species has been identified in the surrounding area.
Spectacled flying-fox *Pteropus conspicillatus*	Vulnerable, Vulnerable	This species was long assumed to feed primarily on rainforest species but individuals regularly feed on a wide variety of non-rainforest species, including eucalypts (*Eucalyptus* spp., *Corymbia* spp.) in tall open forests adjoining rainforest communities and in tropical woodland and savanna ecosystems. The spectacled flying-fox occurs in north-eastern Queensland, north of Cardwell with past records from Brisbane and Chillagoe. It is restricted to tropical rainforest areas, most specifically, the species occurs between Ingham and Cooktown, and between the McIlwrait and Iron Ranges of Cape York (Department of the Environment, 2018).	**Low** Suitable habitat in the form of wet, closed forest was not identified during the field surveys; however suitable foraging habitat within the Project site is present. No known spectacled flying-fox roosts are mapped in the Project site. The closest known roost is at Ingham.

Species	Status (EPBC Act, NC Act)	Preferred Habitat	Likelihood of Occurrence
Reptiles			
Common death adder *Acanthophis antarcticus*	-, Vulnerable	Within its range, the species is found in a wide variety of habitats in association with deep leaf litter, including rainforests, wet sclerophyll forests, woodland, grasslands, chenopod dominated shrublands, and coastal heathlands. This species occurs from the Gulf region of the Northern Territory across to central and eastern Queensland and New South Wales, and through to the southern parts of South Australia and Western Australia (Department of Environment and Heritage Protection, 2017).	**Low** Deep leaf litter is not found within the Project site, which is characterised by bare ground with occasional grass tussocks.
Yakka skink *Egernia rugosa*	Vulnerable, Vulnerable	Habitat requirements are poorly known, however the species is known from rocky outcrops, sand plain areas and dense ground vegetation, in association with open dry sclerophyll forest (ironbark) or woodland, brigalow forest and open shrub land. Common woodland and open forest types include brigalow (*Acacia harpophylla*), *mulga* (*Acacia aneura*), bendee (*Acacia catenulata*), lancewood (*Acacia shirleyi*), belah (*Casuarina cristata*), poplar box (*Eucalyptus populnea*), ironbark (*Eucalyptus* spp.), and white cypress pine (*Callitris glaucophylla*). The known distribution of the yakka skink extends from the coast to the hinterland of sub-humid to semi-arid eastern Queensland. This vast area covers portions of the Brigalow Belt, Mulga Lands, South-east Queensland, Einasleigh Uplands, Wet Tropics and Cape York Peninsula bioregions (Department of the Environment, 2018).	**Unlikely** Land zone 8 (identified within the Project site) is not considered core habitat for this species; however they may still occur there. The common woodland and open forest types this species is typically found in are not found within the Project site.
Amphibians			
Australian lace-lid *Litoria dayi*	Endangered, Endangered	This frog is a rainforest species, endemic to the Wet Tropics bioregion. It is associated with rainforests and rainforest margins. In montane areas the species prefers fast-flowing rocky streams although they also frequent slower watercourses where ample vegetation exists along the margins. The Australian lace-lid frog occurs throughout the Wet Tropics bioregion from Paluma to Cooktown, northern Queensland, at altitudes between 0 and 1200 m (Department of the Environment, 2018).	**Unlikely** The Project site is in the distribution of the species; however it lacks the necessary habitat.

Species	Status (EPBC Act, NC Act)	Preferred Habitat	Likelihood of Occurrence
Waterfall frog *Litoria nannotis*	Endangered, Endangered	The waterfall frog is a stream dwelling species that is endemic to the Wet Tropics bioregion. It is restricted to rocky stream habitats in rainforest or wet sclerophyll forest where there is fast flowing water, waterfalls and cascades. The waterfall frog occurs throughout the Wet Tropics bioregion, North Queensland, from Paluma to Cooktown (Department of the Environment, 2018).	**Unlikely** The Project site is in the distribution of the species; however it lacks the necessary habitat.

Table 14 Likelihood of Occurrence Assessment - Migratory Fauna

Species	Status (EPBC Act, NC Act)	Preferred Habitat	Likelihood of Occurrence
Migratory Marine Birds			
Fork-tailed swift *Apus pacificus*	Migratory, Special Least Concern	The fork-tailed swift is a non-breeding migrant to Australia and is almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher. This species mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes. Recorded generally east of the Great Dividing Range from Cooktown to the New South Wales border, but extends further west in southern Queensland (Department of the Environment, 2018).	**Low** Aerial species known to fly over broad habitat types. May occur in the airspace above the Project site.
Migratory Terrestrial Species			
Oriental cuckoo *Cuculus optatus*	Migratory, Special Least Concern	The species uses a range of vegetated habitats such as monsoon rainforest, wet sclerophyll forest, open woodlands and appears quite often along edges of forests, or ecotones between forest types. The oriental cuckoo is a regular migrant to Australia, where it spends the non-breeding season (Sept- May) in coastal regions across northern and eastern Australia as well as offshore islands (Department of the Environment, 2015).	**Low** Limited suitable habitat occurs within the Project site.
White-throated needletail *Hirundapus caudacutus*	Migratory, Special Least Concern	The white-throated needletail is a non-breeding migrant in Australia and is found across a range of habitats, more often over wooded areas, where it is almost exclusively aerial, though does roost in tree hollows and the foliage canopy. It forages for insects on the wing; flying anywhere between “cloud level” and “ground level” and readily forms mixed feeding flocks with other aerial insectivores. This species is widespread in eastern and south-eastern Australia. In eastern Australia, it is recorded in all coastal regions of Queensland and New South Wales, extending inland to the western slopes of the Great Divide and occasionally onto the adjacent inland plains (Department of the Environment, 2015).	**Low** Aerial species known to fly over broad habitat types. May occur in the airspace above the Project site.

Barn swallow *Hirundo rustica*	Migratory, Special Least Concern	In Australia, the barn swallow is recorded in open country in coastal lowlands, often near water, towns and cities. Birds are often sighted perched on overhead wires, and also in or over freshwater wetlands, paperbark *Melaleuca* woodland, mesophyll shrub thickets and tussock grassland. The barn swallow usually occurs in northern Australia, on Cocos-Keeling Island, Christmas Island, Ashmore Reef, and patchily along the north coast of the mainland from the Pilbara region, Western Australia, to Fraser Island in Queensland (Department of the Environment, 2015).	**Low** Suitable habitat is present in the Project site; however all records of the barn swallow are in coastal areas.
Black-faced monarch *Monarcha melanopsis*	Migratory, Special Least Concern	The black-faced monarch is a wet forest specialist, occurring mainly in rainforests and riparian vegetation. This species mainly occurs in rainforest ecosystems, including semi-deciduous vine-thickets, complex notophyll vine-forest, tropical (mesophyll) rainforest, subtropical (notophyll) rainforest, mesophyll (broadleaf) thicket/shrub land, warm temperate rainforest, dry (monsoon) rainforest and (occasionally) cool temperate rainforest. In Queensland, the black-faced monarch is widespread from the islands of the Torres Strait and on Cape York Peninsula, south along the coasts (occasionally including offshore islands) and the eastern slopes of the Great Divide, to the New South Wales border (Department of the Environment, 2015).	**Low** Wet forest was not identified during the field survey. Numerous records exist approximately 40 km east of Mount Fox, in the wetter forests around Paluma.
Spectacled monarch *Monarcha trivirgatus*	Migratory, Special Least Concern	This species occupies dense vegetation, mainly in rainforest but also in moist or wet sclerophyll forest and occasionally in other densely vegetated habitats such as mangroves, drier forest, woodlands, parks and gardens. The spectacled monarch is found in coastal north-eastern and eastern Australia, including coastal islands, from Cape York, Queensland to Port Stephens, New South Wales (Department of the Environment, 2015).	**Low** Wet forest was not identified during the field survey. Numerous records exist approximately 40 km east of Mount Fox, in the wetter forests around Paluma.

Grey wagtail *Motacilla cinerea*	Migratory, Special Least Concern	The species has a strong association with water. In their normal breeding range, grey wagtails are found across a variety of wetlands, especially watercourses, but also on the banks of lakes and marshes, as well as artificial wetlands such as sewage farms, reservoirs and fishponds. This association with water extends into non-breeding habitats with all confirmed Australian records being associated with water; especially creeks, rivers and waterfalls. The grey wagtail is a scarce but regular visitor to northern Australia, generally arriving during the last 10 days of October and departing around March (Department of the Environment, 2015).	**Unlikely** There are no wetlands, creeks or rivers within close proximity to the Project site.
Yellow wagtail *Motacilla flava*	Migratory, Special Least Concern	Habitat requirements for the yellow wagtail are highly variable, but typically include open grassy flats near water. Habitats include open areas with low vegetation such as grasslands, airstrips, pastures, sports fields; damp open areas such as muddy or grassy edges of wetlands, rivers, irrigated farmland, dams, waterholes; sewage farms, sometimes utilise tidal mudflats and edges of mangroves. The yellow wagtail is a regular wet season visitor to northern Australia. In Queensland this species is a regular visitor from Mossman south to Townsville. The species is a vagrant further south and on Heron Island (Department of the Environment, 2015).	**Unlikely** There are no wetlands, creeks or rivers within close proximity to the Project site. Records indicate the species is predominately recorded in coastal areas.
Satin flycatcher *Myiagra cyanoleuca*	Migratory, Special Least Concern	Satin flycatchers are eucalypt forest and woodland inhabitants. They are particularly common in tall wet sclerophyll forest, often in gullies or along water courses. In woodlands they prefer open, grassy woodland. In Queensland, this species is widespread but scattered in the east, being recorded on passage on a few islands in the western Torres Strait. It is patchily recorded on Cape York Peninsula, from the Cape south to a line between Aurukun and Coen. Satin flycatchers are also found extensively along the Great Dividing Range (Department of the Environment, 2015).	**Low** There are no wetlands, creeks or rivers within close proximity to the Project site. The open forest within the Project site is characterised by low grass abundance.

Rufous fantail *Rhipidura rufifrons*	Migratory, Special Least Concern	In east and south-east Australia, the rufous fantail mainly inhabits wet sclerophyll forests, often in gullies dominated by eucalypts, usually with a dense shrubby understorey often including ferns. The rufous fantail is found in northern and eastern coastal Australia, being more common in the north. This species migrates to south-east Australia in October-April to breed, mostly in or on the coastal side of the Great Dividing Range (Department of the Environment, 2015).	**Low** Wet forest was not identified during the field survey. Numerous records exist approximately 40 km east of Mount Fox, in the wetter forests around Paluma.
Migratory Wetland Species			
Common sandpiper *Actitis hypoleucos*	Migratory, Special Least Concern	The common sandpiper is known to occur in a range of wetland environments, both coastal and inland. Their primary habitat is rocky shorelines and narrow muddy margins of billabongs, estuaries and mangroves. Found along all coastlines of Australia and in many areas inland, the common sandpiper is widespread in small numbers. The population when in Australia is concentrated in northern and western Australia (Department of the Environment, 2018).	**Unlikely** There are no wetlands, creeks or rivers within close proximity to the Project site.
Sharp-tailed sandpiper *Calidris acuminata*	Migratory, Special Least Concern	In Australasia, the sharp-tailed sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline salt lakes inland. In Queensland, the sharp-tailed sandpiper are recorded in most regions, being widespread along much of the coast and are very sparsely scattered inland, particularly in central and south-western regions. Many inland records are of birds on passage (Department of the Environment, 2018).	**Unlikely** There are no wetlands, creeks or rivers within close proximity to the Project site.

Pectoral sandpiper *Calidris melanotos*	Migratory, Special Least Concern	This species is usually found in coastal or near coastal habitat but occasionally found further inland. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire. In Queensland, most records for the pectoral sandpiper occur around Cairns. There are scattered records elsewhere, mainly from east of the Great Divide between Townsville and Yeppoon. Records also exist in the south-east of the state as well as a few inland records at Mount Isa, Longreach and Oakley (Department of the Environment, 2018).	**Unlikely** There are no wetlands, creeks or rivers within close proximity to the Project site.
Latham's snipe *Gallinago hardwickii*	Migratory, Special Least Concern	In Australia, the Latham's snipe occurs in permanent and ephemeral wetlands up to 2000 m above sea-level. They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies). Latham's snipe is a non-breeding visitor to south-eastern Australia, and is a passage migrant through northern Australia. This species has been recorded along the east coast of Australia from Cape York Peninsula through to south-eastern South Australia. In Queensland, the range extends inland over the eastern tablelands in south-eastern Queensland (Department of the Environment, 2018).	**Unlikely** There are no wetlands, creeks or rivers within close proximity to the Project site.
Osprey *Pandion haliaetus*	Migratory, Special Least Concern	Ospreys occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia. 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. The breeding range of the 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 (Department of the Environment, 2018).	**Unlikely** There are no wetlands, creeks or rivers within close proximity to the Project site.