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ENVIRONMENTAL CONSULTANTS

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Edify Green Hydrogen

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1 Introduction

Terra Solutions has been engaged by Open Lines Pty Ltd on behalf of Edify Energy Pty Ltd to undertake an Ecological Assessment for a Green Hydrogen plant and solar farm on Lot 51 on E124242, Woodstock (Figure 1).

The purpose of the investigation is to inform the statutory planning process, provide information for input into future design and identify any potential ecological constraints relating to the development of the proposed green hydrogen plant and solar farm.

1.1 Objectives

The objective of this Ecological Assessment is to describe the ecological values and constraints relating to development of the proposed Green Hydrogen plant. These matters include, but are not limited to, threatened species and ecological communities listed as Matters of National Environmental Significance (MNES) under the Federal Government *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and threatened species listed as Matters of State Environmental Significance (MSES) under the Queensland's *Nature Conservation Act 1992* (NC Act).

1.2 Scope of Works

The scope of the study included the following:

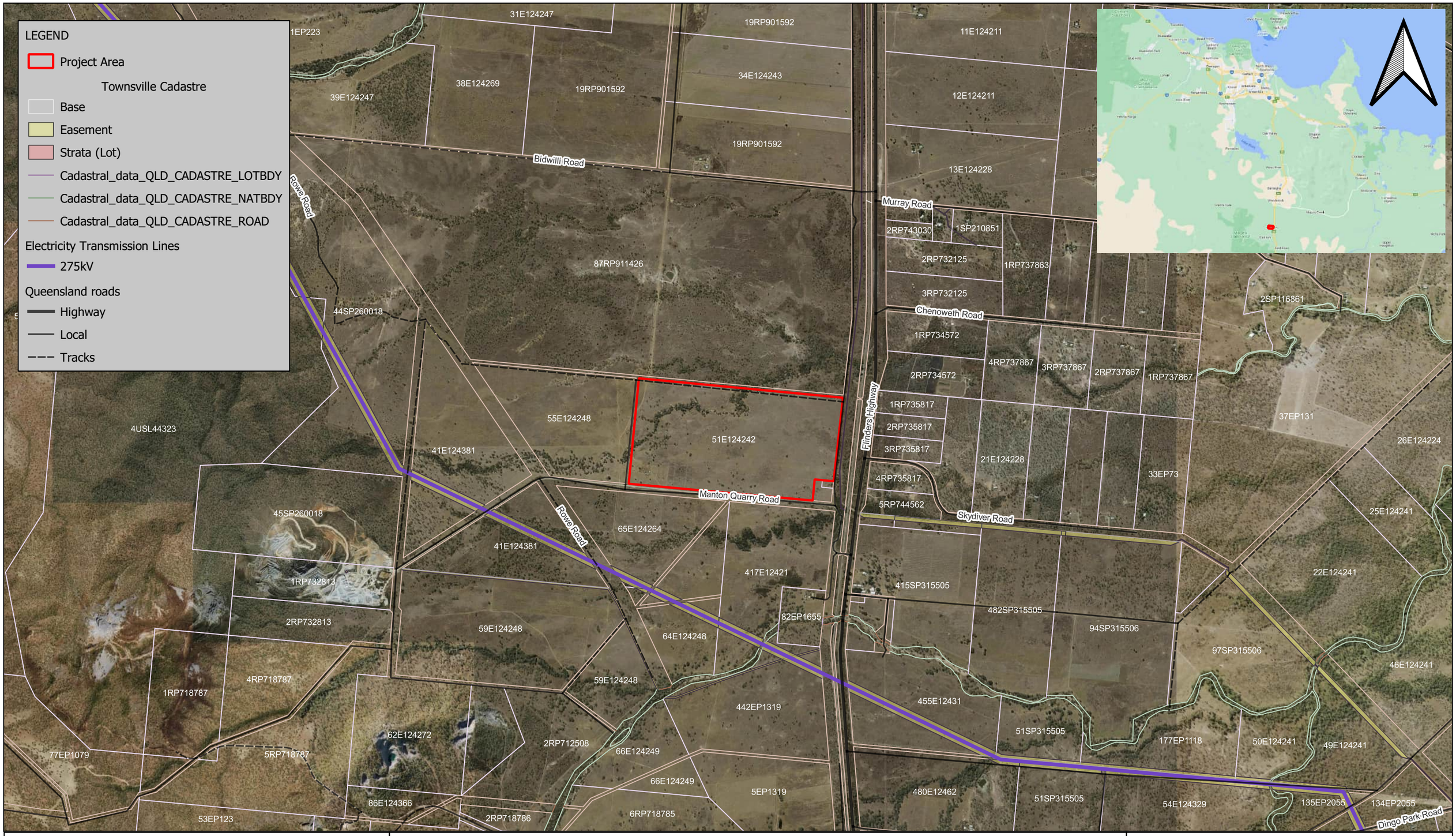
- Review relevant background information and data related to ecological constraints in a local and regional context
- Undertake an inspection of the project area and undertake targeted surveys for threatened species
- Prepare a report detailing, methodology and results of the assessment.

1.3 Project Area Description

The project area is located within the Townsville City Local Government Area on Lot 51 on 1E124242, Woodstock (Figure 1) which occupies a total area of approximately 106.14 ha. No easements intersect the project area.

The Queensland – Land Use layer (Queensland Globe 2023) classifies land use within the project area as 'production from relatively natural environments' or 'grazing native vegetation'. The project area is currently grazed for cattle production.

An aerial image of the project area superimposed with contours is presented in Figure 2.



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CLIENT: EDIFY ENERGY

FIGURE 1: PROJECT AREA LOCATION

0 1,000 2,000 3,000 4,000 m

1:25,000

DOCUMENT: P:\Projects\202210 Edify

DATE: 23/05/2023 | AUTHOR: K PARISON

Credits:

Coordinate system: GDA2020 / MGA zone 55 EPSG:7855

LEGEND

Project Area

Elevation contours

Watercourse lines

SO 1 & 2

SO 3 & 4

80

90

100

70

70

70

Two Mile Creek

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FIGURE 2: AERIAL IMAGERY AND ELEVATION

DOCUMENT: P:\Projects\202210 Edify

DATE: 23/05/2023

AUTHOR: K PARISON

0 450 900 1,350 1,800 m

1:10,000

Credits:

Cadastral Parcels - All © State of Queensland (Department of Natural Resources and Mines), 2016,Includes material © State of Queensland (Department of Resources); © Planet Labs Netherlands B.V. reproduced under licence from Planet and Geoplex, all rights reserved, 2022.

Coordinate system: GDA2020 / MGA zone 55 EPSG:7855

1.4 Statutory Consideration

The following legislation, policy, guidelines, and guidance documents provided in Table 1 are relevant to identifying the impacts and constraints relevant to the project area and provide guidance in the assessment of the ecological values of the project area.

Table 1 Relevant environmental statutory considerations

Legislative act	Brief description
Commonwealth Legislation	
Environment Protection and Biodiversity Conservation Act 1999	The *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* provides a mechanism for assessing the environmental impact of activities and development where "Matters of National Environmental Significance" (MNES) may be significantly affected. The Act identifies eight matters of MNES, which require consideration and analysis, including: • Ramsar wetland of international importance • World Heritage properties • National Heritage places • Commonwealth Marine areas • Great Barrier Reef Marine Park • Nationally threatened species and ecological communities • Nationally listed migratory species • Nuclear actions (including uranium mining). Where a project or action is believed to potentially cause a significant impact on a matter of MNES, it is to be referred to the Australian Government Department of Climate Change, Energy, the Environment and Water (DCCEEW) for assessment as to whether the action is a 'controlled action' requiring Commonwealth approval for the proposed action. The EPBC Act processes also allow voluntary referral of a Project to seek confirmation that a Project will not have significant impacts on matters of MNES. Where an action requires Commonwealth approval, a formal assessment process is undertaken in accordance with provisions of relevant legislation.
State Legislation	
Nature Conservation Act 1999	The NC Act aims to conserve nature in Queensland, while allowing for the involvement of Indigenous people in the management of protected areas in which they have an interest under Aboriginal tradition or Island custom. The NC Act provides for the protection of wildlife, including threatened species, and areas of conservation significance. The *Nature Conservation (Animals) Regulation 2020* and the *Nature Conservation (Plants) Regulation 2020* prescribes particular species in accordance with the categories set out in the Act. It is an offence to take protected wildlife without a licence, permit or other authority (section 320). It is also an offence for a person, without a reasonable excuse, to tamper with an animal breeding place being used by a protected animal to incubate or rear offspring (section 335*, Nature Conservation (Animals) Regulation 2020)*.
Environmental Offsets Act 2014	The Environmental Offsets Framework streamlines environmental offsets by providing an outcome-based approach to offsets, removing the complexities and by aligning offsets across all three levels of government. The framework includes: • *Environmental Offsets Act 2014* which coordinates the delivery of environmental offsets across jurisdictions is the overarching legislation for offsets in Queensland • *Environmental Offsets Regulation 2014* which provides details of the prescribed activities regulated under existing legislation and prescribed environmental matters to which the Act applies • Queensland Environmental Offsets Policy which provides a single, consistent, whole-of-government policy for the assessment of offset proposals provided by authority holders to satisfy offset conditions. The Environmental Offsets Policy provides greater flexibility in relation to how offsets can be delivered including: • Financial settlement calculated using the Financial Settlement Offset Calculator • Land-based offsets

Legislative act	Brief description
	• Offsets delivered as actions in a Direct Benefit Management Plan • Or a combination of these approaches • Where offset conditions specify, staged offsets can also be delivered. The policy also introduces a more strategic approach to offset delivery through the introduction of Strategic Offset Investment Corridors and Direct Benefit Management Plans (DBMP). This more strategic approach is intended to lead to greater benefits for the environment and will provide more opportunities for landholders to receive income in return for voluntarily agreeing to manage their land, or part of their land, as an offset.
Vegetation Management Act 1999	The VM Act is the planning initiative underlying regional management of vegetation in Queensland, including clearing of vegetation types, termed Regional Ecosystems (REs). • The RE classification is a hierarchical system formed by a three-part code with the primary subdivision being bioregion, followed by land zone, and then vegetation. The biogeographic region or bioregion is the primary level of classification for biodiversity values in Queensland describing where the RE is found on a state-wide basis. Land Zones are geological and geomorphic categories that describe the major geologies and landforms of Queensland. The system is based primarily on geology, with geologic age considered an important determinant • The status of REs is based on their pre-clearing and remnant extent, and is gazetted under the Act and listed in the RE Description Database (REDD) maintained by the DES. • The Act aims to conserve remnant endangered and of concern REs, prevent land degradation and further loss of biodiversity, manage the environmental impacts of clearing vegetation, and reduce the emissions of greenhouse gases. The VMA status of an RE is described in line with the following: ○ Endangered. An RE that is prescribed under the regulation and has either of the following attributes: ▪ Less than 10% of its pre-clearing extent remaining ▪ From 10% to 30% of its pre-clearing extent remaining and the remnant vegetation remaining is less than 10,000 ha. ○ Of concern. An RE that is prescribed under the regulation and has either of the following attributes: ▪ From 10% to 30% of its pre-clearing extent remaining ▪ More than 30% of its pre-clearing extent remaining and the remnant vegetation remaining is less than 10,000 ha. ○ Least concern. An RE that is prescribed under the regulation and has more than 30% of its pre-clearing extent remaining and the remnant vegetation remaining is more than 10,000 ha ○ The biodiversity status of an RE is classified by DES based on the condition of remnant vegetation. A RE will have a vegetation management status and/or a biodiversity status of endangered, of concern or least concern ○ Essential Habitat. The VMA also has provision for the regulation of essential habitat for species of state significance. Essential habitat (mapped by DES) is vegetation in which a listed species has been known to occur. Clearing or disturbance to areas of essential habitat will require compensatory habitat measures to be developed. For the project development area, core habitat has been used to describe the combination of critical or essential habitat for both national or state listed significant species.

2 Methods

2.1 Desktop Assessment

The desktop assessment involved a review of relevant environmental documents, databases, scientific journals, books, technical reports, maps, and legislation (Commonwealth, State and Local) to identify the ecological values that potentially occur within and surrounding the project area.

This review included an assessment of the following information:

- Aerial Photograph Interpretation (API) to determine the broad categorisation of vegetation within and surrounding the project area and to review the extent of historical clearing and land use, and any other significant environmental features such as watercourses and wetlands (Google Earth 2023).
- Regional ecosystem mapping: The most recent version of the Department of Resources (DoR) Regulated Vegetation Management mapping (2020) including regional ecosystems (Version 11.0) and essential habitat mapping (Version 9.07) (Figure 7).
- Referable Wetlands mapping. The referable wetlands mapping produced by the Department of Environment and Science (DES) was reviewed to provide an indication of the occurrence and location of any wetland management areas (comprising significant wetlands and a 100 m wetland buffer area) in relation to the landforms of the project area.
- DES Protected Plants Flora Survey Trigger Map. The flora survey trigger map identifies high-risk areas where endangered, vulnerable or near threatened native plants are present or are likely to be present (Appendix A)
- WildNet database of flora and fauna. This database holds records of plants and animals that have either been sighted or collected within a given radius of the project area (a search parameter was prescribed limiting the search area to a 10 km radius around an approximate central point of the project area (-19.6485, 146.8274). Records held in this database are maintained by DES (Appendix B).
- Atlas of Living Australia (ALA) species records review. ALA is a collaborative, digital, open infrastructure that pulls together Australian biodiversity data from multiple sources (ALA, 2023)
- Protected matters database of MNES. This database applies a range of bio-models to predict the presence of species of flora and fauna and other MNES within a given radius of the project area (a search parameter was prescribed limiting the search area to a 10 km radius around an approximate central point of the study area (-19.64806, 146.82670), as cited under the Commonwealth's EPBC Act (Appendix C).
- Queensland waterways for waterway barrier works (spatial layer): This dataset identifies and provides a risk rating for all waterways defined as a 'waterway' under the Fisheries Act.

Desktop searches were repeated prior to the October 2023 survey to identify and new environmental values present in the project area.

2.2 Field Survey

Following the desktop study, a field investigation was undertaken to verify the desktop data, assess the current condition of the project area and confirm the presence or absence of significant microhabitat values that are critical to threatened species. This investigation included searches for local water sources, assessment of vegetation structure and composition, targeted fauna and flora surveys and the detection and assessment of hollow suitability and rock outcrops.

2.2.1 Vegetation and flora

Following the desktop review, a field assessment was undertaken to confirm the vegetation communities present in the project area, undertake searches for threatened plants, and confirm habitat suitability for threatened fauna species.

The flora investigation consisted of the following:

- An on-ground validation of each mapped regional ecosystem (RE) using the quaternary survey method in accordance with the *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland* (Neldner et al. 2020).

- Searches for threatened flora species in areas of suitable habitat (random meandering).

2.2.2 Fauna

Following the desktop review, a fauna habitat assessment was undertaken to confirm suitability for threatened fauna species and undertake targeted investigations for potentially occurring species as required.

- The fauna habitat assessment assessed the values within each vegetation community present on the project area including, but not necessarily limited to the following:
  - Vegetation structure and dominant/ characteristic flora associated with threatened species
  - Evidence and severity of disturbance (e.g., grazing, weeds, erosion, storm, fire, etc.)
  - Habitat characteristics and abundance in relation to critical microhabitats (such as soil cracks, hollows, rock crevices)
  - Searches for evidence of fauna species (e.g., scats, burrows, etc.) within identified suitable habitat

The survey methodology undertaken for target species are outlined below:

2.2.2.1 Black-throated finch

Surveys for black-throated finch were undertaken in the wet season (November – March) and the dry season (May – October).

Seasonal survey requirements for black-throated finch are dependent on the water types present within and adjacent (within 1.5 km) to the project area (Table 2). Undertaking both wet and dry season surveys was considered appropriate due to the presence of at least one permanent water source within 1.5 km of the project area.

The preferred timing of wet season surveys is between March and May following the highest rainfall months. The preferred timing for dry season surveys is at the end of the season (October).

Survey methods for black-throated finch consisted of targeted water source counts and targeted searches in woodland and grassland within 600 m of key water sources in accordance with the methods described in the *Significant impact guidelines for the endangered black-throated finch (southern) (Poephila cincta cincta) Nationally threatened species and ecological communities Background paper to the EPBC Act policy statement 3.13* (DEWHA 2009).

Table 2 Recommended survey protocol based on location and type of water - reproduced from (DEWHA 2009)

Type of water source within and immediately adjacent (within 1.5 km) to subject land	Survey timing
Seasonal (ephemeral) and permanent	Wet and dry season surveys
Seasonal only	Wet season surveys
Permanent only	Wet and dry season surveys

The water sources surveyed, and the survey effort are detailed in Table 3 and presented in Figure 3. Each water source was surveyed for three hours following sunrise and three hours in the afternoon over two consecutive days (28-29 March 2023 and 24-25 October 2023). Where more favourable waterbodies and habitat conditions were observed during walking transects, survey effort was split for several waterbodies as detailed in Table 3.

Table 3 Water sources surveyed during wet and dry season surveys

Monitoring Point	Description	Wet Season		Dry Season	
		Date	Times	Date	Time
Water source 1	Farm reservoir located approximately 1.3 km northwest of the site	28 March 2023	Morning: 0630-0930 Afternoon: 1230-1530	24 October 2023	Morning: 0630-0930 Afternoon: 1430-1730

Monitoring Point	Description	Wet Season		Dry Season	
		Date	Times	Date	Time
		29 March 2023	Morning: 0630-0930 Afternoon: 1230-1530	25 October 2023	Morning: 0630-0930 Afternoon: 1430-1730
Water source 2	Two Mile Creek - Located where the second stream order transects the western section of Lot 51 on E124242.	28 March 2023	Morning: 0630-0930 Afternoon: 1230-1530	Dry	
Water source 3	Two Mile Creek - Located where the second stream order transects the north-west section of Lot 51 on E124242.	28 March 2023	Morning: 0630-0930 Afternoon: 1230-1530	Dry	
		29 March 2023	Morning: 0630-0930 Afternoon: 1230-1530	Dry	
Water source 4	Two Mile Creek - Located where the second stream order waterway transects the northern section of Lot 51 on E124242, downstream of waterbody 2	28 March 2023	Morning: 0630-0930 Afternoon: 1230-1530	Dry	
		29 March 2023	Morning: 0630-0930	Dry	
Water source 5	Two Mile Creek - Located where the second stream order waterway transects the southeast section of Lot 87 on RP91142, downstream of waterbody 3.	29 March 2023	Morning: 0630-0930 Afternoon: 1230-1530	Dry	
Water source 6	Two Mile Creek - Located where the second stream order waterway transects the southeast section of Lot 87 on RP91142, downstream of waterbody 4.	29 March 2023	Afternoon: 1230-1530	Dry	
Water source 7	Unnamed Creek – Located where the first stream order waterway transects Lot 65 on E124264.	29 March 2023	Morning: 1130-1200	Dry	

Between water source surveys, transect searches were conducted in adjacent woodland and grassland within 600 m of water source sites. During the wet season, four ecologists conducted targeted surveys over two consecutive days for a total of 24 hours. Two ecologists also conducted additional walking transects on 24 March 2023 for a total of 10 hours. During the dry season, three ecologists conducted transect searches on 24 October 2023 for a total of 10 hours. Targeted survey transects are presented in Figure 3.

During the wet season, five Reconyx HC550 Hyperfire® white flash infrared motion triggered cameras were deployed for five days at water sources along Two Mile Creek within the project area. During the dry season there were no suitable deployment sites within the project area due to lack of water. Two cameras were deployed for two days nearby the project area at a cattle trough and a nearby small waterhole (1 x 1 m in size). Camera trap locations are presented in Figure 3.

The targeted surveys were supported by a habitat suitability assessment for the species, which included the following:

- A description of the current land use and site history
- Grassland quality, composition, and density (i.e., proportion of exotic, native, perennial, and annual species)
- Collation of the number of water sources within 5 km of the project area (permanent vs seasonal)
- The types of water source present in the project area (permanent vs seasonal) and the distance to nesting trees and foraging habitat
- The number, location, and characteristics of confirmed and potential nesting trees in the project area
- Connectivity to other areas of black-throated finch habitat.

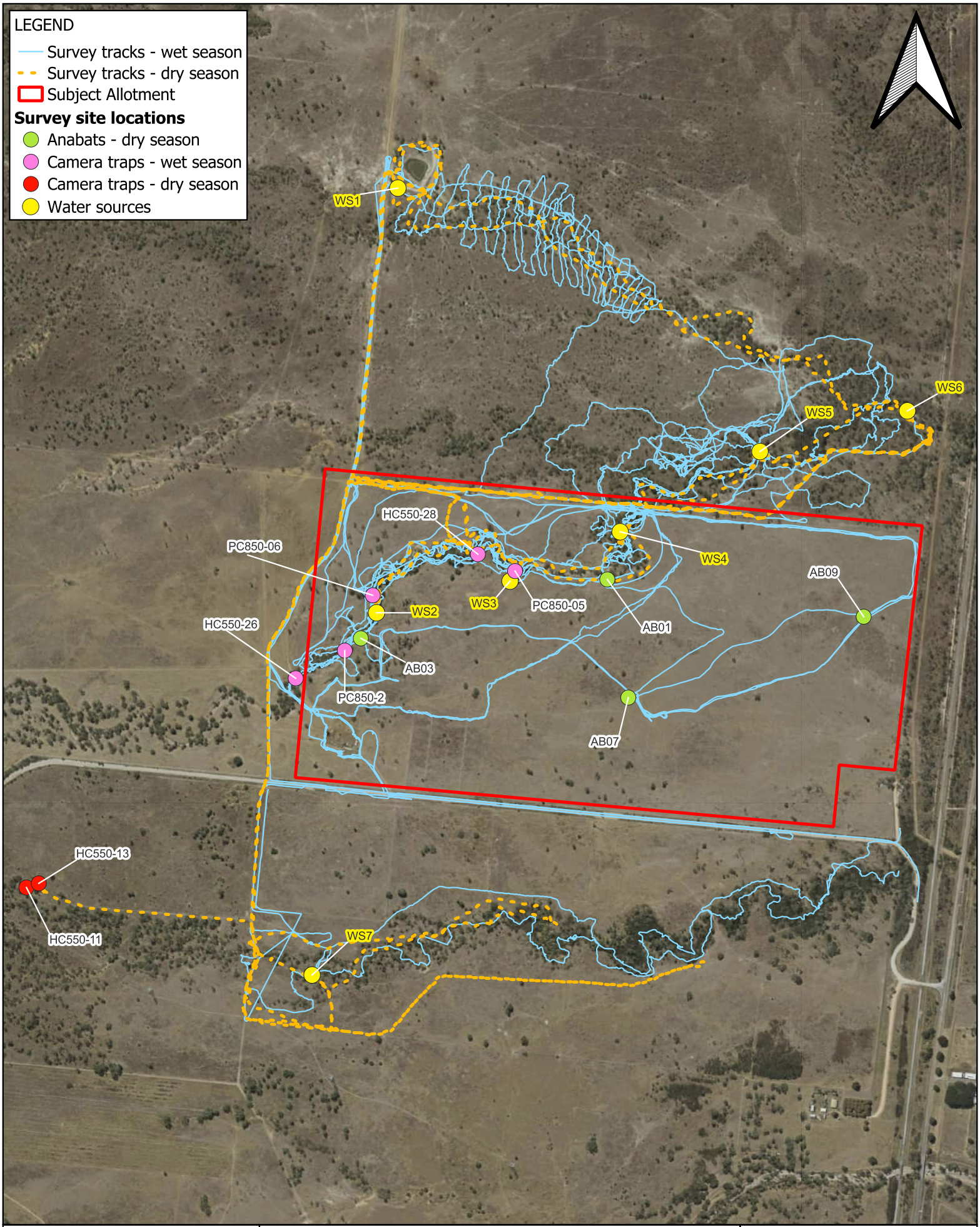

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FIGURE 3: TARGETED SURVEY SITES AND TRANSECTS

AUTHOR: A FITZGERALD	DATE: 30/10/2023
GDA2020 / MGA zone 55	Version: 1

0 200 400 600 800 m

1:11,500

2.2.2.2 Squatter pigeon

The preferred timing for squatter pigeon surveys is during the mid to late dry season from May to the end of October when the subspecies is most actively foraging for grass seed. The optimal period to observe juvenile squatter pigeons and therefore detect breeding habitat is in June (Squatter Pigeon Workshop 2011).

Surveys for the species were undertaken simultaneously with the black-throated finch survey in accordance with the *Survey Guidelines for Australia's threatened birds* (DEWHA 2010) and other methods not published in the document. Surveys consisted of surveys of water sources (described in Section 2.2.2.1), area searches, the use of motion triggered cameras (described in Section 2.2.2.1) and slow driving transects within the project area and surrounds (Figure 3).

The surveys were supported by a habitat suitability assessment for the species, which included the following:

- Vegetation composition and structure on relevant land zones (i.e., specific tree and grass species)
- Breeding, foraging and dispersal habitat requirements
- Identification of permanent or seasonal water bodies or watercourses within 1 km of the disturbance footprint to support breeding habitat
- Identification of permanent or seasonal water bodies or watercourses within 3 km of the disturbance footprint to support foraging habitat.

2.2.2.3 Bare-rumped sheathtail bat

Surveys for bare-rumped sheathtail bat were undertaken using Anabat© echolocation call detection during the wet season survey. Four Anabats were deployed within the two habitat types in the project area, two within the non-remnant development footprint and two within remnant riparian vegetation for a period of four nights as shown in Figure 3 and presented in Table 4. The deployment period and number of detection units deployed followed the *Survey guidelines for Australia's threatened bats* (DEWHA 2010).

Efforts were made to widely space the units and the time of detected calls were recorded to categorise calls as emergence or foraging calls.

All hollow-bearing trees within the proposed clearing footprint were recorded with a GPS including the number of hollows and an estimate of the likely depth as the species is understood to prefer deep hollows.

Call analysis was conducted by Prof. Simon Robson who has over 30 years' experience in the ecology, behaviour, and identification of bats (Australia, Central, South and North America, Papua New Guinea, Southeast Asia) and over 20 years' experience in the detection and analysis of bat calls from northern Queensland specifically. Most reference calls used in the analysis were obtained during a month-long survey of the bats of Cape York by Robson and colleagues (Reardon et al. 2010), which now forms the basis of many conservation decisions concerning the bats of this region.

Sound files (.wav) containing bat calls were detected and analysed with Filters and a Decision Tree program written in Anabat Insight (Titley Electronic ®) in concert with a sound analysis program written in R®. Filters and Decision Trees were tailored to those microbat species bats that are likely to be found in North Queensland, based on Robsons' personal records, published records (Churchill 2008, van Dyck et al. 2013), on-line records (Atlas of Living Australia) and discussion with other Australian bat researchers. The species pool of bats likely to be present within a 50 km radius of the project area was determined using the BatMap function of the Australasian Bat Society (Appendix D).

Table 4 Wet season Anabat survey locations

Monitoring Point	Description	Survey period
Anabat 1	Two Mile Creek – Located in the riparian corridor in the western extent of Lot 51 on E124242.	24 – 28 March
Anabat 2	Two Mile Creek – Located in the riparian corridor in the central north of Lot 51 on E124242.	24 – 28 March
Anabat 3	Grassland habitat in the approximate centre of the project footprint on Lot 51 on E124242.	24 – 28 March
Anabat 4	Grassland habitat in the eastern extent of the project area on Lot 51 on E124242.	24 – 28 March

2.3 Weather conditions

Woodstock is in the dry tropics of Queensland, an area subject to distinct wet and dry seasons. The wet season is characteristically hot and humid with high rainfall. Contrastingly, the dry season is cooler, with low humidity and significantly less rainfall.

The closest Bureau of Meteorology (BOM) climate station with a long-term continuous record was Powerline TM (Station Number 033280) which is located 30 km east of the area. The average annual rainfall is 805.9 mm/yr.

In the 12 months preceding the March 2023 wet season survey (April 2022 to March 2023), total rainfall recorded by Powerline TM weather station (1,673 mm) was above the sum of monthly averages for the same period (883 mm) and the annual average (805.9 mm). Monthly rainfall in February preceding the survey was recorded as 249 mm, which was above the monthly average (190.8 mm). However, monthly rainfall for March was recorded as 74 mm which was below the monthly average of 109.6 mm. A total of 13 mm of rain was recorded in the 10 days preceding commencement of the survey (Table 5).

In the 12 months preceding the October 2023 dry season survey, (October 2022 to September 2023), total rainfall recorded by Powerline TM weather station (1,318 mm) was above the sum of monthly averages for the same period (873.3 mm) and the annual average (805.9 mm). Total rainfall for September preceding the survey was recorded as 1 mm, which was below the average (9.7 mm). Monthly rainfall for October was also recorded as 1 mm which was below the monthly average of 16.3 mm. No rain was recorded in the 10 days preceding commencement of the dry season survey.

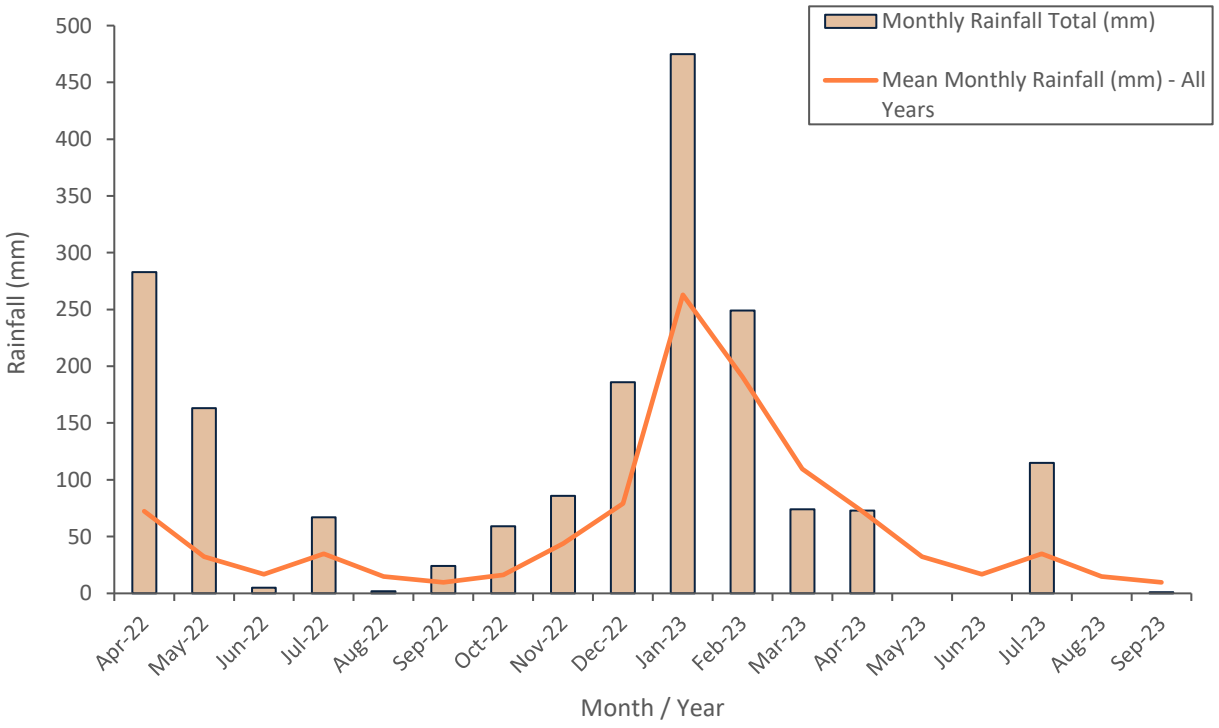

Figure 4 Monthly total and mean rainfall – Powerline TM BOM Station 33280 (April 2022 - September 2023)

Table 5 Rainfall daily totals (mm) preceding and during the wet season survey (28 - 29 March 2023)

Date	18/03/202	19/03/202	20/03/202	21/03/202	22/03/2023	23/03/2023	24/03/2023	25/03/2023	26/03/2023	27/03/2023	28/03/2023	29/03/2023
Rainfall Daily Total (mm)	0	0	0	9.0	2.0	2.0	0	0	0	0	0	0

3 Results

3.1 Topography

The project area is situated on old alluvial system draining east to the Haughton and ranges from approximately 80 m AHD in the west to 70 m AHD in the east. The microtopography of the project area consists of a flat to gently undulating system of old channel in-fills, relic swamp deposits and natural river levees (Murtha and Crack 1966).

3.2 Geology

The entire project area is mapped as quaternary age alluvium as the dominant rock type. The rock type is a stratified unit of flood plain alluvium with a lithologic composition of clay, silt, sand, and gravel (Queensland Detailed Surface Geology Mapping – Queensland Globe 2023).

3.3 Soils

The soils of the project area were mapped at 1:10,000 in the Soils of the CSIRO Research Station "Lansdown", Townsville, Queensland (Murtha and Crack 1966) (Figure 5). Each of the soil types present in the project area are described in Table 6.

Important elements of the soils typically include:

- The high proportion of fine sand in the A horizons of soils with a strong texture contrast and gradational texture profiles. This is important in the solodic soils where the surface horizons are hard setting and provide a poor physical environment for plant growth (Murtha and Crack 1966).
- Most of the soils described by Murtha and Crack have a low level of fertility as evidenced by phosphorous, nitrogen and organic carbon values for the surface horizons (Murtha and Crack 1966).
- The total soil nitrogen and organic carbon contents are in general low. Slightly higher values are found in the clay surface soils and in soils formed on more recent alluvium with a loam surface texture.
- The low levels of 'available' and total phosphorus in most soils represent a gross and consistent deficiency of this element for plant growth, the only exceptions being those soils formed on more recent alluvium (e.g., Magenta sandy loam) (Murtha and Crack 1966).
- The total soluble salt content of surface horizons is low for all soils except for Sandalwood sandy loam (Murtha and Crack 1966).

Table 6 Site soil type descriptions (CSIRO 1966)

Map Code	Map Code Meaning	Soil Description	Great Soil Group	Area (Ha)
Soils with uniform texture profiles				
Mls	Magenta Loamy Sand	Very dark grey-brown loamy sands showing little pedological development. Restricted to the lowest terrace and the alluvium of minor creeks and gullies. Weakly acid to neutral.	Alluvial soil	7.15
Cc	Calman Clay	Uniform dark heavy clays over highly calcareous grey and yellowish grey clay. In the past probably occurred extensively in back swamps but has since been buried beneath solodics. Weakly alkaline at the surface and strongly alkaline at depth.	Black earth	5.13
Soils with gradational texture profiles				
M1	Miscellaneous Unit 1	Grey-brown sandy loam A1 and weak A2 over red or yellow sandy clay loam to sandy clay subsoil. Contains a range of soils that have developed on small areas of unsorted colluvium and fan deposits and form where small creeks flow from hills to the west. Weakly acidic.	Red and yellow podzolics	6.07

Map Code	Map Code Meaning	Soil Description	Great Soil Group	Area (Ha)
Wsl	Woodridge Sandy Loam	Light grey-brown sandy loam A1 and bleached A2 over yellow and red-mottled sandy clay loam to sandy clay. Probably formed on relict levees. Weakly acidic in the A and B horizons and strongly alkaline in the D horizon.	Yellow earth – yellow podzolic intergrade	4.28
Soils with strong texture contrast (solodic)				
LC	Lansdown Complex	Very strongly bleached sandy loam A1-A2 over mottled yellow or olive sandy clays. A complex of solodic soils primarily consisting of Lansdown and Manton Sandy loams.	Solodic-solodized Solonetz / solodic	46.11
Stsl	Stockyard Sandy Loam	Deep sandy loam bleached A1-A2 horizons over mottled gritty medium clay subsoils. Distribution is related to the depositional old flood plain. Strongly solonised. Weakly acidic in the A horizons, alkaline through the B horizons and weakly acidic at the top of the D horizons.	Solodic-Solodized solonetz	11.82
MtC	Manton Gilgai Complex	Dark grey-brown loam A1, bleached A2 over grey-brown or olive heavy clays. A microrelief consisting of a series of low puffs protruding above a flat surface.	Solodic - G.S.H.T	8.58
Ssl	Sandalwood Sandy Loam	Very thin strongly bleached sandy loam A1-A2 over olive and yellow heavy clays. Solodic to solonozetic in character. Slightly acid at the surface becoming strongly alkaline at depth.	Solodic-solodized solonetz	8.57
Mtl	Manton Loam	Dark grey-brown loam A1, bleached A2 over grey-brown or olive heavy clays. Occurs extensively within the Manton Gilgai Complex where it represents the interpuff areas. Dominant soil is solodic. Weakly acidic at the surface and alkaline at depth.	Solodic	7.29
MtC(g)	Manton Gilgai Complex, gravelly phase	Dark grey-brown loam A1, bleached A2 over grey-brown or olive heavy clays. Consists of Gilligan Clay on the Puffs and Manton Loam in the interpuff areas. Gravels are restricted to the puffs.	Solodic - G.S.H.T	2.33

LEGEND

- Project Area

Soil mapping

- Cc
- M1
- LC
- Mls
- MtC
- MtC(g)
- Mtl
- Ssl
- Stsl
- Wsl

MtC(g)
Wsl
Ssl
Ssl
Mls
Wsl
MtC
Ssl
Ssl
Mls
LC
Mtl
M1
Cc
Stsl
M1
Cc
Ssl

Terra SOLUTIONS

CLIENT: EDIFY ENERGY

FIGURE 5: SOIL MAPPING - CSIRO LANSDOWNE PASTURE RESEARCH STATION

0 250 500 750 1,000 m

1:6,000

DOCUMENT: P:\Projects\202210 Edify

DATE: 23/05/2023

AUTHOR: K PARISON

Coordinate system: GDA2020 / MGA zone 55 EPSG:7855

3.4 Aquatic Ecosystems and Wetlands

The project area is located within the Haughton River drainage basin sub-area which is in the Haughton basin of the Northeast Coast drainage division of Queensland (Figure 6).

The general drainage direction from the project area is from the west to east via two main watercourses:

- The southern extent of the project area may drain via overland flow toward a first order stream in the south of Manton Quarry Road. This watercourse joins Double Barrel Creek and Major Creek which flows into the Haughton River near Majors Creek, approximately 16 km south of Giru.
- A second order watercourse named Two Mile Creek traverses the project area, entering the western boundary before following a north-easterly path to the northern boundary where it exits the project area and continues in a north easterly direction, flowing into Four Mile Creek, Double Barrel Creek, and then Major Creek.

All drainage from the project area and local surrounds flows through Double Barrel Creek in a generally eastern direction where the upper catchment of these systems arises in a band of small hills to the east of Mingela State Forest.

All watercourses traversing the project area are small (Stream Order one or two) and classified as ephemeral systems.

Non-fluvial (overland) flows are not currently understood but most likely flow toward the northeast, east and southeast with the slope of the land.

There are no constructed dams within the project area, with the closest dam located on adjacent land approximately 800 m north of the project area. This dam is likely to provide a year-round water supply for fauna.

3.4.1 Wet Season

During the wet season, all water source sites contained water. While the watercourses in the project area are classified as ephemeral systems which typically have flashy intermittent flow regimes, it was noted that deeper pools within Two Mile Creek (in the project area and downstream) have potential retain water for a longer duration during periods or low or zero flow (Plate 1).

Water quality within the pools of Two Mile Creek varied substantially due to influences such as the substrate, cattle access and erosive processes. Areas with fine soils along the banks where pools can be accessed by cattle were particularly turbid and coincided with areas of erosion and scouring (Plate 2 to Plate 6). The location of key erosion areas is presented in Figure 6.

Plate 1 Deeper pools with potential to retain water for longer periods

Plate 2 Camera deployment site. Note scouring on the far bank in the image

Plate 3 A pool frequently accessed by cattle resulting in denuded banks and turbid water

Plate 4 A large pool frequented by cattle again noting the turbid water

Plate 5 An active erosional site located on the northern bank of Two Mile Creek

Plate 6 Additional scouring (left) and an area of active gully erosion (right) located on the northern bank of Two Mile Creek.

3.4.2 Dry Season

The dry season survey confirmed the ephemeral nature of the watercourses within, and surrounding, the project area as water was absent from all previously surveyed water sources (Plate 7 and Plate 8) except the farm dam to the northwest. The dam along with a leaking cattle trough and small pool to the southwest (Plate 8 and Plate 9) were the only water sources near the project area. Camera traps were deployed at the leaking cattle trough and small pool approx. 20 m away (Plate 9).

Plate 7 Dry sites WS5 (left) and WS4 (right)

Plate 8 Dry site WS3 (left) and signs of heavy stocking/grazing surrounding the dam (WS1 – note the photo was taken facing south away from the dam).

Plate 9 Camera trap deployed at leaking trough southwest of the project area (left) and another trap deployed at a small pond approx. 20 m away (right). These were the only water sources nearby the project with the exception of the dam.

LEGEND

- Water storage points

Erosion and bank degradation

- Bank Erosion
- Bank Scouring
- Bed Level Crossing

Watercourse lines - NE Coast drainage division - northern section

- Stream Order 1 & 2
- Stream Order 3 & 4
- Project area
- 1.5 km from project area boundary
- Reservoirs (man made >625 sq m)

Four Mile Creek

Two Mile Creek

Double Barrel Creek

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FIGURE 6: MAPPED WATERCOURSES, WATERBODIES AND EROSION SITES

PROJECT: EDIFY GREEN HYDROGEN

DATE: 15/06/2023

AUTHOR: A FITZGERALD

0 800 1,600 2,400 3,200 m

1:18,000

Coordinate system: GDA2020 / MGA zone 55 EPSG:7855

3.5 Vegetation

3.5.1 Regional ecosystems

Regulated vegetation mapping in Queensland divides vegetation into three broad categories: remnant, non-remnant, and high value regrowth vegetation. Table 7 outlines the definitions of each of these categories.

Table 7 Description of vegetation classifications

Vegetation classification	Definition
Remnant Vegetation (Category A)	Areas subject to compliance notices, offsets, and voluntary declarations.
Remnant Vegetation (Category B)	Remnant vegetation is vegetation which has never been cleared or vegetation which has been cleared but has regrown to meet the following: • 50% of the original undisturbed canopy cover • 70% of the original undisturbed canopy height • Composed of the same floristic species that would exist if the vegetation community were undisturbed.
Reef Regrowth watercourse vegetation (Category R)	Native woody vegetation on freehold land, Indigenous land or leasehold land granted for agriculture or grazing purposes, located within 50 metres of a watercourse in the Burdekin, Mackay, Whitsunday, and Wet Tropics Great Barrier Reef catchments (if there is no native vegetation within 50 metres of a regrowth watercourse, the code does not apply).
High Value Regrowth Vegetation (Category C)	Category C regrowth vegetation is an area on leasehold land granted for agricultural or grazing purposes that has regrowth vegetation (not remnant vegetation), that is either a least concern, of concern or endangered regional ecosystem, and has not been cleared for 15 years.
Non-remnant Vegetation (Category X)	Non-remnant vegetation is vegetation which has been cleared and has not yet regrown to the meet the definition of remnant vegetation.

Category A, Category B, Category C and Category R vegetation are further classified as RE's under the Regional Ecosystem Framework and VM Act (Table 6). Sattler and Williams (1999) describe RE's as:

"Communities of vegetation that are consistently associated with a particular combination of geology, landform and soil in a bioregion".

The RE (Version 12) mapping identifies most of the project area as non-remnant vegetation. The remaining Category B vegetation is primarily associated with the onsite watercourse and consists of RE 11.3.30 – *Eucalyptus crebra, Corymbia dallachiana* woodland on alluvial plains and RE 11.3.35 *Eucalyptus platyphylla*, *Corymbia clarksoniana* woodland on alluvial plains. A description of each RE and its status under the VMA is provided in Table 8 and presented in Figure 7.

Cleared areas within 50 m of the mapped watercourse are mapped as Category R vegetation and is also described as RE 11.3.30 and RE 11.3.35.

Table 8 Regional ecosystem descriptions

Regional ecosystem	Community description	VMA Status
11.3.30	*Eucalyptus crebra* or *E. paedoglauca* and *Corymbia dallachiana* woodland. Forms an open woodland to open forest in places. Has a grassy ground layer of *Heteropogon contortus*, *Bothriochloa bladhii*, *Themeda triandra*, *Sehima nervosum*, *Enneapogon* spp., with forbs such as *Indigofera* spp., *Glycine tabacina*, *Galactia tenuiflora* and *Tephrosia juncea* common. Occurs on older floodplain complexes on Cainozoic alluvial plains.	Least concern
11.3.35	*Eucalyptus platyphylla*, *Corymbia clarksoniana* woodland, occasionally with *Corymbia tessellaris*. A secondary tree layer commonly occurs, including *Planchonia careya*, *Pandanus spiralis*, *Melaleuca viridiflora* or *M. nervosa* and *Petalostigma pubescens*. The ground layer is usually tussock grasses, including *Themeda triandra*, *Heteropogon contortus*, *Mnesithea rottboellioides* and *Bothriochloa*	Least concern

Regional ecosystem	Community description	VMA Status
	decipiens, together with herbs or forbs such as *Glycine tabacina*, *Galactia tenuiflora* or *Sida hackettiana*. Occurs on Cainozoic alluvial plains. Older floodplain complexes, major stream levees and lighter deltaic deposits.	

LEGEND

Project Area

Vegetation management watercourses

Regional Ecosystems

Category A or B area that is least concern

Category C or R area that is of least concern

Non-remnant

CLIENT: EDIFY ENERGY

FIGURE 7: REGIONAL ECOSYSTEM MAPPING V12.0

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DATE: 23/05/2023

AUTHOR: K PARISON

0 350 700 1,050 1,400 m

1:8,000

Coordinate system: GDA2020 / MGA zone 55 EPSG:7855

3.5.2 Vegetation Communities

Three vegetation communities were verified in the project area during the field investigations. These communities are described as:

- Non-remnant grassland and legume pastures
- *Lophostemon grandiflorus* and *Melaleuca fluviatilis* fringing riparian woodland
- *Eucalyptus crebra* and *C.dallachiana* woodland

The field investigation confirmed that the vegetation mapping of the project area was relatively accurate with the remnant vegetation reduced to a narrow corridor associated with the onsite watercourse. Slight inaccuracies were observed in relation to the mapping of vegetation boundaries but were within the expected error margin for 1:100k vegetation mapping. It is noted that the observed RE's occur locally and that the inaccuracies are a result of the scale of the RE mapping.

All observed Category B (remnant) and Category R (reef regrowth) have a least concern conservation status under the VM Act. We note that the mapped Category R vegetation refers to native woody vegetation located within 50 m of watercourses in the Burdekin, Mackay, Whitsunday and Wet Tropics Great Barrier Reef catchments. For parts of the mapped Category R vegetation there is no woody vegetation present and the VM Act does not apply.

Extensive clearing of the Project Area has been undertaken for pasture development, access tracks, stock yards and a shed and these areas are represented by non-remnant vegetation.

Photographs of the communities are provided (Plate 10 to Plate 21), the spatial location of each community in Figure 8 and the total area of each community in Table 9.

Table 9 Vegetation community extent

Community description	Project Area (ha)	Development Footprint (ha	Avoidance Area (ha)
Non-remnant grassland	40.70	39.44	1.26
Legume pastures	60.41	55.71	4.70
Lophostemon grandiflorus and *Melaleuca fluviatilis* fringing riparian woodland	5.02	0.43	4.59
Eucalyptus crebra and *C.dallachiana* woodland	0.86	0.81	0.05

3.5.2.1 Non-remnant grassland and legume pastures

The vegetation community within the Project Area consists of a pastureland dominated by exotic species which occupies approximately 101.41 ha of the project area (Figure 8). Within the non-remnant grassland, dense patches of leguminous species dominated by *Chamaecrista rotundifolia* and *Senna obtusifolia* are present (Plate 10 and Plate 12) which occupy approximately 60.45 ha. We note that *S. obtusifolia* is a restricted invasive species under the Biosecurity Act 2015. Outside of these areas, approximately 40.96 ha of introduced pasture grasslands occur. These grasslands are dominated by Indian bluegrass (*Bothriochloa pertusa*), rhodes grass (*Chloris gayana),* purple top chloris *(Chloris inflata),* sabi grass *(Urochloa mosambicensis)* and guinea grass (*Megathyrsus maximus*) with occasional patches of summer grass (*Digitaria ciliaris*) and fairy grass (*Sporobolus australasicus*) (Plate 11). Other species present in the grassland include *Basilicum polystachyon, Senna obtusifolia, Sporobolus jacquemontii, Chamaecrista rotundifolia, Pterocaulon sphacelatum, Sida cordifolia, Sporobolus australasicus, Aeschynomene indica, Sesbania cannabina* and *Themeda quadrivalvis.*

The community contains isolated trees including *Acacia salicina, Corymbia clarksoniana, Corymbia dallachiana, Corymbia tessellaris, Eucalyptus crebra, Eucalyptus platyphylla* and *Dolichandrone heterophylla*. At the time of the wet season survey bare ground was rarely encountered (Plate 13).

Prior to clearing in the 1960's, the vegetation across the project area likely consisted of RE 11.3.30. Remnants of this community in the form of a small number of retained *E. crebra* within the cleared areas.

Plate 10 Vegetation areas dominated by *Chamaecrista rotundifolia* and *Senna obtusifolia*.

Plate 11 Grassland habitat containing Indian bluegrass (*Bothriochloa pertusa*), rhodes grass (*Chloris gayana*), purple top chloris (*Chloris inflata*), sabi grass (*Urochloa mosambicensis*) and guinea grass (*Megathyrsus maximus*)

Plate 12 Patches of vegetation dominated by *Chamaecrista rotundifolia* and grass species

Plate 13 Grassland habitat with isolated trees

3.5.2.2 Riparian woodland

Approximately 5.03 ha of riparian fringing woodland occurs along Two Mile Creek. This community is dominated by species that are typically associated with watercourses in the region, including *Lophostemon grandiflorus*, *Lagunaria queenslandica*, *Melaleuca fluviatilis* and occasionally other plant species that are associated with semi-evergreen vine thicket (Plate 14). The community is narrow, often restricted to a single tree width (Plate 16), and is typically too narrow to be mapped at the normal 1:100,000 scale RE mapping. It would be best described a narrow and depauperate representation of RE 11.3.25b (riverine wetland or fringing riverine wetland), which often occurs as a *Melaleuca fluviatilis*, *Nauclea orientalis* open forest, and includes *Corymbia tessellaris*, *Millettia pinnata* and *Lophostemon grandiflorus*.

Within this community areas with a mid-dense to dense shrub layer of rubber vine (*Cryptostegia grandiflora*) and chinee apple (*Ziziphus mauritiana*) (both listed as a restricted invasive plant under the *Biosecurity Act 2014)* and Leucaena (*Leucaena leucocephala*) (an unlisted invasive plant) (Plate 15). In the northern section of Two Mile Creek as shown in Figure 8, these species have altered the natural structure of the vegetation communities present. Other patches also occur along the watercourse but are unmapped due to the small area infested.

Plate 14 Large *M. leucadendra* growing on cobbles in the centre of Two Mile Creek

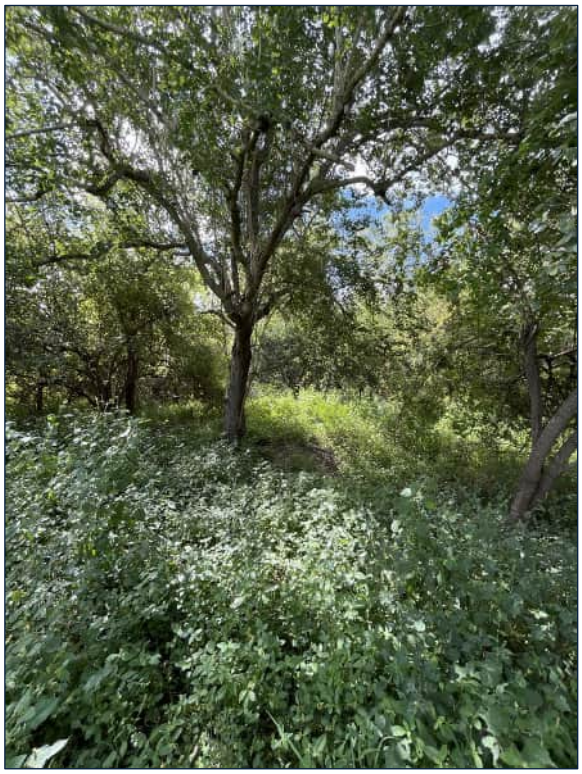

Plate 15 Significant infestation of chinee apple and rubber vine in the area identified in Figure 8.

Plate 16 Parts of the riparian area have been cleared to one tree width or in some cases may be absent of woody vegetation

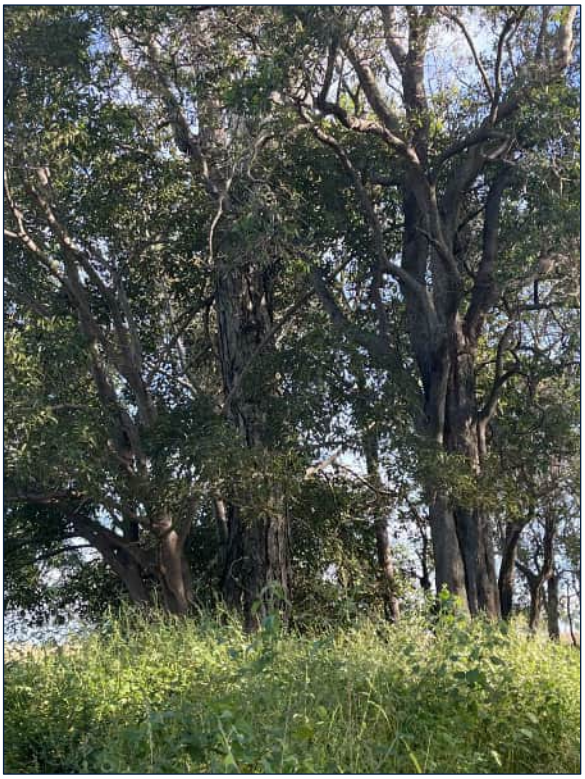

Plate 17 Depicts the dense understorey of introduced plants

Plate 18 Cleared areas degraded through weed invasion and erosion

Plate 19 A pool with a dense infestation of guinea grass on the right and *M. viridiflora* on the left

3.5.2.3 *Eucalyptus crebra* and *C.dallachiana* woodland

A small patch of woodland covering approximately 0.86 ha is in the west of the project area adjacent to Two Mile Creek. This community is representative of a degraded version of RE 11.3.30 – *Eucalyptus crebra*, *Corymbia dallachiana* woodland on alluvial plains. The community consists of a canopy dominated by *E. crebra,* with subdominant *C. dallichania* and occasional *C. tesselaris* over a highly modified, dense ground layer of *C. rotundifolia*, *S. obtusifolia* and *Sida acuta* (Figure 8). Indicative photographs of this area are presented in Plate 20 and Plate 21.

Plate 20 *Eucalyptus crebra* and *C. dallachiana* woodland

Plate 21 A dense understory of introduced plants including *C. rotundifolia, S. obtusifolia and Sida acuta*

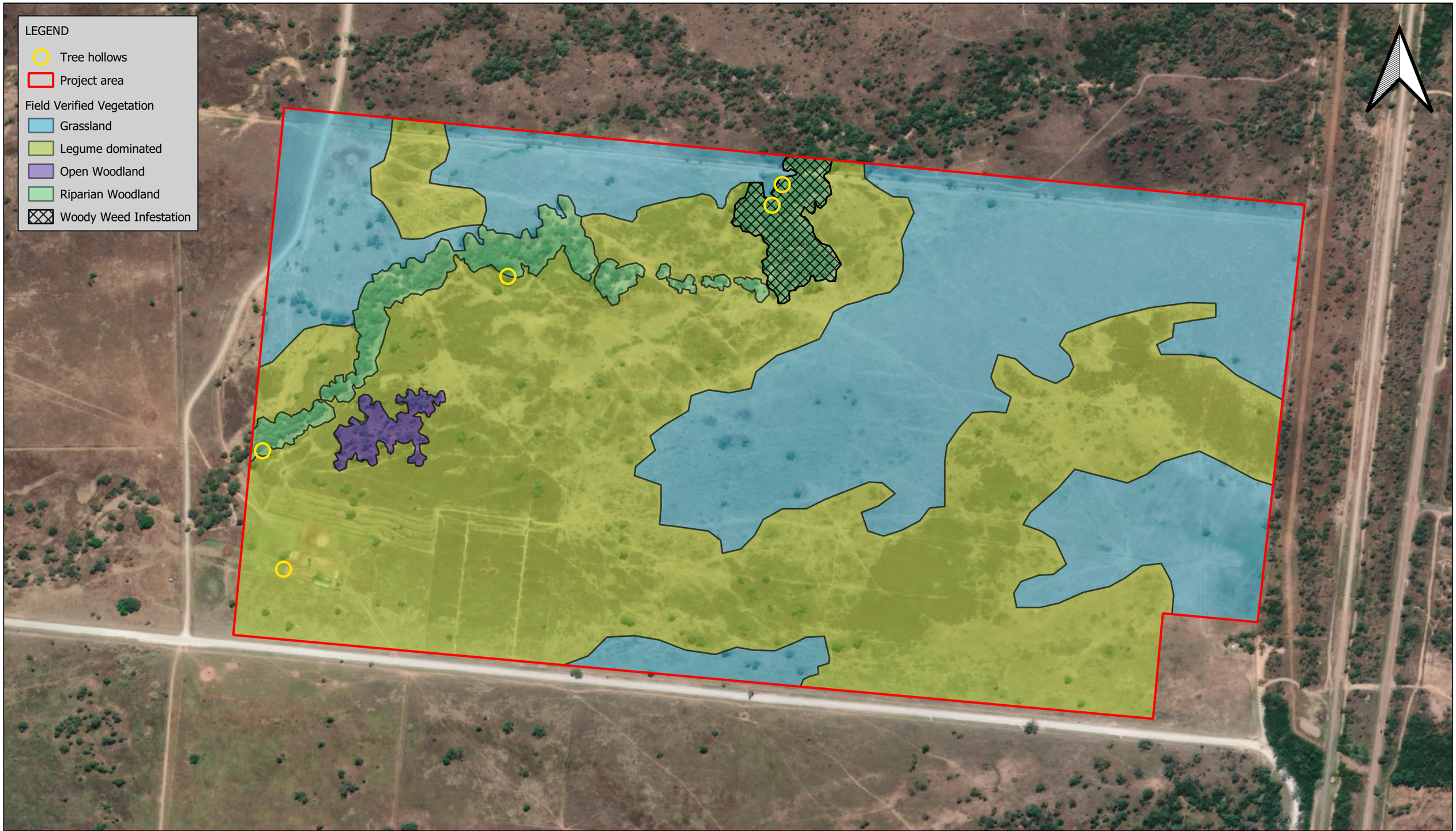

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FIGURE 8: FIELD VERIFIED VEGETATION

PROJECT: EDIFY GREEN HYDROGEN

DATE: 11/06/2023

AUTHOR: A FITZGERALD

0 225 450 675 900 m

1:5,000

Credits:

Cadastral Parcels - All © State of Queensland (Department of Natural Resources and Mines), 2016,Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Coordinate system: GDA2020 / MGA zone 55 EPSG:7855

3.5.3 Threatened ecological communities

Listed threatened ecological communities are MNES under the EPBC Act. Currently there are three categories for listing threatened ecological communities (TECs) under the EPBC Act: critically endangered, endangered, and vulnerable.

The protected matters search tool report (Appendix C) did not return any TEC's that are modelled to occur within the search area and no TEC's were observed during field surveys.

3.5.4 Threatened flora

Desktop searches for threatened flora species within the locality were undertaken using the WildNet database (Appendix B) and the Protected Matters database of MNES (Appendix C) using a 10 km radius of the project area.

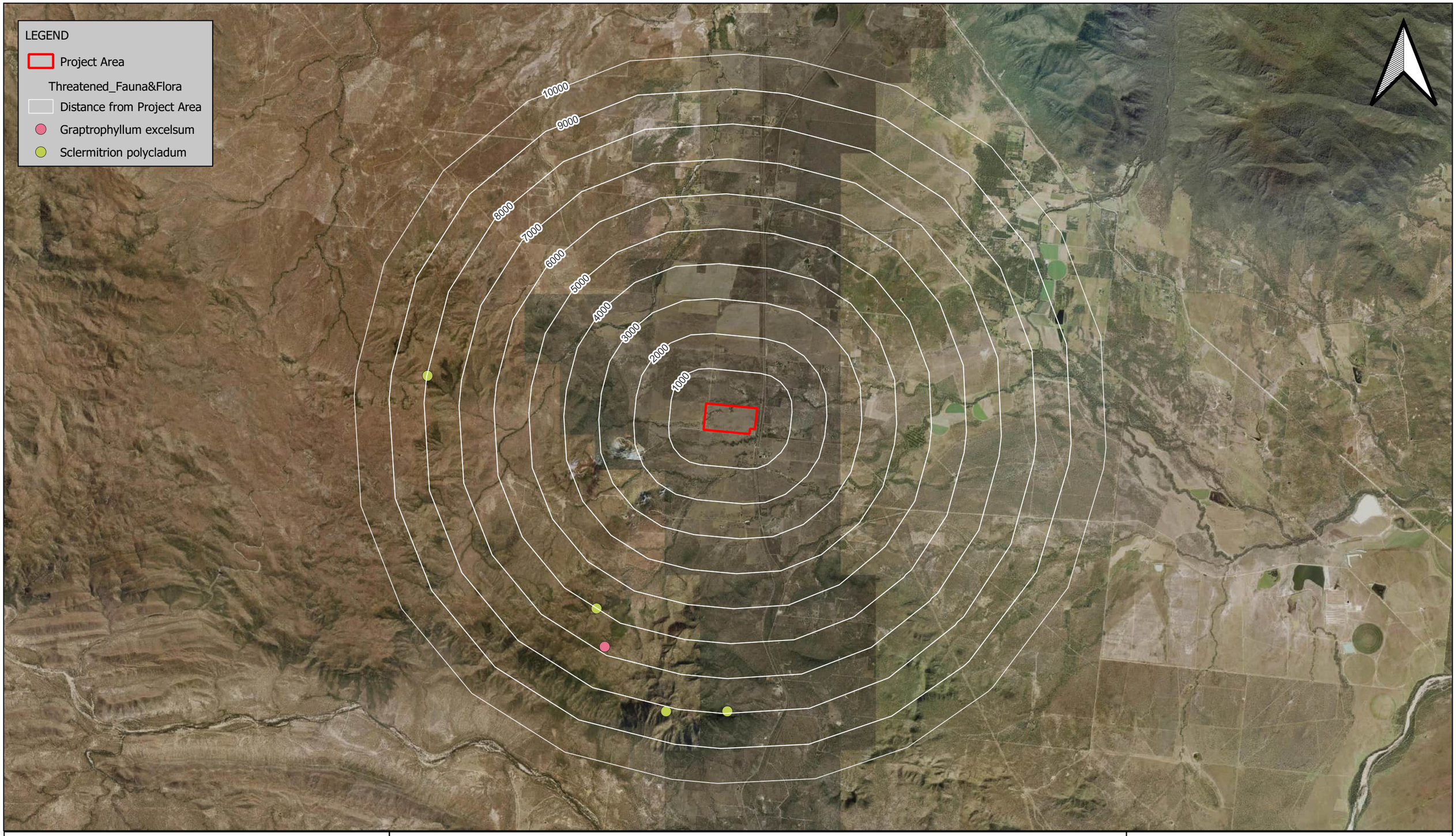
An assessment of the likelihood of occurrence for each flora species have been provided based on the known ecological requirements of each species and the environmental conditions and habitat values of the project area (Appendix F). Of the species assessed, there are none considered likely to occur within the project area.

The WildNet database search returned the records of two threatened flora species within the search area. These records include:

- One record of *Graptophyllum excelsum* from RE 9.12.19 - *Eucalyptus crebra* or *E. granitica* +/- *Corymbia citriodora subsp. citriodora* +/- *E. portuensis* mixed woodland on igneous hills.
- Four records of *Scleromitrion polycladum* including:
  - Two records from RE 9.12.19 - Eucalyptus crebra or E. granitica +/- Corymbia citriodora subsp. citriodora +/- E. portuensis mixed woodland on igneous hills.
  - One record from RE 11.11.15 - Eucalyptus crebra woodland to open woodland on deformed and metamorphosed sediments and interbedded volcanics
  - One record from RE 9.12.34 - A Semi-evergreen vine thicket with Araucaria cunninghamii on steep hills on igneous rocks.

The above records are located high in nearby catchments within RE's that differ substantially in terms of the land zone and plant community compared with the project area (Figure 9) and these differences render the species unlikely to occur within the project area.

The field assessment, including random meander searches, did not detect any threatened flora species within or adjacent to the project area.



Terra SOLUTIONS

CLIENT: EDIFY ENERGY

FIGURE 9: THREATENED FLORA RECORDS WITHIN 10 KM OF THE PROJECT

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DATE: 23/05/2023

AUTHOR: K PARISON

0 4,500 9,000 13,500 18,000 m

1:100,000

Coordinate system: GDA2020 / MGA zone 55 EPSG:7855

3.6 Fauna

3.6.1 Desktop results

Desktop searches for threatened fauna species potentially occurring within the locality were undertaken using the WildNet database (Appendix B) and the Protected Matters database of Matters of NES (Appendix C). These searches returned a total of 34 threatened species, including 24 bird species, seven mammal species and three reptile species within a 10 km search radius within a central point of the project area.

Several species returned in the desktop searches are identified as obligate marine species, migratory shorebirds, aquatic species or tend to be exclusively aerial. These species were immediately excluded from further assessment as their broad habitat requirements (i.e., mud flats, wetlands, oceanic or intertidal waters) are not present in the project area.

A likelihood of occurrence assessment was undertaken for the remaining species using the known habitat requirements of each species (Appendix G). The assessment utilised topographical, botanical, pedological, geological and hydrological datasets to identify any critical landscape scale habitat features in the local area that are relevant to threatened species (e.g., wetlands, extensive rock outcrops or ecosystems known for their high density of hollow-bearing trees).

Species with records proximate to the project area were given the greatest attention, especially where unfragmented habitat connects the project area to the species record (Figure 10). The WildNet database search returned the records of two threatened fauna species within the search area. These records include:

- 14 records of *Poephila cincta cincta* (black-throated finch (sth)): EPBC Act – Endangered and NC Act – Endangered.
- Three records of *Geophaps scripta scripta* (squatter pigeon): EPBC Act - Vulnerable and NC Act – Vulnerable.
- One record of *Dasyurus hallucatus* (northern quoll)

On completion of the process five threatened species were assessed as having potential to occur in the project area at some stage of their life cycle. This includes flyover species that are unlikely to be meaningfully impacted by development of the project area (Table 10).

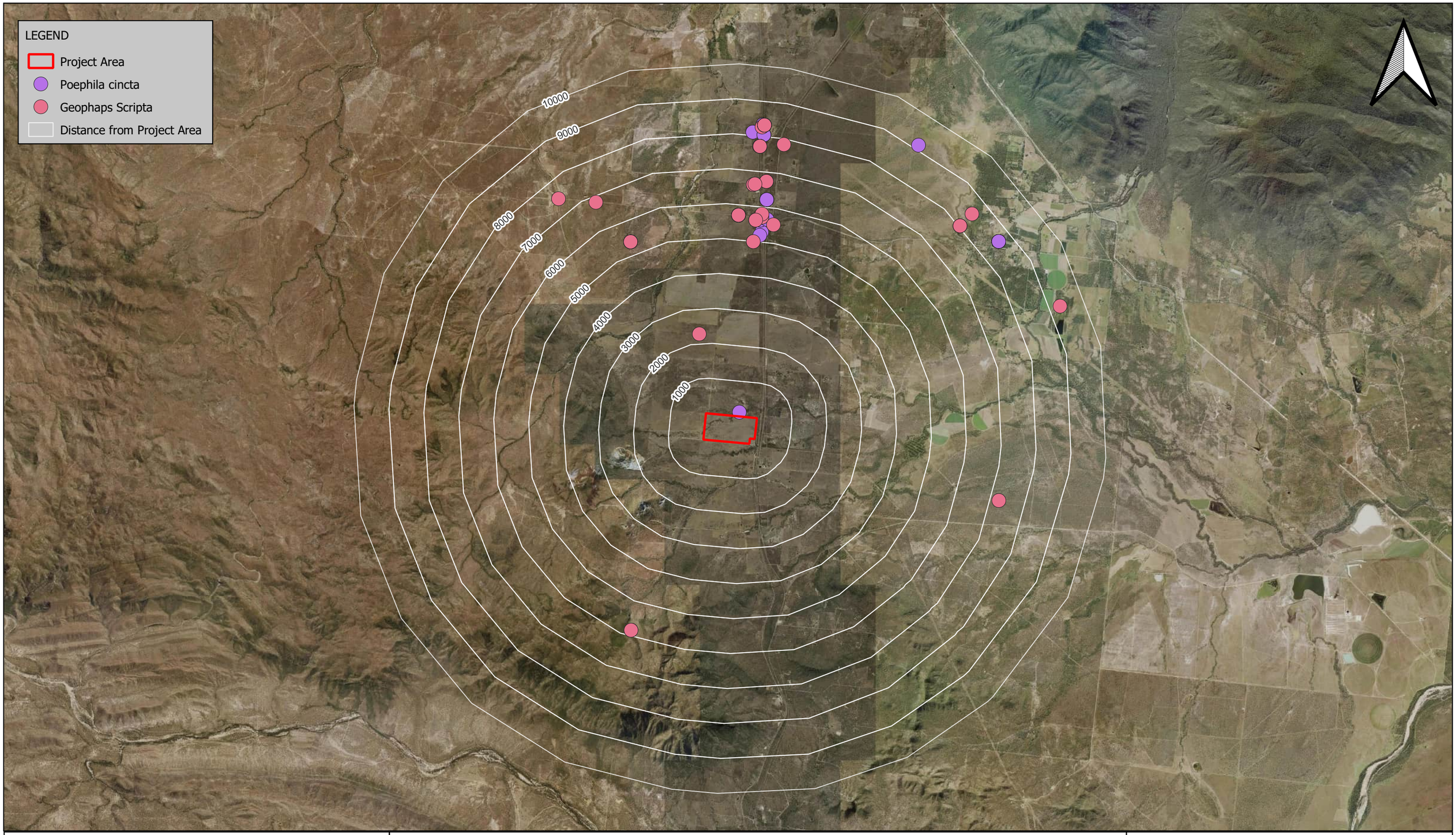
Table 10 Conservation significant fauna habitat assessment

Species name	Common name	NC Act status	EPBC Act status
Geophaps scripta scripta	Squatter pigeon (southern subspecies)	Vulnerable	Vulnerable
Hirundapus caudacutus	White-throated needletail	Vulnerable	Vulnerable
Phascolarctos cinereus	Koala (combined populations of Qld, NSW, and the ACT)	Endangered	Endangered
Poephila cincta cincta	Black-throated finch (southern subspecies)	Endangered	Endangered
Saccolaimus saccolaimus nudicluniatus	Bare-rumped sheathtail bat	Endangered	Vulnerable

3.6.2 Habitat assessment

The vegetation communities present within the project area consists of a narrow riparian woodland and grasslands consisting almost entirely of introduced pasture species. Native grasses were uncommon in the pastures and a diverse range of seeds for granivorous species such as squatter pigeon was not present.

Hollow-bearing trees were predominantly restricted to the riparian corridors in the project area and absent elsewhere. A small number of hollows occurred within isolated trees located in the grassland community in the project area and within the *E.crebra* and *C.dallachiana* woodlands. Those within the grassland areas were shallow and superficial. One hollow-bearing tree with hollows of reasonable depth and diameter was observed within a *Eucalyptus platyphylla* in the south-east of the project area which is likely to be impacted by development (Figure 8).



Terra SOLUTIONS

CLIENT: EDIFY ENERGY

FIGURE 10: THREATENED FAUNA RECORDS WITHIN 10 KM OF THE PROJECT AREA

DOCUMENT: P:\Projects\202210 Edify

DATE: 23/05/2023

AUTHOR: K PARISON

0 4,000 8,000 12,000 16,000 m

1:100,000

Coordinate system: GDA2020 / MGA zone 55 EPSG:7855

No significant rock, boulder piles or large logs occur in the project area. The rocks observed did not possess the required complexity and depth of interstitial spaces to provide adequate cover for threatened species that might utilise these habitats.

As detailed in 3.4 Section Erosion in the form of bank scouring was observed at various locations along Two Mile Creek (Figure 6) which is exacerbated by cattle access to pooled water, reduced ground cover from grazing. In the areas immediately surrounding the eroded banks there is limited food availability for granivorous birds and due to cattle access at these locations there is a high chance that the eggs of ground nesting birds would be crushed. This area also coincides with a break in the canopy and subsequently reduced connectivity along Two Mile Creek.

Overgrazing by livestock and the reduction of grass diversity is identified as the greatest threat to squatter pigeon and black-throated finch within the project area. The remaining community composition in the grass layer is dominated by four introduced pasture grasses, Indian bluegrass (*Bothriochloa pertusa*), rhodes grass (*Chloris gayana*), purple top chloris (*Chloris inflata*) and sabi grass (*Urochloa mosambicensis*).

Cleared sections of the project area have contained limited woody vegetation for approximately 80 years. Whilst there are few long-term longitudinal studies on changes to species composition and abundance following clearing, significant changes in the bird assemblage have been reported (Woinarski et al 2006). As observed during the field investigations, the conversion from woodland to grassland habitat favours grassland species such as golden-headed cisticola, red-backed fairy-wren and brown quail whilst the woodland adjacent to Two-mile Creek and land to the north of the project area were dominated by woodland species.

Habitat assessments and targeted survey results for each target threatened species is presented in the following sections.

3.6.3 Targeted survey results

The following species were detected during field surveys

- Squatter pigeon (*Geophaps scripta* subsp. *scripta*)
  - 21 observed in the wet season
  - 20 observed in the dry season
- Bare-rumped sheathtail bat (*Saccolaimus saccolaimus* subsp. *nudicluniatus*)
  - Calls were detected at three sites (AB01, AB03 and AB09)

The following sections describe the background ecology, occurrence in the project area, and the suitability of the project area as habitat for each of the targeted species.

3.6.3.1 Squatter pigeon (southern subspecies)

The squatter pigeon (southern ssp.) (*Geophaps scripta scripta*) occurs from the Burdekin-Lynd divide in the southern region of Cape York Peninsula to the Border Rivers region of northern NSW. In the north of its range, the squatter pigeon's (southern ssp.) distribution is considered to form a single subpopulation that is likely to be separated from subpopulations in the southern extent of its range (i.e., southern Queensland) (DoE 2021b), which are considered important populations.

Suitable habitat for the squatter pigeon (southern ssp.) includes open forests to sparse, open woodlands and scrub dominated in the overstorey by Eucalyptus, Corymbia, Acacia or Callitris species with an open to sparse woody understorey. Habitats include remnant, regrowth or modified vegetation communities located within three kilometres of accessible water (e.g., dams, pools in watercourses). The ground layer in breeding and foraging habitat is patchy, consisting of native, perennial tussock grasses or a mix of perennial tussock grasses and low shrubs or forbs. Bare patches typically consist of gravelly or dusty soils or areas lightly covered in leaf litter and woody debris. Bare areas under an open canopy of trees are used to forage and dust-bathe (DoE 2021b).

The species requires daily access to waterbodies for hydration purposes. Suitable waterbodies include permanent or seasonal rivers, creeks, lakes, ponds and waterholes, stock troughs and artificial dams with gentle slopes and bare ground as they walk into the waterbody. Only a small patch of bare ground may be required in areas where vegetation occurs along the banks of the waterbody (Squatter pigeon Workshop 2011).

Approximately 95% of the squatter pigeon's (sth) diet consists of seeds (Chrome 1976b), where the species mainly forages on seeds which have fallen to the ground from grasses, herbs, and shrubs (Chrome 1976b; Chrome and Shields 1992). The species commonly forages along roads and access tracks, stockyards, and other bare areas.

The breeding season of the squatter pigeon (southern ssp.) is likely to be triggered by the availability of suitable resources and can occur throughout the year. They usually breed in solitary pairs but may occur in small groups, and

even large aggregations, outside the breeding season. Breeding habitat occurs on stony rises occurring on sandy or gravelly soils, within one kilometre of a permanent waterbody (DoE 2021b). Nests are built by lining a depression scraped into the ground beneath a shrub, log, or grass tussock. Usually, two eggs are laid and incubated for 17 days. Chicks remain in the nest for two to three weeks and are dependant for an additional four weeks (DoE 2021b).

The squatter pigeon is considered sedentary or locally nomadic although some movement along vegetated corridors may occur in response to the availability of water and food resources (e.g., influenced by low rainfall, drought etc.) including the possible abandonment of areas under drought conditions. Movement habitats include forest or woodland corridors connecting suitable foraging and breeding habitats. These areas may be unsuitable for uses other than movement between foraging (including hydration areas) and breeding habitat. The squatter pigeon (southern ssp.) is unlikely to move far from woodland trees, which provide protection from predatory birds (Squatter Pigeon Workshop 2011). There is no evidence to indicate the squatter pigeon (southern ssp.) migrates, though it has been suggested (DoE 2021b).

The main threats to the squatter pigeon (southern ssp.) are the loss and fragmentation of habitat due to clearing for agricultural purposes, degradation of habitat by overgrazing by domesticated herbivores, degradation of habitat by invasive weeds and predation by avian and terrestrial predators. Feral predators (cats and foxes) are likely to be having the greatest impact (DoE 2021b). Catastrophic weather events such as drought and bushfires are likely to exacerbate the impacts of other threats.

Species occurrence in the project area

The project area is within the northern range of the squatter pigeon and within the modelled distribution of the species. Squatter pigeon is considered relatively common within suitable habitat in the Townsville region.

During the targeted wet season survey the subspecies was recorded at five locations including two locations within the Two-Mile Creek riparian corridor in the project area and three locations on Lot 87 on RP911426 proximate to the dam. In total 21 birds were recorded although it is probable that some individuals were counted on more than one occasion (e.g., two records where two birds were counted in the riparian corridor). The highest abundance was recorded near WC4 which included one sighting of 12 birds (Figure 11).

During the dry season targeted survey, squatter pigeons were recorded at three locations (Figure 11). Most sightings were at the dam, where groups of two to three individuals were regularly observed drinking. In total, 15 birds were recorded at the dam with the largest individual sighting being six birds.

Habitat suitability

Squatter pigeon habitat is primarily located within the existing riparian woodland of Two Mile Creek and potentially extending a short distance into adjacent grasslands. Numerous hydration points are present along Two-Mile Creek during the wet season. Habitat within Two Mile Creek includes areas of potential breeding habitat (during the wet season), foraging habitat and movement habitat however the area is subject to a range of existing threats.

Within the riparian woodland, a mosaic of open sandy and stony substrates along the bed of Two Mile Creek provides potential nesting habitat for squatter pigeon (Plate 22). Collectively these patches occupy a small area due to the encroachment of invasive plants. The northern section of Two Mile Creek is entirely unsuitable for the species due to the high density of woody weeds (Figure 8, Plate 15 and Plate 17). Whilst a small area of potential breeding sites are available within Two Mile Creek, the breeding success for squatter pigeon may be depressed due to cattle movements and tracking along the watercourse and weed invasion which are key threats to the species and has resulted in reduced habitat suitability in the project area.

Foraging habitat identified during the survey was limited to the breeding habitat plus areas of grassland with bare ground located close to the tree line. Squatter pigeons (sth) prefers to remain close to woodland trees whilst foraging and is unlikely to occur a great distance from the Two-Mile Creek corridor. There is limited information on the preferred foraging grasses/herbs for squatter pigeon (sth), however the general abundance of records clearly indicates that suitable resources occur locally. Areas of unsuitable habitat included sites with a dense grass/herb layer (i.e. where *C. rotundifolia, S. obtusifolia* and *Sida acuta* dominate the understorey) or open grassland areas without a consistent tree layer.

Ground cover was slightly reduced during the dry season survey, thus providing improved foraging conditions within the squatter pigeon habitat. Areas identified as unsuitable habitat were generally unchanged with the same degrading features as the wet season (i.e. dense weed layer, absence of a consistent tree layer). The number and frequency of squatter pigeon sightings during the dry season survey suggested the overall suitability of foraging and movement habitat was similar to that recorded during the wet season.

In terms of habitat that might be used for movement, all areas within the Two Mile Creek riparian corridor could be readily traversed by the species with the exception of weed infested areas near the northern boundary of the project

area. Therefore, breeding and foraging habitat is patchy and discontinuous, whilst the entire corridor is suitable for movement and dispersal.

During the dry season, water resources in the project area are limited to absent, with the only water sources nearby comprising an artificial dam and cattle troughs. Riparian communities in the project area occur between 900 m and >1 km from the closest permanent water (the artificial dam, WS6 to the northwest of the project area). As such, potential breeding habitat in the project footprint is of very low suitability or absent.

Habitat mapping is presented in Appendix H and the areas of breeding, foraging and movement habitat are presented in Table 11

Table 11 Area of squatter pigeon (sth) habitat in the porject area

Habitat Type	Within Disturbance Footprint	Within Avoidance Area	Total
Breeding	0.09	2.7	2.79
Foraging	2.49	1.67	4.16
Movement	3.39	4.41	7.81
All Habitat (Total)	**5.98**	**8.77**	**14.75**

Plate 22 Marginal squatter pigeon breeding habitat. Note the infestation of weeds along the adjacent banks which are recognised threat to the species.

LEGEND

Squatter pigeon records

- Dry Season
- Wet Season
- Subject Allotment
- Watercourse lines

15
12
3
2
2
3
2
2
Two Mile Creek

Terra SOLUTIONS

CLIENT: EDIFY ENERGY

FIGURE 11: CONFIRMED SQUATTER PIGEON RECORDS

PROJECT: EDIFY GREEN HYDROGEN

DATE: 31/10/2023

AUTHOR: A FITZGERALD

0 400 800 1,200 1,600 m

1:9,000

Credits:

Cadastral Parcels - All © State of Queensland (Department of Natural Resources and Mines), 2016,Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Coordinate system: GDA2020 / MGA zone 55 EPSG:7855

3.6.3.2 Koala

Vulnerable under the EPBC Act and NC Act.

Species profile

The koala (*Phascolarctos cinereus*) is an arboreal folivore that inhabits a variety of forest types throughout eastern Australia. The presence and density of the koala are influenced by the availability of preferred tree species (Phillips, et al., 2000; McAlpine, et al., 2006), which differ throughout the species range (Moore & Foley, 2000) but most significant food trees are within the genus Eucalyptus. Trees with heavy, shaded crowns to provide shelter from heat are recognised and these may include non-eucalypt species (Crowther, et al., 2014). The highest koala densities are achieved in habitats with a high density of primary food species, and density is generally lower where primary food trees are at a low density or only secondary food trees are available (McAlpine, et al., 2006). Koalas move between trees daily (Ellis et al. 2002, 2009) and there is a low incidence of repeat visits to individual trees (Matthews et al. 2007; Lollback et al. 2018).

Eucalypt foliage is generally low in nutrients, high in fibre and contains anti-herbivore toxins (Moore & Foley, 2005; Moore & Foley, 2000). Koalas select food trees with a relatively high nutrient status (e.g., phosphorous and potassium) and low concentrations of toxins which results in the selection of specific trees (Moore and Foley 2005; Moore et al. 2005). Soil-related variables, including soil water indicators (wetness and precipitation), soil phosphorous and nitrogen percentage, and soil bulk density have therefore been used to model koala distribution (Rhodes et al., 2015).

Habitat suitability models indicate that koalas are best suited to locations where the mean maximum summer temperatures are 23-26 °C and mean annual rainfall ranges from 700 -1500 mm (Adams-Hosking et al. 2011) but can occupy more extreme environments (McAlpine et al. 2015). Models also indicate that koala occupancy is strongly dependant on annual rainfall and the distance to water features (Santika et al. 2014).

Koala densities generally range between 0.2 ha^{-1} to 3.0 ha^{-1} (Martin 1985; Ellis et al. 2013) and occasionally higher (e.g., Mitchell and Martin 1990; Gall 1980). Koala home range areas typically increase, and population density correspondingly decreases in areas with lower rainfall (e.g., Clifton 2010; Seabrook et al. 2011), although in low-rainfall environments, local densities may be higher in areas with better soil fertility and moisture (e.g., groundwater availability) (e.g., Sullivan et al. 2004).

Home ranges have been reported between 3 – 500 ha and are larger for males (Wilmott 2020). The configuration and size of home ranges are influenced by the life history stage, soil fertility, habitat quality and nutritional requirements (DAWE 2022). The home ranges of individual koalas can overlap, but only about 1-5% of trees are shared between individuals (Mitchell 1990; Kavanagh et al. 2007; Matthews et al. 2007). They can persist in fragmented habitats, including in urban areas, where home ranges may extend to habitat edges (Lassau et al. 2008; de Oliveira et al. 2014). Isolated paddock trees in rural areas can also provide important habitat (Barth et al. 2020).

While the home ranges of male and female koalas overlap, residency may not result in higher male reproductive success (Ellis et al. 2002b). Reproductive maturity is reach at about 24 months, but it may take up to four years for males to be competitive with other males (Martin and Handasyde 1990). A single young per female is born per year, but not all females breed each year (Martin and Handasyde 1995). Most births occur between December and March. Dispersal is male-biased, occurring between July and December when koalas are 20 – 36 months of age (Dique et al. 2003a). Dispersal distances of up to 16 km have been reported, but 3 – 5 km is more typical (White 1999; Dique et al. 2003a; Norman et al. 2019). Generation length is estimated to be six to eight years (Phillips 2000), with a longevity of at least 12 years for males and 15 years for females (Martin and Handasyde 1999). The population viability of long-lived, slow-breeding species such as the koala, is very sensitive to the prevailing mortality rate (Oli 2004).

There are very few records of koala in the Townsville region and density is assumed to be very low as the species only occasionally recorded. This is consistent with knowledge of the species which occurs in patchy and often low-density populations across different bioregions. The species preference for moist forest habitats and subhumid woodlands along with preferred mean maximum summer temperatures of 23-26 °C are key drivers. Aside from June (25.7 °C) and July (25.2 °C) all other months have mean maximum temperatures exceeding 26 °C (range 26.1-31.6 °C). The Townsville region is in the more extreme environments for koala which partially explains the low density of the species and the lack of local records near the project area.

Species occurrence in the project area

Active searches within the project area and the adjacent riparian corridor (within both the wet and dry season surveys) failed to identify any scats or scratches that could be attributable to koala and searches for koalas within the canopy failed to identify animals. During a survey conducted by Evolve in 2022, it was reported that potential koala scratch marks were found on a tree. However, there is insufficient evidence provided of the scratch mark, in addition

to reporting no other evidence of the species' presence (i.e., sightings, scat). Furthermore, the likelihood of an active koala presence was determined to be unlikely (Mainey, Wood, 2022).

Habitat suitability

The project area offers only a small number of primary food trees (approximately 10 *E. crebra*) which are widely spaced across non-remnant parts of the project area. These trees most likely possess a low nutrient status as most soils within the Landsdown precinct are low in phosphorous, nitrogen and organic carbon (Murtha and Crack 1966) which is likely to affect plant health and nutrient status. Koalas select food trees with a relatively high nutrient status (e.g., phosphorous and potassium) and low concentrations of toxins and thus the small number of trees in the project area are not considered to provide an abundant or high-quality resource for the species. It is noted that magenta soils possess a higher nutrient status but there were no suitable food trees on this soil type.

Non-food habitat trees are also lacking in the project area as the small number of paddock trees present possess a sparse canopy and offer little cover for resting koalas. The denser canopy along Two Mile Creek provides improved refugial habitat with a shaded canopy and may offer marginal movement and dispersal although connectivity to the west is lacking. Notwithstanding, the lack of local species records and the failure to detect the species during surveys suggests that a population is unlikely.

3.6.3.3 Black-throated finch (southern subspecies)

Endangered under the EPBC Act and NC Act.

Black-throated finch (BTF) formerly occurred from northern NSW (Northern Tablelands and North-west Slopes), through southern Queensland north to the divide between the Burdekin and Lynd River in North Queensland (Black-throated Finch Recovery Team). The species was once abundant in the south of its range, which has since significantly contracted northwards (Department of Agriculture Water and the Environment, 2021). BTF is now regarded as extinct in NSW (Ley & Cook, 2001) and in Queensland south of Rockhampton. The analysis of post-2000 sightings (Mula et. al., 2019) indicate a significant contraction towards the northern extent of their distribution, with most records concentrated around the Townsville coastal plain, and south-west of Charleville in the eastern parts of the Desert Uplands Bioregion. In addition to these populations, Bravus recently reported a population estimate of 2,200 birds within the 75,000 ha pastoral lease associated with Carmichael Mine.

BTF inhabits grassy woodlands dominated by eucalypts, paperbarks, or acacias in proximity to water and an abundance of seeding grasses and bare patches for foraging (Zann, 1976; Mula, et al., 2019; Williams, et al., 2020). Preferred habitats often occur on floodplains (Vanderduys, et al., 2016). BTF appears to require a mosaic of different habitats in which to find seed, particularly in North Queensland during the wet season (Mitchell, 1996; Rechetelo, et al., 2016).

A significant proportion of BTF habitat within the northern stronghold around Townsville is restricted to pastoral lands (Mula et al 2019) which are often exposed to high grazing pressure and consist of non-native vegetation resulting in sub-optimal habitat for the species which prefers areas of lightly grazed or un-grazed native grasses (BTFRT 2007, Mula et al 2019).

BTF preferentially forage on grass seeds, although the seeds of sedges and legumes are also eaten (Mitchell, 1996; Rechetelo, et al., 2016) and insects are occasionally consumed (Rechetelo, et al., 2016). Perennial grasses dominate the black-throated finch's (southern) diet especially *Urochloa mosambicensis, Enteropogon acicularis, Panicum decompositum, Panicum effusum, Dichanthium sericeum, Alloteropsis semialata, Eragrostis sororia* and *Themeda triandra* (Mitchell 1996; NRA 2007a). Other species consumed by BTF include *Schizachyrium* spp, *Echinopogon* sp, *Sorghum* spp and *Paspalum* sp. (Mitchell 1996; NRA 2007a).

BTF is subjected to a resource bottleneck following the onset of wet season rains when grass seeds either germinate (rendering them inedible), decay or are washed away making them unavailable for consumption. During this period early flowering perennial grass species such as *Alloteropsis semialata* and *Chrysopogon fallax* are important as they provide an earlier seed resource than other species. The timing and intensity of rainfall and fire contribute to the intensity of the resource bottleneck.

BTF nest in loose colonies where they construct a domed nest in trees (rarely tree hollows) usually within 400 m of water (Isles 2007; Garnett et al. 2010; Rechetelo et al. 2016). Nests are usually constructed at least 4m above the ground in the fork or hollow branch of a tree, but they have been recorded in large shrubs closer to the ground (DEWHA 2009). Breeding can occur at any time of year, depending on the availability of food resources (Mula et al. 2019). In north Queensland, breeding generally occurs in the wet season, between February and May (DAWE 2021). Most nesting colonies are in or near larger areas of remnant vegetation.

Rechetelo et al (2016) studied the home range and movements of BTF and found that the species maintains a small home range (25.15 to 120.88 ha) over short time scales, noting that some individuals make long distance movements over longer time scales (up to 15 km away from banding sites) (Rechetelo, et al., 2016). This indicates that the species is mostly sedentary in nature. The purpose of long-distance movements is unknown but might be undertaken to overcome resource bottlenecks (e.g., dwindling food and water resources) (Rechetelo, et al., 2016). Daily movements of radio-tracked animals indicate that BTF maintain their nests in the early morning, forage in the late morning and rest in a single flock during the hottest part of the day (Rechetelo, et al., 2016).

Known threats to the Black-throated Finch (southern) include:

- Clearance and fragmentation of woodlands, riparian habitats and wattle shrublands
- Degradation of habitat by domestic livestock and rabbits, including the alteration of fuel loads, vegetation structure and the availability of food during the wet season
- Alteration of habitat by changes in fire regimes
- Invasion of habitat by exotic weeds, including exotic grasses
- Illegal trapping (BTF Recovery Team 2004).
- Predation by introduced predators
- Hybridization with the northern subspecies

Species records and occurrence

BTF were not recorded in the project area or adjacent allotments during the wet or dry season surveys despite extensive systematic targeted surveys at waterholes and area searches within nearby habitats.

The project area is in the Townsville Plains subregion, a recognised core area for BTF. Records sourced from Atlas of Living Australia and WildNet identified a single record immediately north of the project area (observation recorded in 2017 by member of the public) and several contemporary records from five to six kilometres north of the project area (Figure 10). At present, this is the closest known sub-population of the species (Figure 10) and it is suspected (although uncertain) that the nearby record (Figure 10) of BTF was from this sub-population.

During the wet season survey, small granivorous species (e.g., double-barred finch and peaceful doves) were encountered in low abundance. Conversely, peaceful doves were regularly encountered during the dry season survey and on two occasions, large flocks of plum-headed finches (>150 individuals) were recorded. Investigation of these flocks confirmed that plum-headed finches were not forming a mixed flock with other finch species. These results may suggest that the high-density ground coverage in the wet season restricts widespread foraging opportunities for granivorous species and the dieback of the grass layer and grazing impacts promote a ground cover that facilitates access to seed.

The woodlands to the north were a major focus of wet season surveys due to the availability of the three key resources for BTF, water sources, a diversity of grass seeds and suitable nest trees (although no new or old nests were identified during the surveys). This area also coincided with a previous record of the species. Notwithstanding, no records of BTF were made in this area despite the survey effort.

During the dry season survey, all potential water sources within the project area were dry with the dam and a single cattle trough providing the only water within 1.5 km of the project area. Walking transects in the project area, surveys of the dam and deployment of camera traps at the cattle trough did not detect BTF.

Habitat suitability

The project area consists primarily of marginal habitat for BTF as it primarily consists of open grassland and unsuitable dense legume vegetation within small areas of the preferred open woodlands and forests, dominated by *Eucalyptus*, *Acacia*, and *Melaleuca* (DEWHA 2009). The open grassland areas contain marginal foraging habitat with a lack of perching or cover opportunities and protection from predation. The project area overall is currently subject to a range of threats, known to impact species populations including the fragmentation of riparian habitats, altered vegetation structure, reduced food resources due to domestic livestock, altered vegetation structure through invasion exotic woody weeds and grasses and the likely presence of introduced predators.

The grasslands within the project area (Figure 8) provide marginal foraging resources under wet and dry season conditions. The dominant grass *Urochloa mosambicensis* is a recognised food resource but is a short-lived species and the low grass diversity and virtual absence of native grasses suggests that the available resources are typically of short duration. Early flowering native perennial grasses such as *Alloteropsis semialata* and *Chrysopogon fallax* are also lacking within the Project Area, therefore the site will not provide critical foraging resources during the early wet season resource bottleneck. The dense understorey and weed invasion along Two Mile Creek render the area largely unsuitable as foraging habitat (i.e. lacks suitable forage species and diversity, lacks bare patches with canopy cover (Plate 15 to Plate 21) and the few patches of bare ground have been denuded and compacted due to cattle access at waterbodies which is identified as another threat to the species (Plate 1 to Plate 6). Overall, the Project Area offers some marginal foraging habitat at times but not during the critical resource bottleneck in the early wet season and without intervention or rehabilitation it is unlikely to ever provide a high-quality foraging resource for the species.

Breeding habitat for BTF is typically located proximate to water and foraging resource. The only identified potentially suitable nesting habitats occurred along the fringing riparian woodland of Two Mile Creek due to the proximity to water (Plate 16). However, as previously detailed nearby foraging habitat was observed to be of poor quality reducing the likelihood of the successfully rearing offspring. This conclusion was supported by the absence of new or old finch nests within the Project Area during the wet season survey, which was undertaken during the typical breeding season of the species. Grassland areas (Figure 8) contain only isolated trees which are not usually selected as nest sites.

Other degrading factors observed during field investigations included the infestation of woody weeds in the northern extent of Two Mile Creek (Plate 15, Plate 17 and Figure 8) which renders the area unsuitable to BTF for any purpose.

Overall, the habitat suitability of the project area is very marginal due to reduced canopy cover and limited potential nesting trees, the non-native composition and lack of diversity in the grasslands, and the lack of breeding habitat (as evidenced by the lack of nests sighted).

Moderate to high quality BTF habitat was confirmed as present on land to the north of the Project Area (Appendix H). This area was identified as the best available local habitat, consisting of a native woodland of *Eucalyptus* spp,

Corymbia spp and *Melaleuca* spp., a sparse to mid-dense cover of suitable native grasses, ample nest trees and numerous water sources (during the breeding period). Despite significant survey effort allocated to the area, no BTF or their nests were detected. It is noted that the only locally available water source during the dry season is located approximately 800 m north of the site and if the species were present locally, they would be hydrating at this location and if present it is our view that they would have been detected. The non-detection of BTF is most likely related to temporal (or permanent) local extinction in this area and contraction into refugial habitats elsewhere. It is possible that factors such as declines of native grasses (species and abundance) over the longer-term, together with seasonal variations may have lessened the long-term population viability of BTF within the Project Area and surrounds.

Habitat mapping is presented in Appendix H and the areas of foraging and marginal foraging habitat are presented in Table 12.

Table 12 Area of black-throated finch (sth) habitat in the project area

Habitat Type	Within Disturbance Footprint	Within Avoidance Area	Total
Foraging	2.40	0	2.40
Marginal foraging	39.81	3.96	43.76
All Habitat (Total)	**42.21**	**3.96**	**46.16**

3.6.3.4 Bare-rumped sheathtail bat

Vulnerable under the EPBC Act, Endangered under the NC Act.

The Bare-rumped sheath-tailed bat (BRSTB) occurs in north-eastern Queensland and the monsoonal tropics of the Northern Territory (Milne, et al., 2009), and is likely to occur in areas of the Kimberley in Western Australia (Milne, et al., 2009). In Queensland, it occurs from Ayr to the Iron Range (Dennis 2012), including Magnetic and possibly Prince of Wales Islands (Schulz & Thompson, 2007). Most records are near-coastal, but one record (at Jasper Gorge, Northern Territory) has been found 150 km inland (Milne, et al., 2009).

There are relatively few records of the subspecies across an extensive range indicating a rare or fragmented distribution, or a lack of data publicly available. Issues relating to its detection have previously compromised the detection of the subspecies; BRSTB is morphologically similar to the yellow-bellied sheath-tailed bat (*Saccolaimus flaviventris*) and it is difficult to capture due to the species flying height (up to 400 m above ground level). More recent advances in the delineation of the species echolocation call pattern have helped to distinguish this species from other bats and the species can now be readily identified via their call.

The habitat preferences of the BRSTB are poorly known, but in Queensland it is associated with coastal lowland rainforests, and open forest and woodlands dominated by Eucalyptus or Corymbia species interspersed with coastal lowland rainforest. It has been recorded in lowland woodland, open forest, and other open habitats (Churchill, 2008; Schulz & Thompson, 2007).

The small number of roosts recorded in Australia have been found in deep tree hollows of poplar gum (*Eucalyptus platyphylla*), Darwin woollybutt (*E. miniata*), Darwin stringybark (*E. tetrodonta*) and weeping paperbark (*Melaleuca leucadendra syn. leucodendron*) (Schulz & Thompson, 2007). Hollows in these tree species have also been used as breeding roosts. Individuals may use several roosts, and the number of individuals at any site may vary over time (Department of the Environment, 2016).

The subspecies is insectivorous and forages for flying insects above the canopy (Churchill, 2008) although outside Australia, it has been suggested that the species forages 'close to the ground' (Csorba et al 2021). It has been observed foraging within metres of the canopy in riverine gallery forest and Melaleuca dominated swamps in Queensland (C. Clague pers. obs., cited in (Woinarski, 2014)). The species is likely capable of moving long distances (C. Clague pers. comm., cited in (Department of the Environment, 2016)).

The social structure of the BRSTB is poorly known other than being gregarious with between three and 40 individuals recorded from tree hollow roosts in Australia (Churchill, 2008). Females give birth to single young, with birth records from Queensland in December and January (Compton & Johnstone, 1983), and from the Northern Territory from December to about April (Compton & Johnstone, 1983; Churchill, 2008; Milne, et al., 2009).

Threats to the species include:

- Habitat loss, especially in areas with tree hollows

Likely threats to the species include:

- Vegetation change due to clearing of the understorey for domestic livestock grazing
- Altered fire regimes
- Saltwater intrusion and invasion by exotic species
- Timber collection
- Competition for hollows
- Disease
- Climate change

Species occurrence in the project area

BRSTB calls were recorded at three locations within the project area during field surveys using Anabat ultrasonic detectors. The majority of calls were recorded from detectors placed in the riparian woodlands of Two Mile Creek and *E.crebra* woodlands and only a single call was recorded from the two detectors placed in the grassland habitat.

The timing and quantity of the BRSTB calls suggest that the species is not common within the project area and where detected the species was likely to be transiting the project area while foraging. The calls were concentrated into the post-midnight period which indicates that a colony of the species was not present near any detectors. If a roost were present the activity patterns should reflect a higher number of calls distributed across all sites and at most times during each night of deployment.

Milne et al. (2004) estimated a minimum of 3 hours of Anabat recording was sufficient to record 80% of species at a given site. During the wet season survey Anabats were deployed for three nights within each broad habitat representativeness across the project area. The analysis of calls recorded for BRSTB suggests a low abundance in the project area.

Habitat suitability

Assessment of the project area confirmed that suitable roosting habitat for BRSTB was limited to a number of small hollows within the riparian corridor and the *E.crebra* woodland and a single *E.platyphylla* within the grassland community. The location of the hollows is shown in Figure 8 and photographs are provided in Plate 23 - Plate 26. The depth and significance of these hollows could not be determined but given the small number of confirmed calls it is unlikely a colony of BRSTB occurs within the project area. Other hollows were present within the project area but were either superficial or filled with mud.

BRSTB is a high-flying microbat that typically forages around habitat edges above the canopy. Due to the mobility of the species The riparian corridor and *E.crebra* woodland in the project area is considered to be suitable therefore considered suitable foraging habitat for the species and this was confirmed by a small number of calls.

Plate 23 Hollow bearing tree in *Lophostemon grandiflorus* within the riparian corridor.

Plate 24 Small hollow in E.crebra

Plate 25 Basal hollow in *E. platyphylla*

Plate 26 Isolated E.platyphylla containing multiple small hollows

3.6.4 Migratory species

Migratory species are listed under schedules of the EPBC Act, where any significant impact on migratory species is regarded as a 'controlled action'.

An assessment of the likelihood of occurrence for each migratory fauna species (Appendix G) was based on the known ecological requirements of each species and the current environmental conditions and habitat values of the project area. Of the species assessed, three have the potential to utilise the project area temporarily during migration but are considered unlikely to occupy the project area for significant periods (Table 13).

No listed migratory fauna species were observed within the project area during the field survey and all species are considered unlikely to occur in significant numbers.

Table 13 Migratory species that have the potential to occur in the project area

Species Name	Common Name	NC Act Status	EPBC Act Status
Apus pacificus	Fork-tailed swift	Special least concern	Migratory
Hirundapus caudacutus	White-throated needletail	Special least concern	Migratory
Rhipidura rufifrons	Rufous fantail	Special least concern	Migratory

4 Summary

For ease of reference, findings of the ecological assessment are summarised in Table 14 below.

Table 14 Summary of findings

Significant flora	The desktop assessment and field reconnaissance investigation did not identify potential habitat for threatened plant species and no threatened plants were identified during the survey.
Threatened ecological communities	The protected matters search tool report (Appendix C) did not return any TECs that are modelled to occur within the search area. The field investigation confirmed that TECs are not present within the project area.
Remnant vegetation	The project area supports limited remnant vegetation including areas of least concern RE 11.3.30 (0.86 ha) and a degraded example of RE 11.3.25b (5.03 ha). We note that no *Eucalyptus tereticornis* which is a framework species for RE 11.3.25b occurs in the project area. The remaining 101.41 ha consists of non-remnant vegetation.
Significant fauna	A field investigation was undertaken to verify the desktop data and confirm whether on ground habitats were likely to support these species. The assessment considered both the current condition of the project area and the presence of key microhabitat features utilised by these species. A short summary of observations relevant to the listed species is presented below: • Squatter pigeon (sth) (*Geophaps scripta scripta*) - Vulnerable (EPBC Act and NC Act): In total 41 birds were recorded, although it is probable that some individuals were counted on more than one occasion. The largest flock of squatter pigeon observed was recorded near the dam at WC4 which included one sighting of 12 birds. During the wet season two separate observations of two birds were made along Two Mile Creek in the project area and the habitat within this riparian corridor contains disconnected patches of potential breeding habitat (i.e. stony surfaces near water). During the dry season, one observation of a pair of squatter pigeons was made within the project area. Foraging habitat within the project area was mostly unsuitable as foraging habitat during the wet season survey due to the high grass/herb density and lack of consistent tree layer. Slight improvements within previously identified foraging habitat was observed in the dry season due to a sparser ground layer near Two-Mile Creek. • Koala (combined populations of Qld, NSW, and the ACT) – The project area contains *E. crebra,* a known food resource for koala but they are few and substantially better foraging habitat is present in the local area. The species were not visually identified during the surveys and no koala pellets were observed during searches at the base of *E. crebra* in the project area. • Black-throated finch (*Poephila cincta cincta*) – Endangered (NC Act and EPBC Act): Habitat within the project area was generally unsuitable for BTF due to the high grass density in the wet season, degraded riparian habitat and absence of water during the dry season. No BTF or nest sites were detected during the survey which included waterhole surveys and area searches along Two Mile Creek. Potential hydration points occurred in this area during the wet season, however other key habitat requirements were virtually absent including bare ground for foraging (due to weeds) and limited canopy cover outside the immediate corridor. Most waterholes are regularly disturbed by livestock with subsequent reduction in water quality and the disturbance of drinking birds. Woodland containing the preferred habitat attributes for black-throated finch occurs on land to the north of the project area however extensive searches in this area also failed to detect the species or their nests. Waterholes surveyed in this area during the wet season were dry. Collectively these results indicate that the chances of a BTF population permanently residing in the area are low. • Bare-rumped sheathtail bat (*Saccolaimus saccolaimus nudicluniatus*) – (EPBC Act – Vulnerable; NC Act – Endangered) - Some tree hollows considered suitable for roosting were observed within the riparian corridor during the field survey but tree hollows within the development footprint were superficial or filled with mud. BRSTB displays a preference for deep hollows which were not observed in the project area. Calls were recorded at 3 sites using Anabat ultrasonic detectors. The activity patterns of BRSTB calls suggest that the species is not common, is likely to be transiting the project area while foraging, and does not roost near any of the bat detectors.
Migratory species	The following migratory species have potential to occur within the project area: • Fork-tailed swift (*Apus pacificus*) – (EPBC Act – Migratory; NC Act – Special least concern) • White-throated needletail (*Hirundapus caudacutus)* – (EPBC Act – Migratory; NC Act – Special least concern)

	• Rufous fantail *(Rhipidura rufifrons*) – (EPBC Act – Migratory; NC Act - Special least concern) No listed migratory fauna species were observed in the project area during the field survey and the project area is considered unlikely to support significant numbers of migratory species due to the small project area and the marginal habitat present. Consequently, the likelihood of a significant impact to EPBC listed threatened species is very low.
Aquatic ecosystems and wetlands	• No significant wetlands listed under State or Commonwealth legislation occur in the project area or downstream receiving environment. • An ephemeral second order watercourse named Two Mile Creek traverses the project lot, entering the western boundary before following a north-easterly path to the northern boundary where it exits the project area and continues in a north easterly direction. Typically, these watercourses have flashy intermittent flow regimes, however small pools within Two Mile Creek (within the project area and downstream) may represent baseflow and therefore provide a year-round water supply.

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Appendix A **Protected Plants Flora Survey Trigger Map**

18/05/2023 15:44:17
Lot: 51 Plan: E124242

Protected Plants Flora Survey Trigger Map

Legend

- Selected Lot and Plan
- High risk area
- Other land parcel boundaries
- Freeways / motorways / highways
- Secondary roads / streets

LOCALITY DIAGRAM

N

0 140 280 420 560 700 m

This product is projected into:
GDA 1994 Queensland Albers

This map shows areas where particular provisions of the Nature Conservation Act 1992 apply to the clearing of protected plants.

Land parcel boundaries are provided as locational aid only.

This map is produced at a scale relevant to the size of the area selected and should be printed as A4 size in portrait orientation.

For further information or assistance with interpretation of this product, please contact the Department of Environment and Science at palm@des.qld.gov.au

Disclaimer:
While every care is taken to ensure the accuracy of the data used to generate this product, the Queensland Government makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaim all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damages) and costs which might be incurred as a consequence of reliance on the data, or as a result of the data being inaccurate or incomplete in any way and for any reason.

Protected plants flora survey trigger map

The protected plants flora survey trigger map identifies 'high risk areas' where threatened and near threatened plants are known to exist or are likely to exist. Under the *Nature Conservation Act 1992* (the Act) it is an offence to clear protected plants that are 'in the wild' unless you are authorised or the clearing is exempt, for more information see section 89 of the Act.

Please see the Department of Environment and Science webpage on the clearing of protected plants for information on what exemptions may apply in your circumstances, whether you may need to undertake a flora survey, and whether you may need a protected plants clearing permit.

Updates to the data informing the flora survey trigger map

The flora survey trigger map will be reviewed, and updated if necessary, at least every 12 months to ensure the map reflects the most up-to-date and accurate data available.

Species information

Please note that flora survey trigger maps do not identify species associated with 'high risk areas'. While some species information may be publicly available, for example via the Queensland Spatial Catalogue, the Department of Environment and Science does not provide species information on request. Regardless of whether species information is available for a particular high risk area, clearing plants in a high risk area may require a flora survey and/or clearing permit. Please see the Department of Environment and Science webpage on the clearing of protected plants for more information.

Appendix B WildNet Search Results

Queensland Government

WildNet species list

Search Criteria: Species List for a Specified Point
Species: All
Type: All
Queensland status: All
Records: All
Date: All
Latitude: -19.6485
Longitude: 146.8274
Distance: 10
Email: lochlan@terrasolutions.com.au
Date submitted: Monday 06 Nov 2023 10:51:49
Date extracted: Monday 06 Nov 2023 11:00:03

The number of records retrieved = 391

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	amphibians	Bufonidae	*Rhinella marina*	cane toad	Y			9
animals	amphibians	Hylidae	*Cyclorana alboguttata*	greenstripe frog		C		2
animals	amphibians	Hylidae	*Cyclorana novaehollandiae*	eastern snapping frog		C		1
animals	amphibians	Hylidae	*Litoria caerulea*	common green treefrog		C		3
animals	amphibians	Hylidae	*Litoria fallax*	eastern sedgefrog		C		1
animals	amphibians	Hylidae	*Litoria inermis*	bumpy rocketfrog		C		1
animals	amphibians	Hylidae	*Litoria nasuta*	striped rocketfrog		C		1
animals	amphibians	Hylidae	*Litoria rothii*	eastern laughing treefrog		C		1
animals	amphibians	Hylidae	*Litoria rubella*	ruddy treefrog		C		4
animals	amphibians	Limnodynastidae	*Limnodynastes convexiusculus*	marbled frog		C		1
animals	amphibians	Limnodynastidae	*Limnodynastes terraereginae*	scarlet sided pobblebonk		C		2/2
animals	amphibians	Limnodynastidae	*Platyplectrum ornatum*	ornate burrowing frog		C		1
animals	amphibians	Myobatrachidae	*Crinia deserticola*	chirping froglet		C		1
animals	birds	Acanthizidae	*Gerygone olivacea*	white-throated gerygone		C		6
animals	birds	Acanthizidae	*Gerygone palpebrosa*	fairy gerygone		C		4
animals	birds	Acanthizidae	*Sericornis frontalis*	white-browed scrubwren		C		1
animals	birds	Acanthizidae	*Smicrornis brevirostris*	weebill		C		1
animals	birds	Accipitridae	*Accipiter cirrocephalus*	collared sparrowhawk		C		2
animals	birds	Accipitridae	*Accipiter fasciatus*	brown goshawk		C		9
animals	birds	Accipitridae	*Accipiter novaehollandiae*	grey goshawk		C		1
animals	birds	Accipitridae	*Aquila audax*	wedge-tailed eagle		C		17
animals	birds	Accipitridae	*Aviceda subcristata*	Pacific baza		C		5
animals	birds	Accipitridae	*Circus approximans*	swamp harrier		C		5
animals	birds	Accipitridae	*Circus assimilis*	spotted harrier		C		6
animals	birds	Accipitridae	*Elanus axillaris*	black-shouldered kite		C		13
animals	birds	Accipitridae	*Haliaeetus leucogaster*	white-bellied sea-eagle		C		16
animals	birds	Accipitridae	*Haliastur indus*	brahminy kite		C		3
animals	birds	Accipitridae	*Haliastur sphenurus*	whistling kite		C		39
animals	birds	Accipitridae	*Hamirostra melanosternon*	black-breasted buzzard		C		1
animals	birds	Accipitridae	*Hieraaetus morphnoides*	little eagle		C		1
animals	birds	Accipitridae	*Milvus migrans*	black kite		C		48
animals	birds	Acrocephalidae	*Acrocephalus australis*	Australian reed-warbler		C		1
animals	birds	Aegothelidae	*Aegotheles cristatus*	Australian owlet-nightjar		C		1
animals	birds	Alaudidae	*Mirafra javanica*	Horsfield's bushlark		C		8
animals	birds	Alcedinidae	*Ceyx azureus*	azure kingfisher		C		2
animals	birds	Alcedinidae	*Dacelo leachii*	blue-winged kookaburra		C		49
animals	birds	Alcedinidae	*Dacelo novaeguineae*	laughing kookaburra		C		29
animals	birds	Alcedinidae	*Todiramphus macleayii*	forest kingfisher		C		44
animals	birds	Alcedinidae	*Todiramphus pyrrhopygius*	red-backed kingfisher		C		7
animals	birds	Alcedinidae	*Todiramphus sanctus*	sacred kingfisher		C		24
animals	birds	Anatidae	*Anas gracilis*	grey teal		C		7
animals	birds	Anatidae	*Anas superciliosa*	Pacific black duck		C		32
animals	birds	Anatidae	*Aythya australis*	hardhead		C		9
animals	birds	Anatidae	*Chenonetta jubata*	Australian wood duck		C		4
animals	birds	Anatidae	*Cygnus atratus*	black swan		C		14
animals	birds	Anatidae	*Dendrocygna arcuata*	wandering whistling-duck		C		12

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Anatidae	*Dendrocygna eytoni*	plumed whistling-duck		C		15
animals	birds	Anatidae	*Nettapus coromandelianus*	cotton pygmy-goose		C		6
animals	birds	Anatidae	*Nettapus pulchellus*	green pygmy-goose		C		8
animals	birds	Anhingidae	*Anhinga novaehollandiae*	Australasian darter		C		30
animals	birds	Anseranatidae	*Anseranas semipalmata*	magpie goose		C		29
animals	birds	Apodidae	*Aerodramus terraereginae*	Australian swiftlet		C		1
animals	birds	Ardeidae	*Ardea alba modesta*	eastern great egret		C		22
animals	birds	Ardeidae	*Ardea intermedia*	intermediate egret		C		20
animals	birds	Ardeidae	*Ardea pacifica*	white-necked heron		C		15
animals	birds	Ardeidae	*Bubulcus ibis*	cattle egret		C		7
animals	birds	Ardeidae	*Egretta garzetta*	little egret		C		8
animals	birds	Ardeidae	*Egretta novaehollandiae*	white-faced heron		C		18
animals	birds	Ardeidae	*Ixobrychus flavicollis*	black bittern		C		1
animals	birds	Ardeidae	*Nycticorax caledonicus*	nankeen night-heron		C		4
animals	birds	Artamidae	*Artamus cinereus*	black-faced woodswallow		C		21
animals	birds	Artamidae	*Artamus leucorynchus*	white-breasted woodswallow		C		29
animals	birds	Artamidae	*Artamus personatus*	masked woodswallow		C		2
animals	birds	Artamidae	*Artamus superciliosus*	white-browed woodswallow		C		3
animals	birds	Artamidae	*Cracticus nigrogularis*	pied butcherbird		C		31
animals	birds	Artamidae	*Cracticus torquatus*	grey butcherbird		C		11
animals	birds	Artamidae	*Gymnorhina tibicen*	Australian magpie		C		36
animals	birds	Artamidae	*Strepera graculina*	pied currawong		C		22
animals	birds	Burhinidae	*Burhinus grallarius*	bush stone-curlew		C		4
animals	birds	Cacatuidae	*Cacatua galerita*	sulphur-crested cockatoo		C		32
animals	birds	Cacatuidae	*Calyptorhynchus banksii*	red-tailed black-cockatoo		C		37
animals	birds	Cacatuidae	*Eolophus roseicapilla*	galah		C		2
animals	birds	Cacatuidae	*Nymphicus hollandicus*	cockatiel		C		3
animals	birds	Campephagidae	*Coracina maxima*	ground cuckoo-shrike		C		1
animals	birds	Campephagidae	*Coracina novaehollandiae*	black-faced cuckoo-shrike		C		32
animals	birds	Campephagidae	*Coracina papuensis*	white-bellied cuckoo-shrike		C		46
animals	birds	Campephagidae	*Edolisoma tenuirostre*	common cicadabird		C		2
animals	birds	Campephagidae	*Lalage leucomela*	varied triller		C		4
animals	birds	Campephagidae	*Lalage tricolor*	white-winged triller		C		25
animals	birds	Caprimulgidae	*Caprimulgus macrurus*	large-tailed nightjar		C		2
animals	birds	Casuariidae	*Dromaius novaehollandiae*	emu		C		1
animals	birds	Charadriidae	*Elseyornis melanops*	black-fronted dotterel		C		5
animals	birds	Charadriidae	*Vanellus miles*	masked lapwing		C		25
animals	birds	Charadriidae	*Vanellus tricolor*	banded lapwing		C		2
animals	birds	Ciconiidae	*Ephippiorhynchus asiaticus*	black-necked stork		C		9
animals	birds	Cisticolidae	*Cisticola exilis*	golden-headed cisticola		C		11
animals	birds	Columbidae	*Geopelia cuneata*	diamond dove		C		4
animals	birds	Columbidae	*Geopelia humeralis*	bar-shouldered dove		C		18
animals	birds	Columbidae	*Geopelia placida*	peaceful dove		C		50
animals	birds	Columbidae	*Geophaps scripta*	squatter pigeon		C		15
animals	birds	Columbidae	*Geophaps scripta scripta*	squatter pigeon (southern subspecies)		V	V	3
animals	birds	Columbidae	*Macropygia phasianella*	brown cuckoo-dove		C		2

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Columbidae	*Ocyphaps lophotes*	crested pigeon		C		38
animals	birds	Columbidae	*Phaps chalcoptera*	common bronzewing		C		2
animals	birds	Coraciidae	*Eurystomus orientalis*	dollarbird		C		18
animals	birds	Corcoracidae	*Corcorax melanorhamphos*	white-winged chough		C		5
animals	birds	Corcoracidae	*Struthidea cinerea*	apostlebird		C		18
animals	birds	Corvidae	*Corvus coronoides*	Australian raven		C		25
animals	birds	Corvidae	*Corvus orru*	Torresian crow		C		26
animals	birds	Corvidae	*Corvus sp.*			C		2
animals	birds	Cuculidae	*Cacomantis flabelliformis*	fan-tailed cuckoo		C		7
animals	birds	Cuculidae	*Cacomantis pallidus*	pallid cuckoo		C		11
animals	birds	Cuculidae	*Cacomantis variolosus*	brush cuckoo		C		21
animals	birds	Cuculidae	*Centropus phasianinus*	pheasant coucal		C		31
animals	birds	Cuculidae	*Chalcites basalis*	Horsfield's bronze-cuckoo		C		8
animals	birds	Cuculidae	*Chalcites lucidus*	shining bronze-cuckoo		C		1
animals	birds	Cuculidae	*Chalcites minutillus*	little bronze-cuckoo		C		7
animals	birds	Cuculidae	*Chalcites minutillus russatus*	Gould's bronze-cuckoo		C		4
animals	birds	Cuculidae	*Eudynamys orientalis*	eastern koel		C		7
animals	birds	Cuculidae	*Scythrops novaehollandiae*	channel-billed cuckoo		C		9
animals	birds	Dicaeidae	*Dicaeum hirundinaceum*	mistletoebird		C		14
animals	birds	Dicruridae	*Dicrurus bracteatus*	spangled drongo		C		37
animals	birds	Estrildidae	*Heteromunia pectoralis*	pictorella mannikin		C		1
animals	birds	Estrildidae	*Lonchura castaneothorax*	chestnut-breasted mannikin		C		17
animals	birds	Estrildidae	*Lonchura punctulata*	nutmeg mannikin	Y			4
animals	birds	Estrildidae	*Neochmia modesta*	plum-headed finch		C		16
animals	birds	Estrildidae	*Neochmia phaeton*	crimson finch		C		2
animals	birds	Estrildidae	*Neochmia temporalis*	red-browed finch		C		3
animals	birds	Estrildidae	*Poephila cincta cincta*	black-throated finch (white-rumped subspecies)		E	E	14
animals	birds	Estrildidae	*Taeniopygia bichenovii*	double-barred finch		C		43
animals	birds	Estrildidae	*Taeniopygia guttata*	zebra finch		C		15
animals	birds	Eurostopodidae	*Eurostopodus argus*	spotted nightjar		C		4
animals	birds	Falconidae	*Falco berigora*	brown falcon		C		18
animals	birds	Falconidae	*Falco cenchroides*	nankeen kestrel		C		15
animals	birds	Falconidae	*Falco longipennis*	Australian hobby		C		5
animals	birds	Falconidae	*Falco peregrinus macropus*	Australian peregrine falcon		C		4
animals	birds	Gruidae	*Antigone rubicunda*	brolga		C		10
animals	birds	Hirundinidae	*Hirundo neoxena*	welcome swallow		C		8
animals	birds	Hirundinidae	*Petrochelidon ariel*	fairy martin		C		15
animals	birds	Hirundinidae	*Petrochelidon nigricans*	tree martin		C		10
animals	birds	Jacanidae	*Irediparra gallinacea*	comb-crested jacana		C		37
animals	birds	Laridae	*Gelochelidon nilotica*	gull-billed tern		SL		2
animals	birds	Laridae	*Hydroprogne caspia*	Caspian tern		SL		5
animals	birds	Locustellidae	*Cincloramphus mathewsi*	rufous songlark		C		11
animals	birds	Locustellidae	*Cincloramphus timoriensis*	tawny grassbird		C		2
animals	birds	Maluridae	*Malurus melanocephalus*	red-backed fairy-wren		C		25
animals	birds	Megapodiidae	*Alectura lathami*	Australian brush-turkey		C		5

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animals	birds	Meliphagidae	*Conopophila rufogularis*	rufous-throated honeyeater		C		15
animals	birds	Meliphagidae	*Entomyzon cyanotis*	blue-faced honeyeater		C		32
animals	birds	Meliphagidae	*Lichmera indistincta*	brown honeyeater		C		28
animals	birds	Meliphagidae	*Manorina flavigula*	yellow-throated miner		C		14
animals	birds	Meliphagidae	*Manorina melanocephala*	noisy miner		C		1
animals	birds	Meliphagidae	*Meliphaga lewinii*	Lewin's honeyeater		C		14
animals	birds	Meliphagidae	*Melithreptus albogularis*	white-throated honeyeater		C		44
animals	birds	Meliphagidae	*Melithreptus gularis*	black-chinned honeyeater		C		7
animals	birds	Meliphagidae	*Myzomela obscura*	dusky honeyeater		C		1
animals	birds	Meliphagidae	*Myzomela sanguinolenta*	scarlet honeyeater		C		6
animals	birds	Meliphagidae	*Philemon buceroides*	helmeted friarbird		C		7
animals	birds	Meliphagidae	*Philemon citreogularis*	little friarbird		C		38
animals	birds	Meliphagidae	*Philemon corniculatus*	noisy friarbird		C		20
animals	birds	Meliphagidae	*Ramsayornis fasciatus*	bar-breasted honeyeater		C		3
animals	birds	Meliphagidae	*Ramsayornis modestus*	brown-backed honeyeater		C		21
animals	birds	Meliphagidae	*Stomiopera flava*	yellow honeyeater		C		49
animals	birds	Meropidae	*Merops ornatus*	rainbow bee-eater		C		44
animals	birds	Monarchidae	*Grallina cyanoleuca*	magpie-lark		C		49
animals	birds	Monarchidae	*Monarcha melanopsis*	black-faced monarch		SL		1
animals	birds	Monarchidae	*Myiagra cyanoleuca*	satin flycatcher		SL		1
animals	birds	Monarchidae	*Myiagra inquieta*	restless flycatcher		C		9
animals	birds	Monarchidae	*Myiagra rubecula*	leaden flycatcher		C		31
animals	birds	Monarchidae	*Symposiachrus trivirgatus*	spectacled monarch		SL		3
animals	birds	Motacillidae	*Anthus novaeseelandiae*	Australasian pipit		C		9
animals	birds	Nectariniidae	*Cinnyris jugularis*	olive-backed sunbird		C		24
animals	birds	Neosittidae	*Daphoenositta chrysoptera*	varied sittella		C		1
animals	birds	Oriolidae	*Oriolus sagittatus*	olive-backed oriole		C		20
animals	birds	Oriolidae	*Sphecotheres vieilloti*	Australasian figbird		C		15
animals	birds	Otididae	*Ardeotis australis*	Australian bustard		C		16
animals	birds	Pachycephalidae	*Colluricincla megarhyncha*	little shrike-thrush		C		10
animals	birds	Pachycephalidae	*Pachycephala rufiventris*	rufous whistler		C		29
animals	birds	Pardalotidae	*Pardalotus punctatus*	spotted pardalote		C		6
animals	birds	Pardalotidae	*Pardalotus striatus*	striated pardalote		C		31
animals	birds	Passeridae	*Passer domesticus*	house sparrow	Y			1
animals	birds	Pelecanidae	*Pelecanus conspicillatus*	Australian pelican		C		12
animals	birds	Petroicidae	*Microeca fascinans*	jacky winter		C		9
animals	birds	Petroicidae	*Microeca flavigaster*	lemon-bellied flycatcher		C		30
animals	birds	Petroicidae	*Petroica goodenovii*	red-capped robin		C		1
animals	birds	Petroicidae	*Poecilodryas superciliosa*	white-browed robin		C		1
animals	birds	Phalacrocoracidae	*Microcarbo melanoleucos*	little pied cormorant		C		24
animals	birds	Phalacrocoracidae	*Phalacrocorax carbo*	great cormorant		C		9
animals	birds	Phalacrocoracidae	*Phalacrocorax sulcirostris*	little black cormorant		C		21
animals	birds	Phalacrocoracidae	*Phalacrocorax varius*	pied cormorant		C		2
animals	birds	Phasianidae	*Synoicus ypsilophorus*	brown quail		C		5
animals	birds	Podargidae	*Podargus strigoides*	tawny frogmouth		C		1
animals	birds	Podicipedidae	*Podiceps cristatus*	great crested grebe		C		4

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animals	birds	Podicipedidae	*Tachybaptus novaehollandiae*	Australasian grebe		C		7
animals	birds	Pomatostomidae	*Pomatostomus temporalis*	grey-crowned babbler		C		7
animals	birds	Psittaculidae	*Aprosmictus erythropterus*	red-winged parrot		C		16
animals	birds	Psittaculidae	*Melopsittacus undulatus*	budgerigar		C		4
animals	birds	Psittaculidae	*Platycercus adscitus*	pale-headed rosella		C		45
animals	birds	Psittaculidae	*Trichoglossus chlorolepidotus*	scaly-breasted lorikeet		C		17
animals	birds	Psittaculidae	*Trichoglossus moluccanus*	rainbow lorikeet		C		28
animals	birds	Ptilonorhynchidae	*Chlamydera nuchalis*	great bowerbird		C		20
animals	birds	Rallidae	*Fulica atra*	Eurasian coot		C		3
animals	birds	Rallidae	*Gallinula tenebrosa*	dusky moorhen		C		1
animals	birds	Rallidae	*Porphyrio melanotus*	purple swamphen		C		1
animals	birds	Recurvirostridae	*Himantopus leucocephalus*	pied stilt		C		1
animals	birds	Rhipiduridae	*Rhipidura albiscapa*	grey fantail		C		39
animals	birds	Rhipiduridae	*Rhipidura leucophrys*	willie wagtail		C		36
animals	birds	Rhipiduridae	*Rhipidura rufifrons*	rufous fantail		SL		3
animals	birds	Rhipiduridae	*Rhipidura rufiventris*	northern fantail		C		1
animals	birds	Scolopacidae	*Gallinago hardwickii*	Latham's snipe		SL		1
animals	birds	Strigidae	*Ninox boobook*	southern boobook		C		6
animals	birds	Strigidae	*Ninox connivens*	barking owl		C		12
animals	birds	Threskiornithidae	*Platalea flavipes*	yellow-billed spoonbill		C		13
animals	birds	Threskiornithidae	*Platalea regia*	royal spoonbill		C		13
animals	birds	Threskiornithidae	*Plegadis falcinellus*	glossy ibis		SL		2
animals	birds	Threskiornithidae	*Threskiornis molucca*	Australian white ibis		C		20
animals	birds	Threskiornithidae	*Threskiornis spinicollis*	straw-necked ibis		C		32
animals	birds	Turnicidae	*Turnix maculosus*	red-backed button-quail		C		3
animals	birds	Turnicidae	*Turnix pyrrhothorax*	red-chested button-quail		C		2
animals	birds	Turnicidae	*Turnix velox*	little button-quail		C		1
animals	birds	Tytonidae	*Tyto javanica*	eastern barn owl		C		4
animals	mammals	Dasyuridae	*Dasyurus hallucatus*	northern quoll		C	E	1
animals	mammals	Macropodidae	*Lagorchestes conspicillatus*	spectacled hare-wallaby		C		1
animals	mammals	Macropodidae	*Macropus giganteus*	eastern grey kangaroo		C		4
animals	mammals	Macropodidae	*Notamacropus agilis*	agile wallaby		C		2
animals	mammals	Suidae	*Sus scrofa*	pig	Y			5
animals	reptiles	Agamidae	*Diporiphora australis*	tommy roundhead		C		1
animals	reptiles	Boidae	*Morelia spilota*	carpet python		C		2
animals	reptiles	Chelidae	*Chelodina canni*	Cann's longneck turtle		C		1
animals	reptiles	Chelidae	*Emydura macquarii krefftii*	Krefft's river turtle		C		2/1
animals	reptiles	Colubridae	*Tropidonophis mairii*	freshwater snake		C		2
animals	reptiles	Diplodactylidae	*Amalosia rhombifer sensu lato*	zigzag velvet gecko		C		1/1
animals	reptiles	Diplodactylidae	*Diplodactylus platyurus*	eastern fat-tailed gecko		C		1/1
animals	reptiles	Diplodactylidae	*Oedura castelnaui*	northern velvet gecko		C		1/1
animals	reptiles	Elapidae	*Cryptophis nigrostriatus*	black-striped snake		C		1/1
animals	reptiles	Elapidae	*Furina diadema*	red-naped snake		C		1/1
animals	reptiles	Elapidae	*Pseudonaja nuchalis sensu lato*	western brown snake		C		1
animals	reptiles	Elapidae	*Suta suta*	myall snake		C		1/1
animals	reptiles	Gekkonidae	*Heteronotia binoei*	Bynoe's gecko		C		1

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animals	reptiles	Pygopodidae	*Delma tincta*	excitable delma		C		1/1
animals	reptiles	Pygopodidae	*Lialis burtonis*	Burton's legless lizard		C		1/1
animals	reptiles	Scincidae	*Carlia vivax*	tussock rainbow-skink		C		1
animals	reptiles	Scincidae	*Praeteropus gowi*	speckled worm-skink		C		1
animals	reptiles	Typhlopidae	*Anilios affinis*	small-headed blind snake		C		4/4
animals	reptiles	Typhlopidae	*Anilios ligatus*	robust blind snake		C		1/1
animals	reptiles	Varanidae	*Varanus scalaris*	spotted tree monitor		C		1/1
animals	uncertain	Indeterminate	*Indeterminate*	Unknown or Code Pending				1/1
plants	land plants	Acanthaceae	*Graptophyllum excelsum*			NT		1/1
plants	land plants	Acanthaceae	*Rostellularia adscendens subsp. dallachyi*			C		1/1
plants	land plants	Amaranthaceae	*Amaranthus interruptus*			C		1/1
plants	land plants	Amaranthaceae	*Amaranthus spinosus*	needle burr	Y			1/1
plants	land plants	Amaranthaceae	*Gomphrena humilis*			C		1/1
plants	land plants	Anacardiaceae	*Euroschinus falcatus var. angustifolius*			C		1/1
plants	land plants	Apocynaceae	*Alyxia ruscifolia*			C		1/1
plants	land plants	Apocynaceae	*Cryptostegia grandiflora*	rubber vine	Y			3
plants	land plants	Apocynaceae	*Cynanchum pedunculatum*			C		1/1
plants	land plants	Apocynaceae	*Parsonsia lenticellata*	narrow-leaved parsonsia		C		3/3
plants	land plants	Apocynaceae	*Vincetoxicum williamsii*			C		1/1
plants	land plants	Apocynaceae	*Wrightia saligna*			C		1/1
plants	land plants	Asteraceae	*Camptacra barbata*			C		1/1
plants	land plants	Asteraceae	*Coronidium lanuginosum*			C		1/1
plants	land plants	Asteraceae	*Cyanthillium cinereum*			C		1/1
plants	land plants	Asteraceae	*Ozothamnus cassinioides*			C		1/1
plants	land plants	Asteraceae	*Peripleura bicolor*			C		1/1
plants	land plants	Asteraceae	*Peripleura hispidula var. setosa*			C		1/1
plants	land plants	Asteraceae	*Peripleura scabra*			C		2/2
plants	land plants	Asteraceae	*Pterocaulon ciliosum*			C		1/1
plants	land plants	Asteraceae	*Pterocaulon serrulatum var. serrulatum*			C		1/1
plants	land plants	Boraginaceae	*Trichodesma zeylanicum var. zeylanicum*			C		1/1
plants	land plants	Campanulaceae	*Lobelia concolor*			SL		1/1
plants	land plants	Campanulaceae	*Lobelia quadrangularis*			SL		1/1
plants	land plants	Centrolepidaceae	*Centrolepis exserta*			C		1/1
plants	land plants	Chenopodiaceae	*Chenopodium murale*	green fat-hen	Y			1/1
plants	land plants	Commelinaceae	*Commelina ensifolia*	scurvy grass		C		1/1
plants	land plants	Convolvulaceae	*Ipomoea brassii*			C		1/1
plants	land plants	Convolvulaceae	*Ipomoea polymorpha*			C		2/2
plants	land plants	Convolvulaceae	*Polymeria marginata*			C		1/1
plants	land plants	Convolvulaceae	*Xenostegia tridentata*			C		1/1
plants	land plants	Cornaceae	*Alangium polyosmoides subsp. tomentosum*			C		1/1
plants	land plants	Cyperaceae	*Cyperus concinnus*			C		1/1
plants	land plants	Cyperaceae	*Cyperus distans*			C		1/1
plants	land plants	Cyperaceae	*Cyperus gracilis*			C		1/1
plants	land plants	Cyperaceae	*Cyperus leptocarpus*			C		1/1
plants	land plants	Cyperaceae	*Cyperus platystylis*			C		1/1
plants	land plants	Cyperaceae	*Cyperus polystachyos*			C		1/1

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plants	land plants	Cyperaceae	*Cyperus procerus*			C		1/1
plants	land plants	Cyperaceae	*Cyperus pulchellus*			C		1/1
plants	land plants	Cyperaceae	*Cyperus squarrosus*	bearded flatsedge		C		1/1
plants	land plants	Cyperaceae	*Eleocharis geniculata*			C		1/1
plants	land plants	Cyperaceae	*Fimbristylis littoralis*			C		1/1
plants	land plants	Cyperaceae	*Fimbristylis nuda*			C		1/1
plants	land plants	Cyperaceae	*Fimbristylis sieberiana*			C		1/1
plants	land plants	Cyperaceae	*Schoenus falcatus*			C		1/1
plants	land plants	Cyperaceae	*Scleria brownii*			C		1/1
plants	land plants	Cyperaceae	*Scleria sphacelata*			C		1/1
plants	land plants	Davalliaceae	*Davallia denticulata*			C		2/2
plants	land plants	Ebenaceae	*Diospyros geminata*	scaly ebony		C		1/1
plants	land plants	Eriocaulaceae	*Eriocaulon pygmaeum*			C		1/1
plants	land plants	Gentianaceae	*Canscora diffusa*			C		2/2
plants	land plants	Gesneriaceae	*Boea hygroscopica*			SL		1/1
plants	land plants	Goodeniaceae	*Goodenia mystrophylla*			C		1/1
plants	land plants	Lamiaceae	*Anisomeles moschata*			C		1/1
plants	land plants	Lamiaceae	*Clerodendrum floribundum*			C		1/1
plants	land plants	Lamiaceae	*Coleus congestus*			C		1/1
plants	land plants	Lamiaceae	*Teucrium modestum*			C		1/1
plants	land plants	Leguminosae	*Acacia jackesiana*			C		1/1
plants	land plants	Leguminosae	*Acacia salicina*	doolan		C		1/1
plants	land plants	Leguminosae	*Acaciella*					1/1
plants	land plants	Leguminosae	*Acaciella angustissima*	white ball acacia	Y			5/5
plants	land plants	Leguminosae	*Albizia*					1/1
plants	land plants	Leguminosae	*Butea monosperma*		Y			1/1
plants	land plants	Leguminosae	*Cajanus marmoratus*			C		2/2
plants	land plants	Leguminosae	*Cajanus reticulatus var. reticulatus*			C		1/1
plants	land plants	Leguminosae	*Cajanus scarabaeoides var. scarabaeoides*			C		1/1
plants	land plants	Leguminosae	*Centrosema*					1/1
plants	land plants	Leguminosae	*Crotalaria goreensis*	gambia pea	Y			1/1
plants	land plants	Leguminosae	*Crotalaria laburnifolia*		Y			1/1
plants	land plants	Leguminosae	*Crotalaria spectabilis*	showy rattlepod	Y			1/1
plants	land plants	Leguminosae	*Crotalaria verrucosa*			C		2/2
plants	land plants	Leguminosae	*Erythrina vespertilio subsp. vespertilio*			C		1/1
plants	land plants	Leguminosae	*Falcataria toona*			C		2/2
plants	land plants	Leguminosae	*Flemingia parviflora*	flemingia		C		1/1
plants	land plants	Leguminosae	*Galactia tenuiflora var. lucida*			C		1/1
plants	land plants	Leguminosae	*Glycine tomentella*	woolly glycine		C		1/1
plants	land plants	Leguminosae	*Heliodendron thozetianum*			C		1/1
plants	land plants	Leguminosae	*Indigofera polygaloides*			C		1/1
plants	land plants	Leguminosae	*Indigofera tryonii*			C		1/1
plants	land plants	Leguminosae	*Leucaena leucocephala*		Y			10
plants	land plants	Leguminosae	*Leucaena leucocephala subsp. glabrata*		Y			1/1
plants	land plants	Leguminosae	*Rhynchosia minima var. minima*			C		1/1
plants	land plants	Leguminosae	*Senegalia*					1/1

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plants	land plants	Leguminosae	*Senna occidentalis*	coffee senna	Y			1/1
plants	land plants	Leguminosae	*Tephrosia astragaloides*			C		1/1
plants	land plants	Leguminosae	*Tephrosia brachyodon*			C		1/1
plants	land plants	Leguminosae	*Tephrosia juncea*			C		1/1
plants	land plants	Leguminosae	*Vachellia bidwillii*			C		1/1
plants	land plants	Leguminosae	*Vigna radiata var. sublobata*			C		1/1
plants	land plants	Leguminosae	*Vigna vexillata var. youngiana*			C		1/1
plants	land plants	Leguminosae	*Zornia dyctiocarpa var. filifolia*			C		1/1
plants	land plants	Leguminosae	*Zornia muelleriana subsp. muelleriana*			C		1/1
plants	land plants	Lentibulariaceae	*Utricularia aurea*	golden bladderwort		SL		1/1
plants	land plants	Lentibulariaceae	*Utricularia minutissima*			SL		1/1
plants	land plants	Loganiaceae	*Mitrasacme prolifera*			C		1/1
plants	land plants	Loranthaceae	*Dendrophthoe vitellina*	long-flowered mistletoe		C		1/1
plants	land plants	Lythraceae	*Ammannia multiflora*	jerry-jerry		C		1/1
plants	land plants	Lythraceae	*Lythrum paradoxum*			C		1/1
plants	land plants	Malpighiaceae	*Stigmaphyllon australiense*			C		2/2
plants	land plants	Malvaceae	*Abutilon auritum*	Chinese lantern		C		1/1
plants	land plants	Malvaceae	*Abutilon micropetalum*			C		1/1
plants	land plants	Malvaceae	*Hibiscus divaricatus*			C		1/1
plants	land plants	Malvaceae	*Hibiscus heterophyllus*			C		1/1
plants	land plants	Malvaceae	*Hibiscus phyllochlaenus*			C		1/1
plants	land plants	Malvaceae	*Sida cordifolia*		Y			1/1
plants	land plants	Menispermaceae	*Stephania japonica var. timoriensis*			C		1/1
plants	land plants	Moraceae	*Ficus virens var. virens*			C		1/1
plants	land plants	Myrsinaceae	*Lysimachia ovalis*			C		1/1
plants	land plants	Myrtaceae	*Corymbia intermedia*	pink bloodwood		C		1/1
plants	land plants	Myrtaceae	*Corymbia lamprophylla*			C		1/1
plants	land plants	Myrtaceae	*Eucalyptus brownii*	Reid River box		C		2/2
plants	land plants	Myrtaceae	*Eucalyptus persistens*			C		1/1
plants	land plants	Myrtaceae	*Eucalyptus xanthoclada*	yellow-branched ironbark		C		1/1
plants	land plants	Myrtaceae	*Eugenia reinwardtiana*	beach cherry		C		1/1
plants	land plants	Myrtaceae	*Gossia bidwillii*			C		1/1
plants	land plants	Myrtaceae	*Lophostemon grandiflorus subsp. riparius*			C		2/2
plants	land plants	Myrtaceae	*Melaleuca bracteata*			C		1/1
plants	land plants	Myrtaceae	*Melaleuca nervosa*			C		1/1
plants	land plants	Phyllanthaceae	*Glochidion apodogynum*			C		1/1
plants	land plants	Phyllanthaceae	*Phyllanthus novae-hollandiae*			C		1/1
plants	land plants	Poaceae	*Aristida gracilipes*			C		1/1
plants	land plants	Poaceae	*Arthragrostis deschampsioides*			C		1/1
plants	land plants	Poaceae	*Arundinella setosa*			C		1/1
plants	land plants	Poaceae	*Cenchrus caliculatus*	hillside burrgrass		C		1/1
plants	land plants	Poaceae	*Chionachne cyathopoda*	river grass		C		1/1
plants	land plants	Poaceae	*Cynodon aethiopicus*		Y			1/1
plants	land plants	Poaceae	*Dinebra decipiens var. asthenes*			C		1/1
plants	land plants	Poaceae	*Eragrostis parviflora*	weeping lovegrass		C		1/1
plants	land plants	Poaceae	*Oryza*					1/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	land plants	Poaceae	*Panicum trichoides*			C		2/2
plants	land plants	Poaceae	*Paspalidium gracile*	slender panic		C		1/1
plants	land plants	Polypodiaceae	*Drynaria sparsisora*			SL		1/1
plants	land plants	Pteridaceae	*Adiantum atroviride*			SL		1/1
plants	land plants	Putranjivaceae	*Drypetes deplanchei*	grey boxwood		C		1/1
plants	land plants	Rhamnaceae	*Ventilago viminalis*	supplejack		C		1/1
plants	land plants	Rhamnaceae	*Ziziphus mauritiana*	Indian jujube	Y			1
plants	land plants	Rubiaceae	*Pavetta australiensis var. australiensis*			C		1/1
plants	land plants	Rubiaceae	*Psychotria fitzalanii*			C		1/1
plants	land plants	Rubiaceae	*Scleromitrion galioides*			C		1/1
plants	land plants	Rubiaceae	*Scleromitrion polycladum*			NT		4/4
plants	land plants	Rubiaceae	*Spermacoce brachystema*			C		1/1
plants	land plants	Rubiaceae	*Timonius timon var. timon*			C		1/1
plants	land plants	Sapindaceae	*Alectryon tomentosus*			C		1/1
plants	land plants	Sapindaceae	*Harpullia pendula*			C		1/1
plants	land plants	Sapotaceae	*Amorphospermum antilogum*			C		1/1
plants	land plants	Selaginellaceae	*Selaginella ciliaris*			C		1/1
plants	land plants	Solanaceae	*Nicotiana glauca*	tree tobacco	Y			1/1
plants	land plants	Solanaceae	*Solanum cookii*			C		1/1
plants	land plants	Sparrmanniaceae	*Grewia*					1/1
plants	land plants	Sparrmanniaceae	*Grewia savannicola*			C		1/1
plants	land plants	Thymelaeaceae	*Pimelea sericostachya*			C		1/1
plants	land plants	Vitaceae	*Apocissus oblonga*			C		1/1
plants	land plants	Vitaceae	*Causonis trifolia*			C		1/1

CODES

I - Y indicates that the taxon is introduced to Queensland and has naturalised.

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992.*
The codes are Extinct (EX), Extinct in the Wild (PE), Critically Endangered (CR), Endangered (E), Vulnerable (V), Near Threatened (NT), Special Least Concern (SL) and Least Concern (C).

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999.*
The values of EPBC are Extinct (EX), Extinct in the Wild (XW), Critically Endangered (CE), Endangered (E), Vulnerable (V) and Conservation Dependent (CD).

Records - The first number indicates the total number of records of the taxon (wildlife records and species listings for selected areas).
This number is output as 99999 if it equals or exceeds this value. A second number located after a / indicates the number of specimen records for the taxon.
This number is output as 999 if it equals or exceeds this value.

Appendix C EPBC Protected Matters Search Results

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 06-Nov-2023

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	30
Listed Migratory Species:	18

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	23
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	1
Regional Forest Agreements:	None
Nationally Important Wetlands:	1
EPBC Act Referrals:	10
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar Wetlands)		[Resource Information]
Ramsar Site Name	Proximity	Buffer Status
Bowling green bay	10 - 20km upstream from Ramsar site	In feature area

Listed Threatened Species			[Resource Information]
Status of Conservation Dependent and Extinct are not MNES under the EPBC Act. Number is the current name ID.			
Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Charadrius leschenaultii			
Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Erythrotriorchis radiatus			
Red Goshawk [942]	Endangered	Species or species habitat likely to occur within area	In feature area
Falco hypoleucos			
Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Geophaps scripta scripta			
Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat may occur within area	In feature area
Hirundapus caudacutus			
White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
Neochmia ruficauda ruficauda			
Star Finch (eastern), Star Finch (southern) [26027]	Endangered	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Numenius madagascariensis			
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Poephila cincta cincta			
Southern Black-throated Finch [64447]	Endangered	Species or species habitat known to occur within area	In feature area
Rostratula australis			
Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area	In feature area
Tyto novaehollandiae kimberli			
Masked Owl (northern) [26048]	Vulnerable	Species or species habitat likely to occur within area	In feature area
MAMMAL			
Dasyurus hallucatus			
Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat likely to occur within area	In feature area
Hipposideros semoni			
Semon's Leaf-nosed Bat, Greater Wart-nosed Horseshoe-bat [180]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Macroderma gigas			
Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Petauroides minor			
Greater Glider (northern), Greater Glider (north-eastern Queensland) [92008]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Petauroides volans			
Greater Glider (southern and central) [254]	Endangered	Species or species habitat may occur within area	In feature area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)			
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat likely to occur within area	In feature area
Rhinolophus robertsi			
Large-eared Horseshoe Bat, Greater Large-eared Horseshoe Bat [87639]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Saccolaimus saccolaimus nudicluniatus Bare-rumped Sheath-tailed Bat, Bare-rumped Sheathtail Bat [66889]	Vulnerable	Species or species habitat likely to occur within area	In feature area
PLANT			
Bulbophyllum globuliforme Miniature Moss-orchid, Hoop Pine Orchid [6649]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Dichanthium setosum bluegrass [14159]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Eucalyptus paedoglauca Mt Stuart Ironbark [56188]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Eucalyptus raveretiana Black Ironbox [16344]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Leichhardtia araujacea [91900]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
Leichhardtia brevifolia listed as Marsdenia brevifolia [91893]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Omphalea celata [64586]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Phlegmariurus tetrastichoides Square Tassel Fern [86555]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Tephrosia leveillei [16946]	Vulnerable	Species or species habitat may occur within area	In feature area
REPTILE			
Egernia rugosa Yakka Skink [1420]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Lerista vittata Mount Cooper Striped Skink, Mount Cooper Striped Lerista [1308]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Listed Migratory Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Marine Species			
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area	In feature area
Migratory Terrestrial Species			
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat known to occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area	In feature area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area	In feature area
Symposiachrus trivirgatus as Monarcha trivirgatus Spectacled Monarch [83946]		Species or species habitat known to occur within area	In feature area
Migratory Wetlands Species			

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area	In feature area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
[Charadrius leschenaultii](#) Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat may occur within area	In buffer area only
[Gallinago hardwickii](#) Latham's Snipe, Japanese Snipe [863]		Species or species habitat known to occur within area	In feature area
[Numenius madagascariensis](#) Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
[Pandion haliaetus](#) Osprey [952]		Species or species habitat likely to occur within area	In buffer area only
[Tringa nebularia](#) Common Greenshank, Greenshank [832]		Species or species habitat may occur within area	In buffer area only

Other Matters Protected by the EPBC Act

Listed Marine Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area overfly marine area	In feature area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area	In feature area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat known to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Breeding known to occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area overfly marine area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area overfly marine area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area overfly marine area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area	In buffer area only
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area overfly marine area	In feature area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Symposiachrus trivirgatus as Monarcha trivirgatus			
Spectacled Monarch [83946]		Species or species habitat known to occur within area overfly marine area	In feature area
Tringa nebularia			
Common Greenshank, Greenshank [832]		Species or species habitat may occur within area overfly marine area	In buffer area only
Reptile			
Crocodylus porosus			
Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area	In feature area

Extra Information

State and Territory Reserves [Resource Information]

Protected Area Name	Reserve Type	State	Buffer Status
Serpentine	Nature Refuge	QLD	In buffer area only

Nationally Important Wetlands [Resource Information]

Wetland Name	State	Buffer Status
The Serpentine Aggregation	QLD	In buffer area only

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
EGH2 Green Hydrogen Project	2023/09604		Assessment	In feature area
Lansdown Eco-Industrial Precinct ? Enabling Infrastructure	2022/09383		Assessment	In feature area
Lansdown Eco-Industrial Precinct Access Road	2022/09281		Completed	In buffer area only
Queensland Pacific Metals - Townsville Energy Chemicals Hub TECH Project	2021/9033		Post-Approval	In buffer area only
Woodstock Renewable Energy Hub	2023/09616		Referral Decision	In buffer area only
Controlled action				
Gas pipeline	2002/728	Controlled Action	Post-Approval	In buffer area only
Not controlled action				

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
Majors Creek Solar Farm, south of Townsville, Queensland	2017/7963	Not Controlled Action	Completed	In buffer area only
Re-opening of Marathon Quarry	2009/4877	Not Controlled Action	Completed	In buffer area only
Not controlled action (particular manner)				
275kV Transmission Line from Ross substation to Strathmore Substation (approx 180km)	2008/4390	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

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Appendix D **Woodstock Acoustic Microbat Survey Report 24 – 27 March 2023**

WOODSTOCK

ACOUSTIC MICROBAT SURVEY REPORT
24 – 27 MARCH 2023

Estimate # 43
Acoustic Bat
Survey March
2023

Data
Analytics

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S. Robson  2 May 2023

DISCLAIMER:

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Executive Summary

Ultrasound surveys of four Woodstock sites identified at least nine bat species listed as being of Least Concern within the Qld Government Threatened Species Listing, none of which were listed as being either Vulnerable, Endangered or Critically Endangered within the EPBC Act List of Threatened Fauna. These species and species groups are 1: *Chaerephon jobensis, 2: Chalinolobus gouldii, 3: Chalinolobus nigrogriseus, 4: Miniopterus orianae oceanensis, 5: Nyctophilus bifax / N. geoffroyi &/or N. gouldi, 6: Ozimops lumsdenae, 7: Ozimops ridei / Seterostris elery, 8: Saccolaimus flaviventris* and *9: Scoteanax rupellii / Scotorepens balstoni / S. greyii / S. sanborni.*

A single EPBC Vulnerable-listed species *Saccolaimus saccolaimus* was detected at three of the four sites, but examination of the number of calls and distribution across the nightly foraging period indicates that relatively few individuals are accessing the sites and does not suggest that a roost site is present near the detectors.

Scope of Study

To implement ultrasound bat surveys to report on the species of microchiropteran bats present at Woodstock QLD during late March 2023, and to provide an analysis of nightly activity patterns for any species of particular conservation interest found.

Material & Methods

Data collection

Ultrasound (.wav) files were recorded at four Woodstock sites (AB01, AB03, AB07 & AB09) for four nights (24, 25, 26 & 27th of March 2023) using Titley Chorus® bat detectors.

Identification of bat calls

Call analysis was conducted by Prof. Simon Robson who has over 30 years' experience in the ecology, behaviour and identification of bats (Australia, Central, South and North America, Papua New Guinea, South East Asia) and over 20 years experience in the detection and analysis of bat calls from northern Queensland specifically. The majority of reference calls used in this analysis were obtained during a month-long survey of the bats of Cape York by Robson and colleagues (Reardon *et al*. 2010), which now forms the basis of many conservation decisions concerning the bats of this region.

Sound files (.wav) containing bat calls were detected and analysed with Filters and a Decision Tree program written in Anabat Insight (Titley Electronic ®) in concert with a sound analysis program written in R®.

Filters and Decision Trees were tailored to those microbat species bats that are likely to be found in North Queensland, based on personal records, published records (Churchill 2008,

van Dyck *et al*. 2013), on-line records (Atlas of Living Australia) and discussion with other Australian bat researchers.

Relevant call metrics used in the Filters and Decision Trees were similar to those used in other published keys e.g. (Milne 2002, Pennay *et al*. 2004, Reinhold *et al*. 2001), calibrated against a personal reference library of over 1700 calls of bats from the North Queensland Region, collected over the last 20 years as part of Robson's ongoing research into the ecology and behaviour of bats of the region e.g. Hourigan (2001), Hourigan *et al*. (2006), Inkster (2008, 2011), Parsons (2005, 2011), Parsons *et al*. (2006, 2007, 2010, 2011), Reardon *et al*. (2010) and Stiso (2013).

Recent changes in bat taxonomy follow Jackson & Groves (2015), van Dyck *et al.* (2013) and ongoing discussions with the Australian bat research community.

The species pool of bats likely to be present within a 50 km radius of the survey sites was determined using the BatMap function of the Australasian Bat Society https://www.ausbats.org.au/batmap.html.

The Environmental Protection & Biodiversity Conservation Act and the Nature Conservation Act conservation status of individual species was determined using the EPBC Protected Matters WWW Search Tool https://www.environment.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl and the NCA WWW Search tool https://apps.des.qld.gov.au/species-search/details/?id=992.

Activity patterns of relevant species

Activity patterns were illustrated using bar charts plotted with R Studio®.

Results and Discussion

A total of 41,055 sound files were collected and examined from the four sites (Table 1) of which 2,331 could be identified as bat calls. Representative bat calls are provided in Appendix 1.

It is currently not possible to reliably distinguish between the species of Long-eared bats in areas of geographical overlap, so the three species potentially present at this site based on call features alone, so the three species have been listed in Table 1 as a single group of *Nyctophilus*.

It is also currently not possible to reliably distinguish between *Ozimops ridei* and *Seterostris eleyri* based on call features alone, so the two species have been listed in Table 1 as a single group.

The *Scoteanax* and *Scotorepens* species of north Queensland can be difficult and time-consuming to confidently identify to species, and given that none of them are of particular conservation interest they have also been placed into a single group in Table 1.

Ultrasound surveys of four Woodstock sites identified at least nine bat species listed as being of Least Concern within the Qld Government Threatened Species Listing, none of which were listed as being either Vulnerable, Endangered or Critically Endangered within the EPBC Act List of Threatened Fauna. These species and species groups are 1: *Chaerephon jobensis, 2: Chalinolobus gouldii, 3: Chalinolobus nigrogriseus, 4: Miniopterus orianae oceanensis, 5: Nyctophilus bifax / N. geoffroyi &/or N. gouldi, 6: Ozimops lumsdenae, 7: Ozimops ridei / Seterostris elery, 8: Saccolaimus flaviventris* and *9: Scoteanax rupellii / Scotorepens balstoni / S. greyii / S. sanborni.*

A single EPBC Vulnerable-listed species *Saccolaimus saccolaimus* was detected at three of the four sites, but examination of the number of calls and distribution across the nightly foraging period indicates that relatively few individuals are accessing the sites and does not suggest that a roost site is present near the detectors.

The activity patterns of the single EPBC-listed Vulnerable species *Saccolaimus saccolaimus* suggest that the species is not common, is likely to be transiting the site while foraging, and does not roost near any of the bat detectors. This species was detected at only three of the four sites, the overall number of call files detected was low, and the calls that were detected were concentrated into the post-midnight period. If a roost site was present the activity patterns should reflect a higher number of calls distributed across all sites and at a majority of times during each night.

Figure 1. Nightly activity patterns for *Saccolaimus saccolaimus* at the four Woodstock sites.

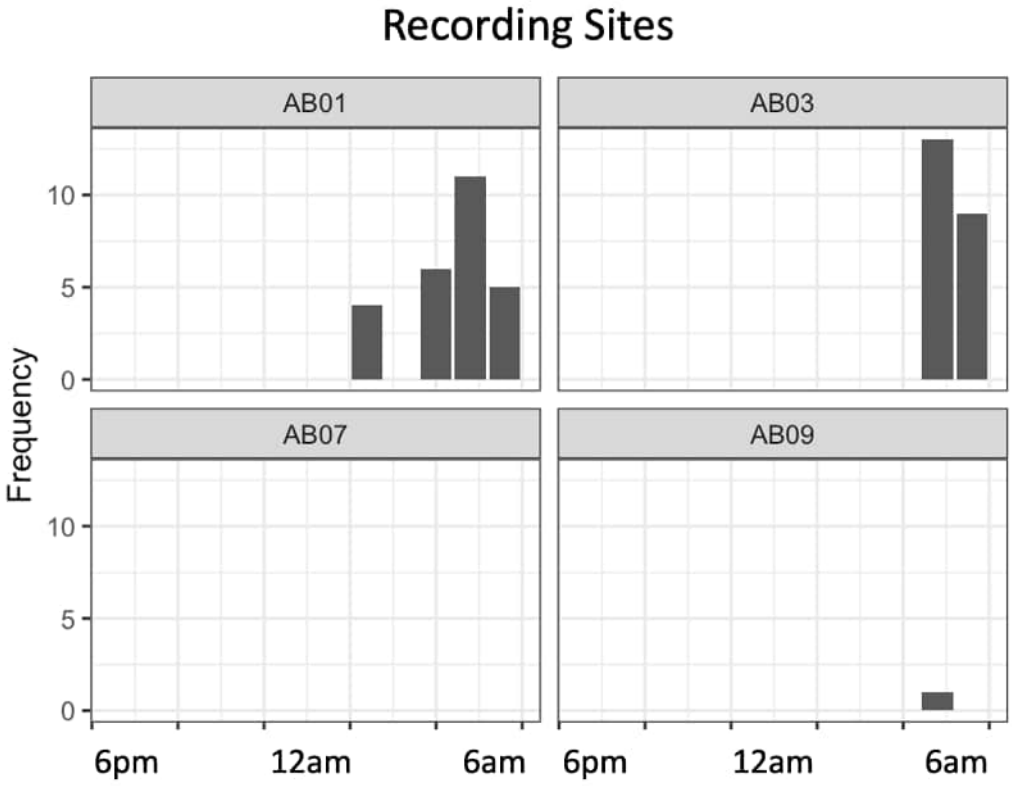


Table 1. Potential Woodstock microbat species pool, their conservation listing and the actual microbat species detected through acoustic ultrasound surveys.

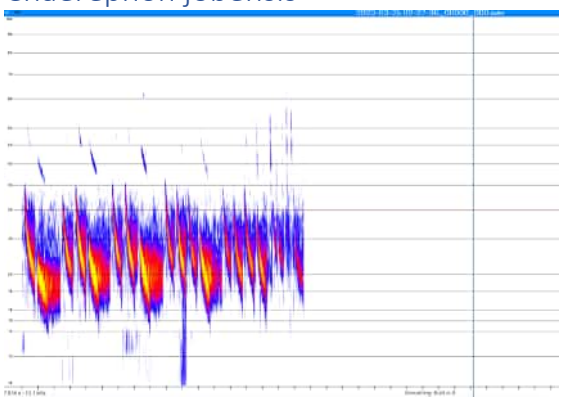
Species possibly present	Common name	Conservation Listing		Location			
		EPBC	NCA	AB01 24-27 March 2023	AB03 24-27 March 2023	AB07 24-27 March 2023	AB09 24-27 March 2023
Austronomus australis	White-striped Freetail Bat	NL	LC				
Chaerephon jobensis	Northern Freetail Bat	NL	LC	YES	YES	YES	YES
Chalinolobus gouldii	Gould's Wattled Bat	NL	LC	YES	YES	YES	YES
Chalinolobus morio	Chocolate Wattled Bat	NL	LC				
Chalinolobus nigrogriseus	Hoary Wattled Bat	NL	LC	YES	YES	YES	YES
Hipposideros ater	Dusky Leaf-nosed Bat	NL	LC				
Macroderma gigas	Ghost Bat	V	E				
Miniopterus australis	Little bent-winged Bat	NL	LC				
Miniopterus orianae oceanensis	Eastern Bent-wing Bat	NL	LC	YES	YES	YES	YES
Myotis macropus	Large-footed Myotis	NL	LC				
Nyctophilus bifax	Eastern Long-eared Bat	NL	LC	YES	YES	YES	YES
&/or							
Nyctophilus geoffroyi	Lesser Long-eared Bat	NL	LC				
&/or *Nyctophilus gouldi*	Gould's Long-eared Bat	NL	LC				
Ozimops lumsdenae	Lumsden's Freetail Bat	NL	LC	YES	YES	YES	YES
Ozimops ridei	Ride's Freetail Bat	NL	LC	YES	YES	YES	YES
&/or							
Setirostris eleryi	Bristle-faced Freetail Bat	NL	LC				

Species possibly present	Common name	Conservation Listing		Location			
		EPBC	NCA	AB01 24-27 March 2023	AB03 24-27 March 2023	AB07 24-27 March 2023	AB09 24-27 March 2023
Phoniscus papuensis	Golden-tipped Bat	NL	LC				
Rhinolophus megaphyllus	Eastern Horseshoe Bat	NL	LC				
Saccolaimus flaviventris	Yellow-bellied Sheathtal Bat	NL	LC	YES	YES	YES	YES
Saccolaimus saccolaimus	Bare-rumped Sheathtail Bat	V	E	YES	YES		YES
Scoteanax ruppellii	Greater Broad-nosed Bat	NL	LC	YES	YES	YES	YES
&/or							
Scotorepens balstoni	Inland Broad-nosed Bat	NL	LC				
&/or							
Scotorepens greyii	Little Broad-nosed Bat	NL	LC				
&/or							
Scotorepens sanborni	Northern Broad-nosed Bat	LC	LC				
Taphozous troughtoni	Troughton's Sheathtail Bat	NL	LC				
Vespadelus troughtoni	Eastern Cave Bat	NL	LC				
Total # bat call files				**711**	**933**	**313**	**374**
Total # sound files				**7,957**	**16,673**	**4,708**	**11,717**

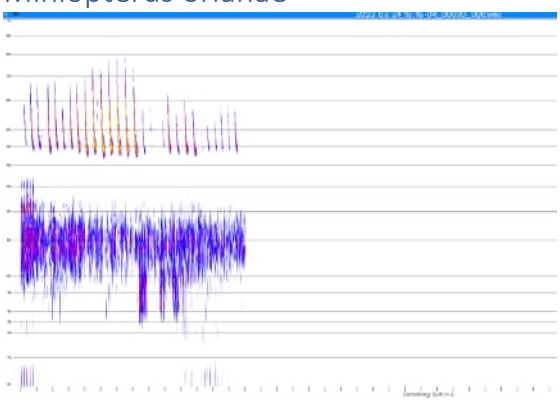
EPBC (NL = Not Listed, V=Vulnerable), NCA (LC = Least Concern, V = Vulnerable, E = Endangered)

Appendix 1. Representative Microbat Calls

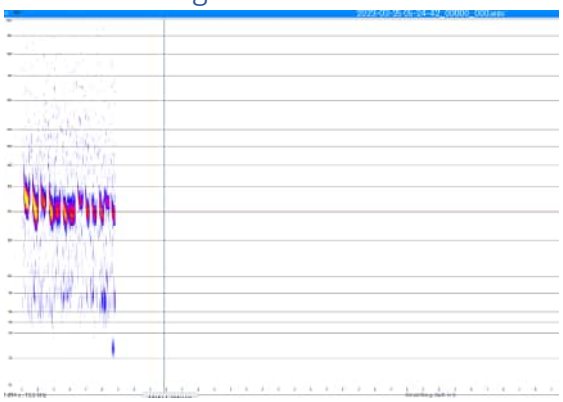
Chaerephon jobensis



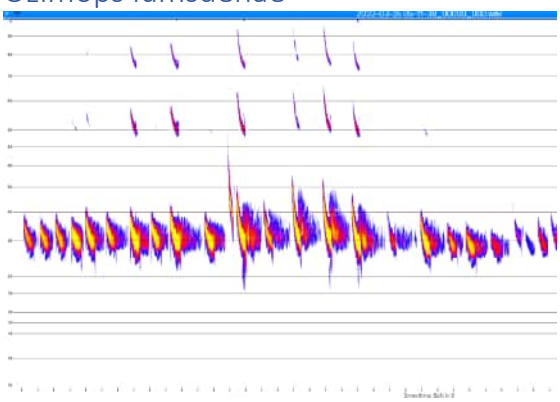
Miniopterus orianae



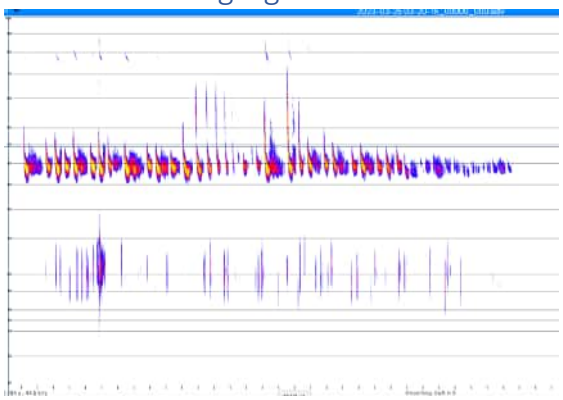
Chalinolobus gouldii



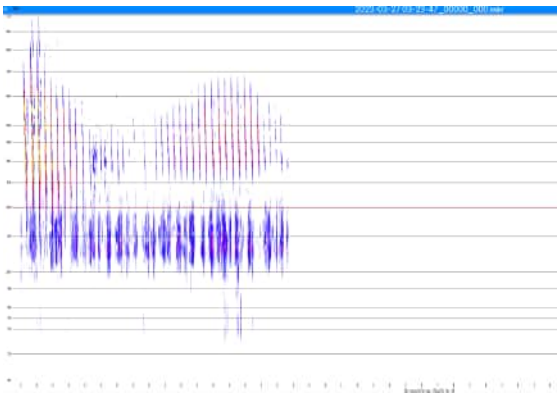
Ozimops lumsdenae



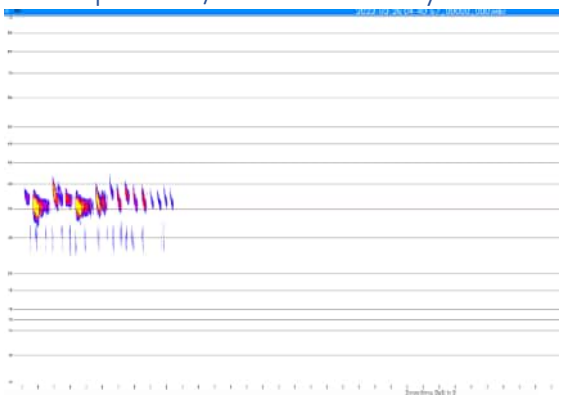
Chalinolobus nigrogriseus



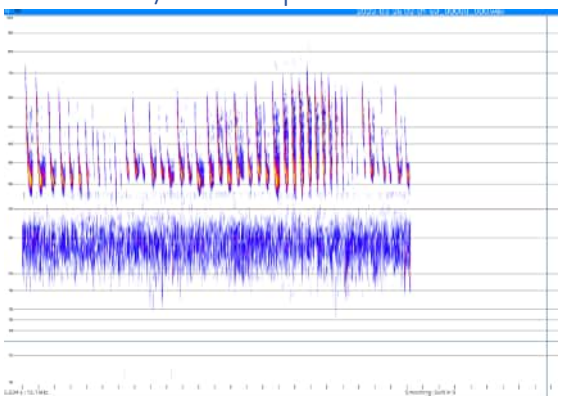
Nyctophilus spp.



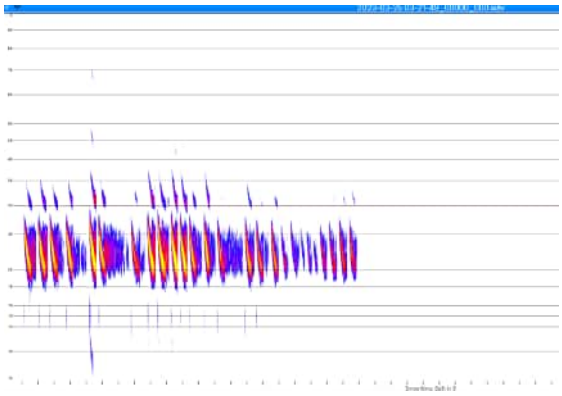
Ozimops ridei / Seterostris eleyri



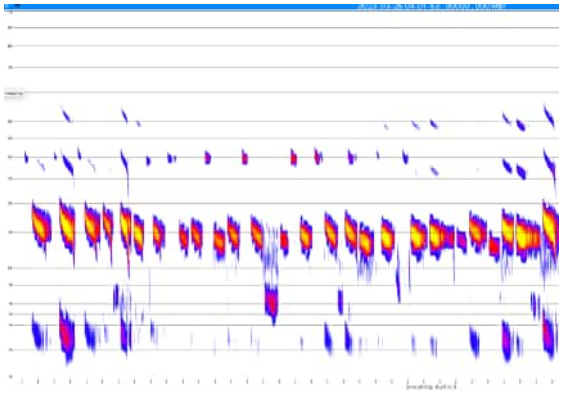
Scoteanax / Scotorepens



Saccolaimus flaviventris



Saccolaimus saccolaimus



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Appendix E Identified Fauna Species

Taxa	Common Name	Scientific Name	Wet Seasons (28 - 29 March 2023)	Dry Season (24 – 25 October 2023)
Amphibian	Cane toad	*Rhinella marina*	X	X
Bird	Brown goshawk	*Accipiter fasciatus*	X	
Bird	Grey teal	*Anas gracilis*		X
Bird	Pacific Black Duck	*Anas superciliosa*		X
Bird	Magpie goose	*Anseranas semipalmata*	X	
Bird	Australasian pipit	*Anthus novaeseelandiae*		X
Bird	Red-winged parrot	*Aprosmictus erythropterus*	X	
Bird	Wedge-tailed Eagle	*Aquila audax*		X
Bird	Australian Bustard	*Ardeotis australis*		X
Bird	Black-faced wood swallow	*Artamus cinereus*	X	
Bird	White-breasted woodswallow	*Artamus leucorynchus*	X	X
Bird	Bush stone-curlew	*Burhinus grallarius*	X	
Bird	Sulphur-crested cockatoo	*Cacatua galerita*	X	X
Bird	Pallid Cuckoo	*Cacomantis pallidus*		X
Bird	Brush Cuckoo	*Cacomantis variolosus*		X
Bird	Red-tailed black-cockatoo	*Calyptorhynchus banksia*	X	X
Bird	Pheasant coucal	*Centropus phasianinus*	X	
Bird	Great Bowerbird	*Chlamydera nuchalis*		X
Bird	Golden-headed cisticola	*Cisticola exilis*	X	X
Bird	Black-faced cuckoo-shrike	*Coracina novaehollandiae*	X	X
Bird	White-bellied cuckoo-shrike	*Coracina papuensis*	X	X
Bird	Australian raven	*Corvus coronoides*		X
Bird	Torresian crow	*Corvus orru*	X	
Bird	Brown quail	*Coturnix ypsilophora*	X	X
Bird	Pied butcherbird	*Cracticus nigrogularis*	X	X
Bird	Australian magpie	*Cracticus tibicen*	X	X
Bird	Blue-winged kookaburra	*Dacelo leachii*	X	X
Bird	Laughing kookaburra	*Dacelo novaeguineae*	X	
Bird	Plumed whistling duck	*Dendrocygna eytoni*	X	
Bird	Mistletoebird	*Dicaeum hirundinaceum*	X	
Bird	Spangled drongo	*Dicrurus bracteatus*	X	X

Taxa	Common Name	Scientific Name	Wet Seasons (28 - 29 March 2023)	Dry Season (24 – 25 October 2023)
Bird	White faced heron	*Egretta novaehollandiae*	X	X
Bird	Black-fronted dotterel	*Elseyornis melanops*		X
Bird	Blue-faced honeyeater	*Entomyzon cyanotis*	X	X
Bird	Galah	*Eolophus roseicapilla*	X	X
Bird	Dollarbird	*Eurystomus orientalis*	X	X
Bird	Peregrine falcon	*Falco peregrinus*		X
Bird	Peaceful dove	*Geopelia striata*	X	X
Bird	Squatter pigeon (southern subspecies)	*Geophaps scripta subsp. scripta*	X	X
Bird	Fairy gerygone	*Gerygone palpebrosa*	X	
Bird	Magpie-lark	*Grallina cyanoleuca*	X	X
Bird	Brolga	*Grus rubicunda*		X
Bird	Whistling kite	*Haliastur sphenurus*	X	X
Bird	White-winged triller	*Lalage tricolor*		X
Bird	Singing honeyeater	*Lichenostomus virescens*		X
Bird	Brown honeyeater	*Lichmera indistincta*	X	
Bird	Brown cuckoo-dove	*Macropygia phasianella*	X	
Bird	Red-backed fairy-wren	*Malurus melanocephalus*	X	X
Bird	Yellow-spotted honeyeater	*Meliphaga notata*		X
Bird	White-throated honeyeater	*Melithreptus albogularis*		X
Bird	Rainbow bee-eater	*Merops ornatus*	X	X
Bird	Black kite	*Milvus migrans*	X	X
Bird	Leaden flycatcher	*Myiagra rubecula*	X	X
Bird	Olive-backed sunbird	*Nectarinia jugularis*	X	X
Bird	Plum-headed finch	*Neochmia modesta*		X
Bird	Crested pigeon	*Ocyphaps lophotes*	X	X
Bird	Olive-backed oriole	*Oriolus sagittatus*		X
Bird	Rufous whistler	*Pachycephala rufiventris*	X	X
Bird	Striated pardalote	*Pardalotus striatus*	X	X
Bird	Tree martin	*Petrochelidon nigricans*	X	
Bird	Little friarbird	*Philemon citreogularis*	X	X
Bird	Noisy friarbird	*Philemon corniculatus*	X	X
Bird	Hornbill friarbird	*Philemon yorki*		X
Bird	Pale-headed rosella	*Platycercus adscitus*	X	X

Taxa	Common Name	Scientific Name	Wet Seasons (28 - 29 March 2023)	Dry Season (24 – 25 October 2023)
Bird	Brown-backed honeyeater	*Ramsayornis modestus*		X
Bird	Channel-billed cuckoo	*Scythrops novaehollandiae*		X
Bird	Australasian figbird	*Sphecotheres vieilloti*	X	
Bird	Yellow honeyeater	*Stomiopera flava*	X	X
Bird	Double-barred finch	*Taeniopygia bichenovii*	X	X
Bird	Australian white ibis	*Threskiornis molucca*	X	
Bird	Straw-necked ibis	*Threskiornis spinicollis*	X	X
Bird	Forest kingfisher	*Todiramphus macleayii*	X	X
Bird	Red-backed kingfisher	*Todiramphus pyrrhopygius*	X	
Bird	Sacred kingfisher	*Todiramphus sanctus*	X	
Bird	Rainbow lorikeet	*Trichoglossus moluccanus*	X	X
Bird	Masked lapwing	*Vanellus miles*	X	X
Mammal	Cattle	*Bos taurus*	X	X
Mammal	Dingo	*Canis familiaris*		
Mammal	Northern brown bandicoot	*Isoodon macrourus*		X
Mammal	Agile wallaby	*Macropus agilis*	X	X
Reptile	Elegant rainbow skink	*Carlia decora*		X
Reptile	Shaded-litter rainbow-skink	*Carlia munda*		X
Reptile	Metallic snake-eyed skink	*Cryptoblepharus metallicus*	X	X
Reptile	Lesser black whipsnake	*Demansia vestigiata*	X	

Appendix F Threatened Flora Likelihood of Occurrence

Table 15 Threatened flora likelihood of occurrence

Species	Common Name	NC Act Status	EPBC Act Status	Habitat	Species Records	Likelihood of occurrence
Bulbophyllum globuliforme	Miniature moss-orchid	NT	V	This orchid is endemic to eastern Australia, and is known from four locations, ranging from Paluma, north-east Queensland, south to the McPherson Range on the Queensland / New South Wales border (Weston and Hill, 1993; Queensland Herbarium, 2012). The species is host specific, only growing on the upper branches of mature hoop pine (Araucaria cunninghamii), usually from 100–900 m altitude (Jones 2006).	No	Unlikely: Hoop pine does not occur in project area.
Dichanthium queenslandicum	King Blue Grass	V	E	This species is restricted to natural bluegrass grasslands of central and southern Queensland, where it occurs on black cracking clay in tussock grasslands mainly in association with other species of blue grasses (*Dichanthium* spp. and *Bothriochloa* spp.) (SEWPaC 2013a). The species is known from three locations in central and southern Queensland, Hughenden district, Dalby district and the Nebo-Monto area west to the Clermont-Rolleston area and is mostly confined to natural bluegrass grasslands.	No	Unlikely: Suitable cracking clay soils are not present in the project area.
Eucalyptus paedoglauca	Mount Compass Swamp Gum / Mt Stuart Ironbark	V		This small eucalypt species is best known from Mt Stuart where it dominates woodland communities at the summit, however, it also occurs on other ranges further to the south where it is known to occupy lower slopes and flats (Calvert et al. 2005). Although previously regarded as being restricted entirely to Mt Stuart (Brooker & Kleinig 1994), it is also known to occur on the alluvial flats on the south-east side of Pepper Pot Mountain south-west of Townsville, and on a hill in the Reid River - Fanning River watershed (Qld Herbarium Herbrecs).	No	Unlikely: The preferred elevated range habitats are not present in the project area or nearby and there are no records in the search area.
Eucalyptus raveretiana	Black Ironbox		V	A medium sized tree to 25m high with rough, furrowed bark on the trunk and lower branches. Widely distributed in coastal and sub-coastal Queensland from Townsville to Nebo, especially from Nebo to Ayr and near Rockhampton. The species usually occurs along watercourses and sometimes on river flats and in open woodland. The species is most observed on Land Zone 3 (DotE, 2016).	No	Unlikely: Typically, the species inhabits the riparian area of large rivers. There a no records within the search area.
Graptophyllum excelsum	Scarlet fuchsia, prickly fuchsia	NT		Occurs in vine thickets on hillsides, generally in pockets of well-drained soil amongst limestone, sandstone or granite boulders. Grows in association with numerous dry rainforest plant species. Patchy distribution on mainland ranges from Jimna near Brisbane in the south to chillagoe in the north (Calvert et al. 2005).	Yes (1)	Unlikely: The preferred vine thicket habitat on hillsides does not occur in the Project Area.
Leichhardtia brevifolia		V	V	*Leichhardtia brevifolia* has an apparent disjunct distribution in northern and central Queensland with collections made near Townsville, Springsure and north of Rockhampton. North of Rockhampton, *M. brevifolia* grows on serpentine rock outcrops or crumbly black soils derived from serpentine in eucalypt woodland, often with Broad-leaved Ironbark (*Eucalyptus fibrosa*) and *Corymbia xanthope*. At Hidden Valley near Paluma, plants grow in woodland on granite soils dominated by Granite Ironbark (*E. granitica*), Rustyjacket (*C. leichhardtii*) and White Mahogany (*E. acmenoides*). On Magnetic Island the species occurs in open forest on dark acid agglomerate soils dominated by Narrow-leafed Ironbark (*E. drepanophylla*) (Forster 1995a).	No	Unlikely: The known species and soil associations of the species are not relevant to the project area and there are no records from the search area.
Omphalea celata			V	This small tree to 12m is known from three sites in central east Queensland: including rainforest and vine thickets on Gloucester Island near Bowen, semi-evergreen vine thicket at Hazelwood Gorge and a	No	Unlikely: There are no previous records from the search area and the preferred rainforest and vine

Species	Common Name	NC Act Status	EPBC Act Status	Habitat	Species Records	Likelihood of occurrence
				creek bed and adjacent bank at Homevale Station north-west of Nebo. The species has been recorded at altitudes up to 560 metres (TSSC 2008).		thicket habitats are not present in the project area.
Phlegmariurus tetrastichoides	Square tassel fern	V	V	"The Square Tassel-fern is endemic to north-east Queensland and occurs from Mount Finnigan south to the Clarke Range, west of Mackay. It is most prevalent on the Evelyn, Atherton and Mount Carbine Tablelands but extends to lower altitudes along the North Johnstone River and Mossman Gorge. The Square Tassel-fern occurs in upland notophyll vineforest (Field & Bostock 2008; Queensland Herbarium 2009d). It is an epiphyte on rainforest trees, occurring in north-eastern Queensland, from the Daintree, south to Hinchinbrook Island, and west of Mackay, from sea level to 1100 m altitude (Queensland Herbarium 2009d)."		Unlikely: The project area does not contain the upland notophyll vineforest habitat.
Scleromitrion polycladum		NT		Occurs in NEQ and in the northern part of CEQ. Altitudinal range from 160-300 m. Grows along drainage lines in forest and vine thicket, occasionally in woodland. (CSIRO, 2020)	Yes (4)	Unlikely: The project area is outside the known elevational range of the species and the preferred forest and vine thicket habitat is not present in the project area. All local records are from the upper parts of the local catchment.
Tephrosia leveillei			V	Cullen's Ironbark (*Eucalyptus cullenii*) woodland on alluvial plains, Gum-topped Bloodwood (*Corymbia erythrophloia*) and Cooktown Ironwood (*Erythrophleum chlorostachys*) woodland with Bushman's Clothes-peg (*Grevillea glauca*), *Eucalyptus* spp. and *Corymbia* spp. tall open forest over dense spear-grass (*Heteropogon contortus*) on red sand, along the railway track in Ravenswood.	No	Unlikely: There are no previous records from the search area and the known species associations are not present on in the project area.

1 Conservation status as listed under the Queensland Nature Conservation Act 1992. E: Endangered; V: Vulnerable; NT: Near Threatened
2 Conservation status as listed under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999. CE: Critically Endangered; E: Endangered; V: Vulnerable; M: Migratory
3 Previous records exist within 10 km of the project area (Wildlife Online 2012)
4 Likelihood of occurrence is based on the known distribution and ecological requirements of the species in the context of the project area, where Unlikely: No records of the species occurring regionally or suitable habitat does not occur onsite; Possibly: Species previously recorded in the vicinity of the project area and marginal habitat is present on the project area; or species occurs regionally and preferred habitat is present on the project area; Likely: Species previously recorded in the vicinity of the project area and suitable habitat present on the project area; Confirmed: Species observed through direct observation within or immediately adjacent to the project area.

Appendix G **Threatened Fauna Likelihood of Occurrence**

Table 16 Threatened fauna likelihood of occurrence

Class	Species Name	Common Name	NC Act Status	EPBC Act Status	Migratory	Habitat	Species Records	Likelihood of occurrence
Reptiles	*Egernia rugosa*	Yakka Skink	V	V		The known distribution of the Yakka skink extends from the coast to the hinterland of sub-humid to semi-arid eastern Queensland. Locations range from the Queensland/New South Wales border to Cape York Peninsula. It is known to occur in open dry sclerophyll forest, woodland, and scrub and within these habitats is commonly found in cavities under and between partly buried rocks, logs or tree stumps, root cavities and abandoned animal burrows. In cleared habitat, this species can persist where there are shelter sites such as raked log piles, deep gullies, tunnel erosion/sinkholes and rabbit warrens (DAWE 2020d).	No	Unlikely: There are no previous records from the search area and the project area lacks suitable habitat for denning.
Reptiles	*Lerista vittata*	Mount Cooper striped lerista	V	E		This species is known from vine thickets on sandy soil from Mt Cooper Station near Charters Towers, west to Kidston and Blackbraes National Park (Wilson & Swan 2010).	No	Unlikely: There are no previous records from the search area and suitable vine thicket habitat is not present in the project area.
Reptiles	*Crocodylus porosus*	Estuarine crocodile	V		Migratory (Bonn)	Coastal rivers and swamps though often seen in open sea. Also extends well inland via major drainage systems and the billabongs in the river floodplains (Cogger, 2000) that are deep enough to submerge and that have open sand or mud banks for thermoregulation (Cogger, 2000).	No	Unlikely: There are no previous records from the search area and there is no suitable habitat present.
Aves	*Calidris ferruginea*	Curlew sandpiper	CE	CE	Migratory (Bonn, CAMBA, JAMBA, ROKAMBA)	In Australia, Curlew Sandpipers occur around the coasts and are also quite widespread inland, though in smaller numbers. In Queensland, there are scattered records from the Gulf of Carpentaria and numerous records on the coast south of Cairns. The species prefers intertidal mudflats at sheltered sites and non-tidal swamps and other wetlands. Inland the species utilises ephemeral and permanent lakes, dams, waterholes and bore drains with bare edges of mud and sand (DAWE 2020g).	No	Unlikely: There are no previous records from the search area and there is no suitable habitat present.
Aves	*Erythrotriorchis radiatus*	Red goshawk	E	V		The Red goshawk occurs in coastal and sub-coastal areas of tropical and warm temperate Australia (Marchant & Higgins 1993). The species prefers wooded and forested lands with a mosaic of vegetation types and densities e.g. ecotones between rainforest and eucalypt forest, gallery forest and woodland, woodland and grassland, cleared land, roads or watercourses (DoE 2023). The red goshawk nests in large, often emergent trees. Recent research by Garnett and Baker 2020 has determined the red goshawk has experienced a recent, rapid northward contraction, and is now rarely encountered south of southern Cape York in Queensland. Recent assessment of the population status and trends indicates the species likely extirpation from the Brigalow Tropical Savanna (Brigalow Belt bioregion) and Queensland Tropical Rainforests (Wet Tropics bioregion) (MacColl et al 2023).	No	Unlikely: Red goshawk is not believed to still occur within the Brigalow Belt and there are no records within the search area. No suitable nesting habitat occurs in the project area.

Class	Species Name	Common Name	NC Act Status	EPBC Act Status	Migratory	Habitat	Species Records	Likelihood of occurrence
Aves	*Falco hypoleucos*	Grey Falcon	V	V		Lightly treed inland plains; gibber deserts, sand ridges, pastoral lands, timbered water courses; seldom in driest deserts. Resident or nomadic visitor to inland parts of all mainland states (Pizzey and Knight 2012).	No	Unlikely: There are no previous records from the search area and the species prefers dry inland parts of Australia.
Aves	*Hirundapus caudacutus*	White-throated needletail	V	V	Migratory (CAMBA, JAMBA, ROKAMBA)	A non-breeding migrant to Australia, the White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground. They utilise the airspace over most vegetation types including open forest and rainforest, heathland, grassland, swamps, and coastal landforms including islands (DAWE 2020j).	No	Possibly: There are no previous records from the search area, however the species may occur as a flyover. Unlikely to be impacted.
Aves	*Numenius madagascariensis*	Eastern curlew	E	CE	Migratory (Bonn, CAMBA, JAMBA, ROKAMBA)	Occurs in estuaries, tidal mudflats saltmarshes, mangroves, occasionally fresh or brackish lakes, bare grasslands near water. Estuaries, tidal mudflats saltmarshes, mangroves, occasionally fresh or brackish lakes, bare grasslands near water (Pizzey and Knight 2012).	No	Unlikely: There are no previous records from the search area and there is no suitable habitat present.
Aves	*Rostratula australis* syn *Rostratula benghalensis* (sensu lato)	Australian painted snipe	E	E		The Australian painted snipe generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains (DAWE 2020k). Typical sites include those with rank emergent tussocks of grass, sedges, rushes or reeds, or samphire.	No	Unlikely: There are no previous records from the search area and there is no suitable habitat present.
Aves	*Tyto novaehollandiae kimberli*	Masked owl (northern subspecies)	V	V		In Queensland the species is known to occur along the southern rim of the Gulf of Carpentaria, Cape York Peninsula and south to Atherton Tablelands and the Einasleigh-Burdekin divide. In northern Australia, the Masked Owl has been recorded from riparian forest, rainforest, open forest, Melaleuca swamps and the edges of mangroves, as well as along the margins of sugar cane fields. The Masked Owl (northern) usually nests in tree hollows, within patches of closed forest. The Masked Owl (northern) is sedentary, territorial, and usually seen singly but occasionally in pairs or family groups (DAWE 2020l).	No	Unlikely: There are no previous records from the search area and the species displays a preference for forest and tall forest communities.
Aves	*Actitis hypoleucos*	Common sandpiper	SL		Migratory (Bonn, CAMBA, JAMBA, ROKAMBA)	Occurs along shallow pebbly, muddy, or sandy edges of rivers or streams along the coast to far inland. It is also found on dams, lakes, sewage ponds, margins of tidal rivers, mangroves or saltmarshes, mudflats, rocky or sandy beaches and causeways and drains (Pizzey and Knight 2010).	No	Unlikely: There are no previous records from the search area and there is no suitable habitat present.
Aves	*Apus pacificus*	Fork-tailed swift	SL		Migratory (CAMBA,	The Fork-tailed swift is a non-breeding visitor to all states and territories of Australia (Higgins 1999). In north-east Queensland there are many records east of the Great Divide from near Cooktown and south to Townsville. The species is	No	Possibly: There are no previous records from the search area, however the

Class	Species Name	Common Name	NC Act Status	EPBC Act Status	Migratory	Habitat	Species Records	Likelihood of occurrence
					JAMBA, ROKAMBA)	almost exclusively aerial, and mostly occur over inland plains, over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland, or saltmarsh. They also occur over settled areas, including towns, urban areas, and cities (DEE 2019).		species may occur as a flyover. Unlikely to be impacted.
Aves	*Calidris acuminata*	Sharp-tailed sandpiper	SL		Migratory (Bonn, CAMBA, JAMBA, ROKAMBA)	The Sharp-tailed Sandpiper occurs in tidal mudflats, saltmarshes, mangroves, shallow fresh, brackish, or saline inland wetlands, irrigated pastures, and crops (Pizzey and Knight 2010).	No	Unlikely: There are no previous records from the search area and there is no suitable habitat present.
Aves	*Calidris melanotos*	Pectoral sandpiper	SL		Migratory (Bonn, JAMBA, ROKAMBA)	The species is a regular, but uncommon migrant to eastern Australia. In Queensland most records occur around Cairns with scattered records between Townsville and Yeppoon as well as inland sites including Mt Isa, Longreach, and Oakley. The species breeds in north-east Siberia and the American Arctic and occurs in Australia from September - June. The species is usually found in coastal or near coastal habitat and occasionally further inland. It prefers wetlands with open fringing mudflats and low, emergent, or fringing vegetation, such as grass or samphire (Higgins & Davies 1996).	No	Unlikely: There are no previous records from the search area and there is no suitable habitat present.
Aves	*Cuculus optatus syn. Cuculus saturatus*	Oriental cuckoo	SL		Migratory (CAMBA, JAMBA, ROKAMBA)	The oriental cuckoo is found throughout coastal and sub-coastal regions of northern and eastern Australia. The species prefers dense vegetation including monsoon forest, rainforest edges, dense tree canopies within paddocks, mangroves, and islands (Pizzey and Knight 2010). This species is a non-breeding migrant to Australia from September-May (Pizzey and Knight 2010).	No	Unlikely: There are no previous records from the search area and there are no dense tree canopies present in the project area.
Aves	*Gallinago hardwickii*	Latham's snipe	SL		Migratory - (Bonn, JAMBA, ROKAMBA)	Latham's snipe is a non-breeding visitor to Australia between October and February. The species is a passage migrant through northern Australia, en-route to overwintering habitat in south-eastern Australia (Higgins & Davies 1996). It occurs in permanent and ephemeral wetlands up to 2,000 m above sea-level and usually inhabit open, freshwater wetlands with low, dense vegetation (e.g., swamps, flooded grasslands, or heathlands, around bogs and other water bodies) (DEE 2019).	No	Unlikely: There are no previous records from the search area and there is no suitable habitat present.
Aves	*Monarcha melanopsis*	Black-faced monarch	SL		Migratory - (Bonn)	The black-faced monarch spends spring, summer and autumn in eastern Australia and winters in southern and eastern Papua New Guinea from March to August (DEE 2019). The species is found along the coast of eastern Australia, where it is common in the north, becoming less common further south. The species inhabits rainforests, eucalypt woodlands, coastal scrub, and damp gullies. It may be found in more open woodland when migrating. It forages for insects among foliage or catches flying insects on the wing (Marchant & Higgins 1993).	No	Unlikely: There are no previous records from the search area and habitat in the project area is marginal and only likely to be used during migration.
Aves	*Monarcha trivirgatus*	Spectacled monarch	SL			The spectacled monarch is found throughout coastal north-eastern and eastern Australia and coastal islands, from Cape York (Qld) to the Watson River on the	No	Unlikely: There are no previous records from the

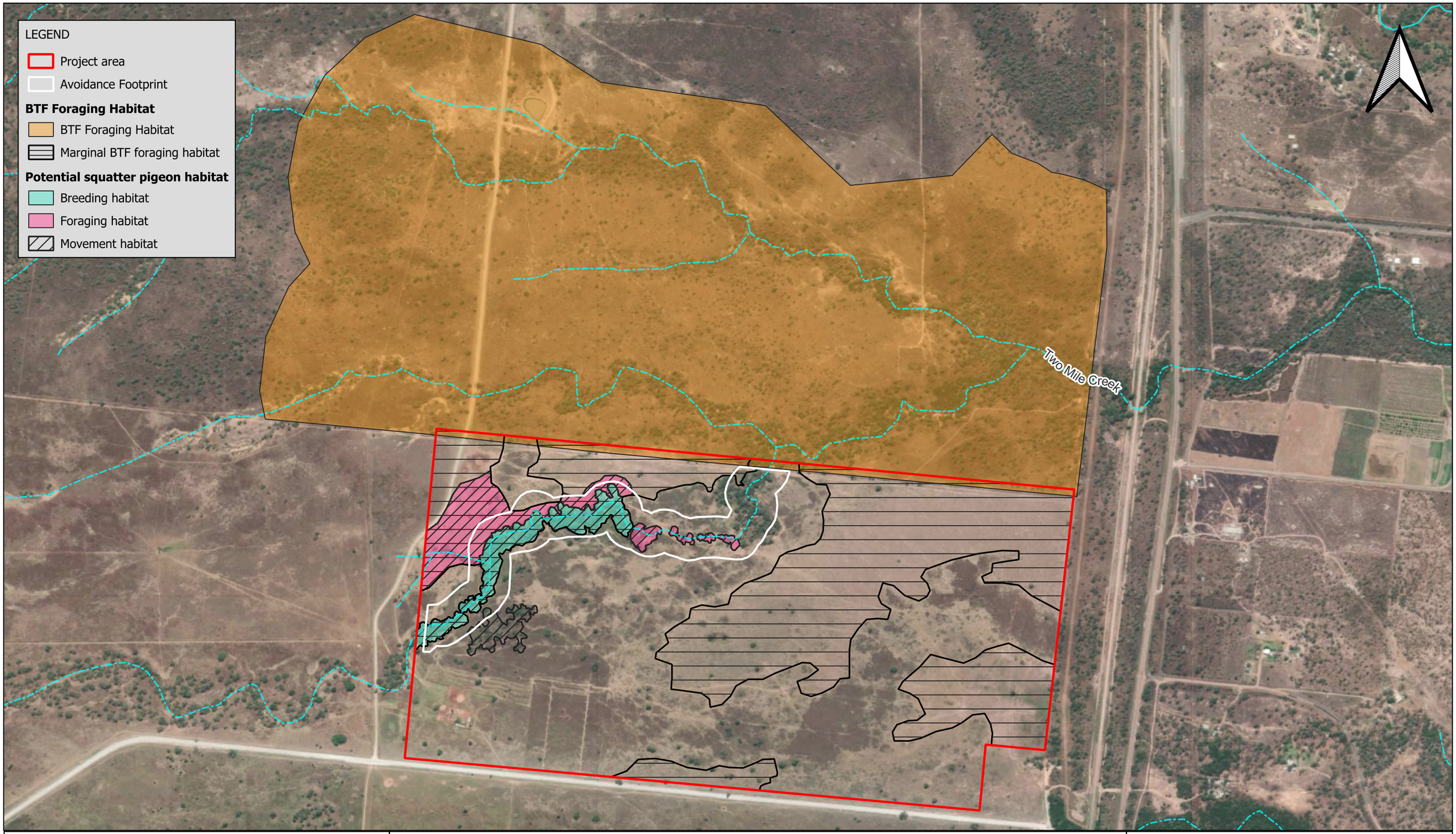
Class	Species Name	Common Name	NC Act Status	EPBC Act Status	Migratory	Habitat	Species Records	Likelihood of occurrence
						west coast and to Port Stephens (NSW) on the east coast. It inhabits the understorey of mountain and lowland rainforests, thickly wooded gullies, waterside vegetation including mangroves, mostly well below the canopy (Pizzey and Knight 2010).		search area and there is no preferred habitat in the project area.
Aves	*Motacilla flava*	Yellow wagtail	SL		Migratory (CAMBA, JAMBA, ROKAMBA)	The yellow wagtail is an extremely uncommon summer migrant to mostly coastal areas of Australia, especially in the area of Darwin to Broome (Pizzey and Knight, 2010). In Queensland, records are most common in coastal habitats between Cairns and Townsville. Important habitat for the species includes well-watered open grasslands and the fringes of wetlands. Roosting habitat includes mangroves and other dense vegetation (DEE 2019).	No	Unlikely: There are no previous records from the search area and there is no preferred habitat in the project area.
Aves	*Myiagra cyanoleuca*	Satin flycatcher	SL		Migratory (Bonn)	The satin flycatcher is widespread in eastern Australia. In Queensland, it is widespread but scattered in the east (DEE 2019). Satin flycatchers inhabit heavily vegetated gullies in eucalypt-dominated forests and taller woodlands. They especially prefer wet sclerophyll forest with a tall shrubby understorey of tall acacias (Blakers et al. 1984) but are sometimes seen in littoral forest (Unpublished data).	No	Unlikely: There are no previous records from the search area and there is no preferred habitat in the project area.
Aves	*Pandion haliaetus*	Osprey	SL		Migratory (Bonn)	Osprey is a cosmopolitan species occupying all coastal habitats and surrounding waters throughout the world, including the Queensland coast. Nest sites are generally located on tall structures, often the highest in the nearby landscape, including trees; alive and dead, rock pylons and transmission towers. The species may be sedentary or dispersive but tends to maintain a regular breeding site which they develop over many seasons (DEE 2019).	No	Unlikely: There are no previous records from the search area and there is no preferred habitat in the project area.
Aves	*Poephila cincta cincta*	Black-throated finch – southern subspecies	E	E		The Black-throated finch (southern subspecies) occurs mainly in grassy, open woodlands and forests, typically dominated by Eucalyptus (especially *E. platyphylla*), Corymbia and Melaleuca, and occasionally in tussock grasslands or other habitats (for example freshwater wetlands), often along or near watercourses, or in the vicinity of water. It is likely that permanent sources of water provide refuge for this species during the dry season, especially during drought years (DEWHA 2009).	Yes (14)	Possible: There are numerous records in the surrounding area and suitable woodland and grassland habitats occur in the project area.
Aves	*Rhipidura rufifrons*	Rufous fantail	SL		Migratory (Bonn)	The rufous fantail occupies a range of coastal and near coastal habitats of northern and eastern Australia. Occurs in understorey of rainforest, wetter eucalypt forest, gullies, monsoon forest, paperbarks, sub inland and coastal scrubs, watercourses, parks, and gardens (Pizzey and Knight 2010).	Yes (1)	Possible: There are previous records from within the search area and marginal habitat occur in the project area.
Aves	*Tringa nebularia*	Common greenshank	SL		Migratory (Bonn, CAMBA,	The species inhabits sheltered coastal habitat with large mudflats, saltmarsh, mangroves or seagrass in bays, harbours, estuaries, deltas, and lagoons. Inland freshwater habitats are also used including swamps, lakes, dams, rivers, creeks,	No	Unlikely: There are no previous records from the search area and there is no

Class	Species Name	Common Name	NC Act Status	EPBC Act Status	Migratory	Habitat	Species Records	Likelihood of occurrence
					JAMBA, ROKAMBA)	waterholes, floodplains, claypans and saltflats. The species is the most widespread wader in Australia (DEE 2019).		preferred habitat in the project area.
Aves	*Neochmia ruficauda ruficauda*	Star finch - eastern subspecies	E	E		The distribution of the Star finch (eastern subspecies) is very poorly known. It was last seen in the Townsville region in 1978 (Wieneke 1989). The subspecies now occurs only in central Queensland. Based on the small number of accepted records, the distribution of the subspecies is believed to extend north to Bowen, west to beyond Winton and, based on recent records, south to near Wowan. Within this range it occurs mainly in grasslands and grassy woodlands that are located close to bodies of fresh water (DEE 2019).	No	Unlikely: There are no previous records from the search area and the species range has contracted to central Queensland areas.
Aves	*Charadrius leschenaultia*	Greater sand plover	V	V	Migratory (Bonn, CAMBA, JAMBA, ROKAMBA)	In the non-breeding grounds in Australasia, the species is almost entirely coastal, inhabiting littoral and estuarine habitats. They mainly occur on sheltered sandy, shelly, or muddy beaches with large intertidal mudflats or sandbanks, as well as sandy estuarine lagoons (Bamford 1988; Blakers et al. 1984; Lane 1987; Sibson 1948; Stewart et al. 2007), and inshore reefs, rock platforms, small rocky islands, or sand cays on coral reefs (Abbott 1982; Morris 1989; Sedgwick 1978). They are occasionally recorded on near-coastal saltworks and saltlakes, including marginal saltmarsh, and on brackish swamps (Sibson 1953; Storr 1964b, 1977; Storr et al. 1986). They seldom occur at shallow freshwater wetlands (Storr 1977). Once, during a severe drought, the species was recorded in a poorly grassed paddock with large bare areas, more than 1 km from the nearest water (Eckert 1968).	No	Unlikely: There are no previous records from the search area and there is no preferred habitat in the project area.
Aves	*Geophaps scripta scripta*	Squatter pigeon	V	V		Squatter pigeons (southern subspecies) predominantly inhabit grassy woodlands and open forests that are dominated by eucalypts but is also recorded in sown grasslands with scattered remnant trees, disturbed habitats and scrub and acacia growth. The species remains common in heavily grazed country north of the Carnarvon Ranges. It is almost always found close to bodies of water (DoEE 2018).	Yes (3)	Confirmed: There are previous records from the search area and suitable habitat is present on the project area depending on the condition and suitability of foraging grasses.
Mammals	*Hipposideros semoni*	Semon's Leaf-nosed Bat	E	V		The known distribution for Semon's Leaf-nosed Bat includes coastal Queensland from Cape York to just south of Cooktown. There is an outlier population at Kroombit Tops, near Gladstone. Semon's Leaf-nosed Bat is found in tropical rainforest, monsoon forest, wet sclerophyll forest and open savannah woodland. This species does not have an obligatory requirement for cave roosts. Daytime roost sites include tree hollows, deserted buildings in rainforest, road culverts and shallow caves amongst granite boulders or in fissures (DAWE 2020p).	No	Unlikely: There are no previous records from the search area and the preferred habitat is not present in the project area.
Mammals	*Macroderma gigas*	Ghost bat	E	V		The Ghost bat occurs from coastal areas up to 400km inland, throughout northern Australia, generally north of the Tropic of Capricorn. It has been recorded from a wide range of habitats from rainforest, monsoon, and vine scrub in the tropics to open woodlands and arid areas. It is an obligate troglodyte, and survival is	No	Unlikely: There are no previous records from the search area and no suitable roost sites are present on the site.

Class	Species Name	Common Name	NC Act Status	EPBC Act Status	Migratory	Habitat	Species Records	Likelihood of occurrence
						critically dependent on finding natural roosts in caves, crevices, deep overhangs, and artificial roosts such as abandoned mines (TSSC 2016c).		
Mammals	*Saccolaimus saccolaimus nudicluniatus*	Bare-rumped sheathtail bat	E	V		Two distinct populations of the species are known, one in the Top End of the Northern Territory and the other in coastal areas of north-eastern Queensland, from Bowen to Cape York Peninsula. They occur in tropical woodland and tall open forests. Most commonly found in poplar gum woodland (Churchill 2008).	No	Possibly: There are no previous records from the search area and preferred habitat is present in the project area.
Mammals	*Petauroides minor*	Greater glider (northern)	V	V		This species occurs only in eastern Australia from the Windsor Tablelands in north Queensland to central Victoria. Greater glider is mostly restricted to Eucalypt Forest and woodlands due to a diet consisting of eucalypt leaves and flowers. The species is most abundant in tall, moist eucalypt forest with abundant hollows, but prefers habitats with a diversity of Eucalypt species (DCCEEW 2022).	No	Unlikely: There are no previous records from the search area and the preferred tall, moist eucalypt forest is not present in the project area.
Mammals	*Phascolarctos cinereus*	Koala (combined populations of Qld, NSW, and the ACT)		E		The threatened populations of the species occur from northern Queensland to the NSW-Victoria border in a range of temperate, sub-tropical and tropical forest, woodland and semi-arid veg dominated by Eucalyptus (DAWE 2020q). The diet is restricted mainly to foliage of Eucalyptus spp. also eat foliage of related genera, incl. Corymbia and Lophostemon may supplement diet with other spp, incl. spp from the genera Leptospermum and Melaleuca (Moore & Foley 2000).	No	Unlikely: There are no previous records from the search area and the project area does not contain the preferred densely vegetated habitats.
Mammals	*Dasyurus hallucatus*	Northern quoll		E		The Northern quoll is known to occur as far south as Gracemere and Mt Morgan, south of Rockhampton, and as far north as Cooktown. It occupies a diversity of habitats including rocky areas, eucalypt forest and woodlands, rainforests, sandy lowlands, and beaches, shrubland, grasslands and desert. However, habitat generally encompasses some form of rocky area or hollow logs for denning purposes with surrounding vegetated habitats used for foraging and dispersal (DEE 2019).	No	Unlikely: There are no previous records from the search area and there is no suitable denning habitat present in the project area.
Mammals	*Rhinolophus philippinensis*	Large-eared Horseshoe Bat	R	E		Open forest, woodland, vine thickets, gallery forest, rainforest. Flies 2-3m above ground along tracks and edges of thick vegetation. Occupies a variety of habitats including rainforest, gallery forest, tropical eucalypt woodland, Melaleuca Forest with rainforest understorey and open woodland. Most observations within or near rainforest. The species is most commonly found roosting in caves and disused mines but also evidence to suggest it roosts in dense vegetation and tree hollows in humid localities. Sensitive to disturbance of roost.	No	Unlikely: There are no previous records from the search area and the project area does not contain the preferred densely vegetated habitats.

1 Conservation status as listed under the Queensland Nature Conservation Act 1992. E: Endangered; V: Vulnerable; NT: Near Threatened
2 Conservation status as listed under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999. CE: Critically Endangered; E: Endangered; V: Vulnerable; M: Migratory
3 Previous records exist within 25 km of the project area (Wildlife Online 2012)
4 Likelihood of occurrence is based on the known distribution and ecological requirements of the species in the context of the project area, where Unlikely: No records of the species occurring regionally or suitable habitat does not occur onproject area; Possibly: Species previously recorded in the vicinity of the project area and marginal habitat is present on the project area; or species known to occur regionally and preferred habitat is present on the project area; Likely: Species previously recorded in the vicinity of the project area and suitable habitat present on the project area; Confirmed: Species observed through direct observation within or immediately adjacent to the project area.

Appendix H **Habitat Mapping**



Terra SOLUTIONS

CLIENT: EDIFY ENERGY

BLACK-THROATED FINCH AND SQUATTER PIGEON HABITAT MAPPING

PROJECT: EDIFY GREEN HYDROGEN

DATE: 09/11/2023

AUTHOR: A FITZGERALD

0 250 500 750 1,000 m

1:8,000

Credits:

Cadastral Parcels - All © State of Queensland (Department of Natural Resources and Mines), 2016,Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Coordinate system: GDA2020 / MGA zone 55 EPSG:7855