



Terrestrial Ecology Report – Tiwi Islands H2 Project

PROVARIS ENERGY



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EXECUTIVE SUMMARY

Provaris Energy is proposing to develop the Tiwi H2 Project – a hydrogen export project on Melville Island in the Northern Territory. The project area comprises the following terrestrial components:

- Solar Precinct – 2,630 ha of plantations and clearing 12 ha of native vegetation
- Transmission Line Corridor – discrete areas of native vegetation within a 30 km by 50 m corridor
- Hydrogen Production Precinct – 40 ha of native vegetation
- Hydrogen Export Precinct – within 32 ha of the Port Melville lease and 0.9 ha of native vegetation.

The project is being referred to the NT Environmental Protection Authority for consideration under the *Environmental Protection Act*. This document provides supplementary information to the Referral Form. The information for this report came from desktop studies, recent field surveys for other projects in the region, and site visit that was undertaken specifically for this project to verify the habitats present and complete targeted threatened species surveys.

The project area occurs on lateritic and sandstone plains that are dominated by open Eucalypt forest. There are seven watercourses within the Transmission Line corridor, but no drainage lines of note in any of the other project components.

Significant vegetation was found in, or adjacent to, all project areas – constituting large old growth trees, hollow-bearing trees, riparian vegetation, wetlands and watercourses. Rainforest communities and GDE's are present in close proximity to project components. Thirteen threatened flora and fauna species are known to occur, or have a reasonable likelihood of occurring, within the project area – see table below. From the field surveys, a significant finding was a new sub-population of *Typhonium* plants within the Port Melville lease area.

While most of the environmental values found are associated with remnant native vegetation, the Solar Precinct under plantation also holds habitat value for threatened fauna species due to its size (>2,600 ha) and by providing foraging and roosting habitat for important populations of threatened species.

Table of threatened species likelihood of occurrence in the project area

Species	Likelihood			
	Solar Precinct	Transmission Line Corridor	Hydrogen Production Precinct	Hydrogen Export Precinct
Red Goshawk (<i>Erythrotriorchis radiatus</i>)	High	High	High	Medium
Partridge Pigeon (<i>Geophaps smithii smithii</i>)	Known	Known	Known	Known
Masked Owl (Tiwi Islands' subspecies) (<i>Tyto novaehollandiae melvillensis</i>)	High	Known	High	Medium
Brush-tailed Rabbit-rat (<i>Conilurus penicillatus</i>)	Medium	Known	Known	Medium
Black-footed Tree-rat (<i>Mesembriomys gouldii melvillensis</i>)	High	Known	Known	Medium
Northern Brush-tailed Phascogale (<i>Phascogale pirata</i>)	High	High	High	Medium
Pale Field-rat (<i>Rattus tunneyi</i>)	Low	Known	Known	Medium
Butler's Dunnart (<i>Sminthopsis butleri</i>)	Medium	High	High	Medium
Northern Brushtail Possum (<i>Trichosurus vulpecula arnhemensis</i>)	High	Known	Known	High
Mertens' Water Monitor (<i>Varanus mertensi</i>)	Low	High	High	High
Floodplain / Yellow Spotted Monitor (<i>Varanus panoptes</i>)	Low	High	High	High
Darwin Cycad (<i>Cycas armstrongii</i>)	Known	Known	Known	Known
<i>Typhonium jonesii</i> or <i>Typhonium mirabile</i>	Low	Low	Low	Known



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1 INTRODUCTION

Provaris Energy is proposing to develop the Tiwi H2 Project (the 'project') – a hydrogen export project on Melville Island, the largest of the Tiwi Islands in the Northern Territory (NT). The project area comprises the following terrestrial components:

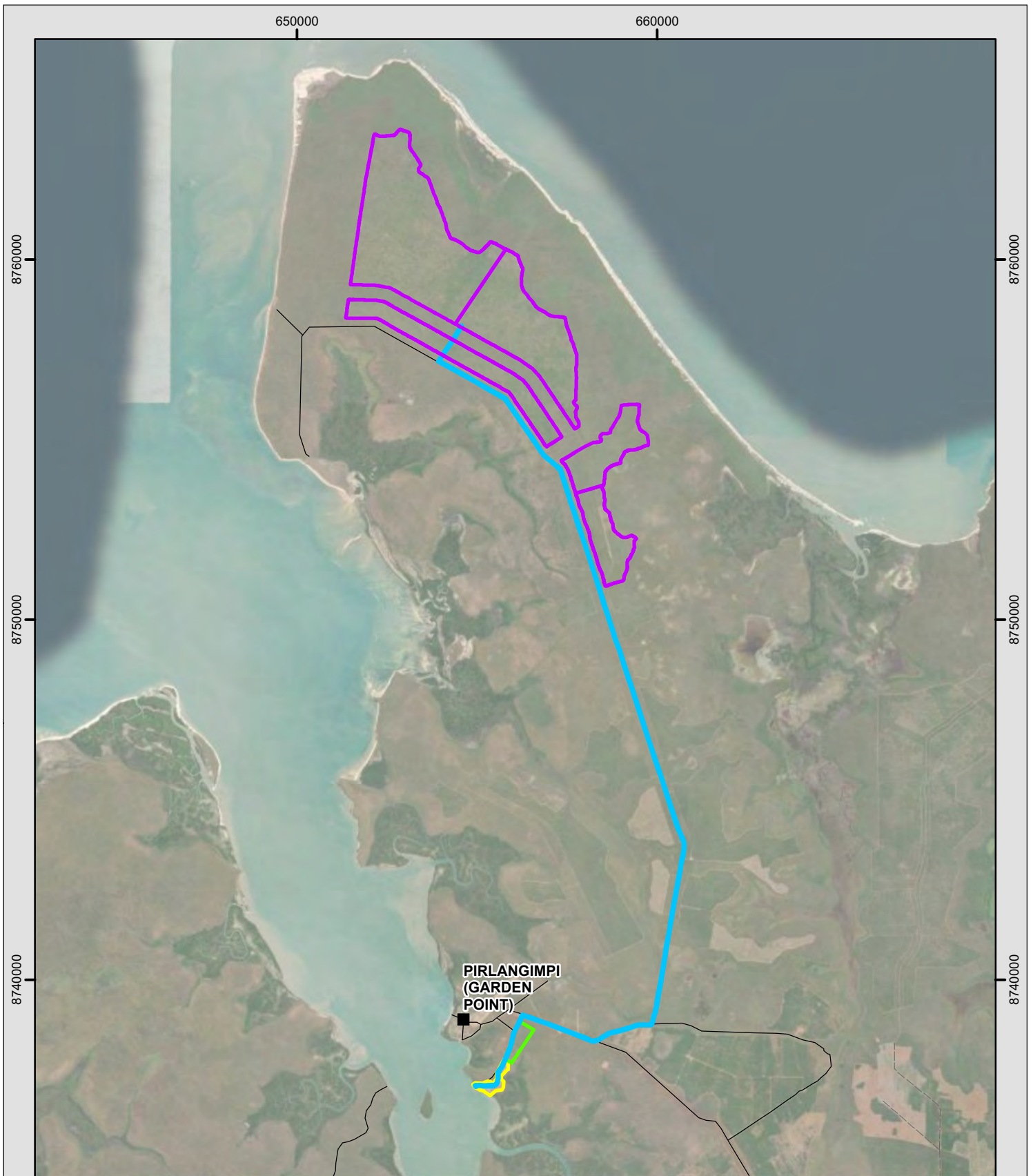
- Solar Precinct – Renewable power generation from an onshore solar farm using 2,630 ha of plantations and clearing 12 ha of native vegetation within wildlife corridors.
- Transmission Line Corridor – High voltage transmission line connecting the Solar Precinct to the Hydrogen Production Precinct, requiring clearance of discrete areas of native vegetation within a 30 km by 50 m corridor.
- Hydrogen Production Precinct – Comprised of an electrolyser facility, sub-station and battery facility which will be located within the Pirlangimpi Township Lease, to be as close as possible to the ship loading point and Hydrogen Export Precinct. This area requires clearance of 40 ha of native vegetation.
- Hydrogen Export Precinct – Comprising a compression facility, desalination facility, loading arms and berth for storage and marine transportation of the green hydrogen to market. This area will be located within the existing 32 ha Port Melville lease and requires clearance of 0.9 ha of native vegetation.

The proposed project location is on the western part of Melville Island, the area with the highest rainfall and most productive land systems. This project intends to predominantly use already-developed land within forestry plantations and at Port Melville.

The project is being referred to the NT Environmental Protection Authority (NT EPA) for consideration under section 48 of the *Environmental Protection Act*. This document provides supplementary information to the Referral Form and has been prepared with reference to the guidelines document *Referring a proposal to the EPA* (NTEPA 2021).

To address the information requirements of the referral, this report presents:

- A review of the existing terrestrial environment (climate, bioregions, land types, vegetation communities and threatening processes).
- Verification of existing land systems to a scale of 1:250,000 to identify sensitive vegetation and inform suitable habitat for threatened species.
- A 'likelihood of occurrence' assessment using desktop information to determine which terrestrial threatened species have a reasonable likelihood of occurring within the project area.
- The methods and results of targeted field surveys to:
 - Identify the presence of *Typhonium* plants within high likelihood modelled habitat
 - Identify the presence or absence of Red Goshawk nests.
- A qualitative assessment of the significance of threatened species identified as occurring (or likely to occur) within the project area.

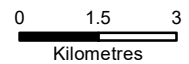


PIRLANGIMPI
(GARDEN
POINT)



Legend

- Minor road
- - - Track
- ▭ Solar Precinct
- ▬ Transmission Line Corridor
- ▭ Hydrogen Production Precinct
- ▭ Hydrogen Export Precinct



MAP INFORMATION
 Scale: 1:145,000 @ A4
 Projection: GDA 1994 MGA Zone 52
 Date Saved: 30/05/2022
 Client: GEV
 Mapper: SR
DATA SOURCE
 Topographic data: Geoscience Aust.
 Project data: EZ21166, GEV
 Imagery: ESRI

Figure 1. Map of the location and project components

2 EXISTING ENVIRONMENT

The existing environmental values within the project area are described in this section. This information will be used in Section 3 to inform the 'likelihood of occurrence' of threatened terrestrial flora and fauna species, and as a basis for the design of the additional ecological surveys. The information for this section mostly comes from desktop databases and reports; supplemented by a site visit in March / April 2022.

The site visit was conducted within the project components provided by Provaris on 3 March 2022 - Figure 1. The site visit included targeted threatened species surveys, rapid vegetation assessments and observations made while traversing the project area and surrounds. The site visit was conducted by ecologists Nicole Clark and Sarah Ryan with the assistance of the Tiwi Land Rangers and accompanied by Munupi Traditional Owners from 23 to 25 March and 29 March to 1 April 2022. The targeted threatened species survey methodology is discussed in Section 3.1.2. The rapid vegetation assessment sites were informed by desktop land system mapping and field observations – Figure 6. Observations on habitat quality, site conditions and threatening processes such as disturbance, weeds and pests were made during the visit, when they were found to occur.

2.1 Climate

The Tiwi Islands region has a tropical climate with a distinct Dry season (approximately April to October) and Wet season (November to April). The closest long-term Bureau of Meteorology (BOM) climate station is at Pirlangimpi Airport (station number 14142). Figure 2 shows average annual data for rainfall, maximum and minimum temperature. The Tiwi Islands have the highest rainfall in the NT and the project is located within the wettest part of the island – the western end – which has a mean annual average of 1,800 to 2,000 mm, compared to the eastern end with a mean annual average of 1,200 to 1,400 mm.

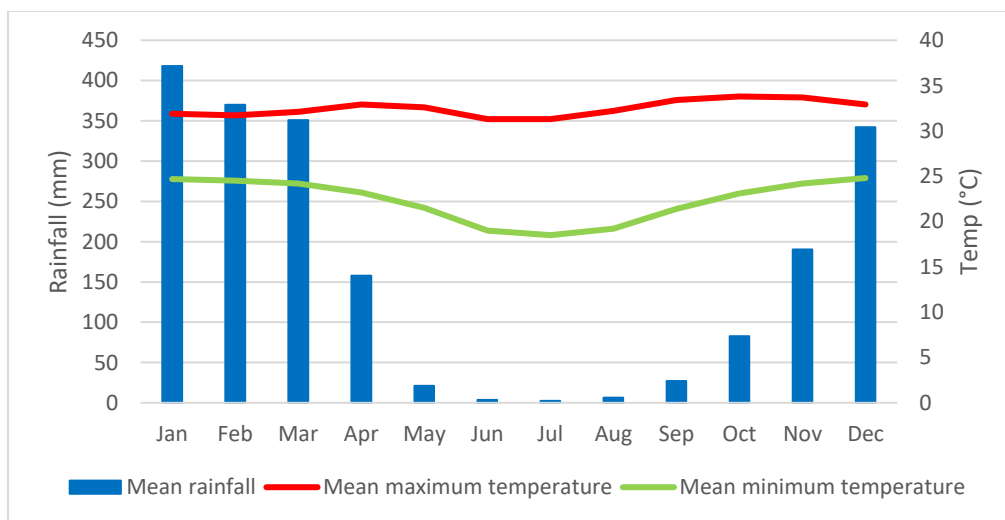


Figure 2. Graph of the weather data at Pirlangimpi to January 2022

2.2 Land use history

Land use within the project area differs for each component of the project.

The Solar Precinct will be located at Imalu, Pitjimirra, Piripiyama and Rangini North, making use of 2,630 ha of existing *Acacia mangium* plantations and 12 ha of native bushland. The plantation areas were cleared and planted for export plantation forestry in 2005. Prior to that, this area was undeveloped land. None of these plantations have been harvested.

The Transmission Line Corridor will run approximately 30 km alongside the Pitjimirra Road, requiring localised clearing within a 50 m wide corridor of native vegetation that was retained as wildlife corridors under the EPBC 2001/229 plantation approval. The Pitjimirra Road is used by Tiwi people accessing homelands, the Pitjimirra



outstation and school camps, TPC staff for plantation access, and research groups accessing the CSIRO carbon plots and coastlines.

The Hydrogen Production Precinct will be constructed on 40 ha of undeveloped land within the Pirlangimpi Township Lease, currently managed by the Office of Township Leasing (OTL).

The Hydrogen Export Precinct will be constructed within the existing lease of Port Melville industrial precinct. Port Melville is a 32 ha multi-user facility supporting the on and offshore oil and gas industry. Port Melville has been shipping log exports from land clearing and plantations since it was built in 2004, and underwent significant development in 2015 for oil and gas facilities. There is a small portion – 4.5 ha – within the Port lease that is undeveloped and retains native vegetation, including cultural and environmental values. Of this remaining vegetation, 0.9 ha is required to be cleared for development.

2.3 Previous scientific research and survey effort

Scientific interest in the natural resources of the Tiwi Islands began in the 1960's with the development of the forestry industry. Woinarski et al. (2003) provides a detailed summary of historic survey efforts up to 2003, including studies conducted in 2000 to 2002 to inform the Tiwi Islands Biodiversity Conservation Strategy. The strategy was informed by a large-scale biodiversity study with 351 monitoring quadrats established across the Tiwi Islands (Woinarski et al. 2003). This survey added thousands of records to the NT Flora and Fauna Atlases and information from this study has been used extensively in subsequent scientific reports. Seven of these historic quadrats are relevant to the project area – two adjacent to the Imalu plantation of the Solar Precinct and five within the Transmission Line Corridor. Woinarski et al. (2003) also describes the only record of flora and fauna surveys within plantations, a 2001 survey at one site within two year old *Acacia*; however, this is a different environment to the current 17 year old plantations within the project area. Since 2001, studies of flora and fauna have not been conducted within plantations on Melville Island.

The years between 2002 and 2008 saw the start of large-scale land clearing and industry development on Melville Island, for the Matilda sand mine and the Tiwi Islands Forestry Project. Pre-clearing flora and fauna surveys were completed for both developments – targeted localised surveys at Andranangoo and Lethbridge Bay for Matilda sand mine, and at select sites within the 22,000 ha of western Melville Island cleared for *Acacia* plantation development. The full results of these studies are not publicly available and most of the records do not appear in the NT Fauna or Flora Atlas. Of the land clearing for the plantations in the area, pre-clearance survey records only exist for Pinyanippi, which is outside of the current project area. There are no recorded surveys within this time for the project area. Pre-clearing ecological studies were also not completed prior to the development of Port Melville in 2004.

In 2009, the Tiwi Carbon Study began on Melville Island. The Tiwi Carbon Study was initially a partnership between the Tiwi Land Council (TLC), Tiwi Land Rangers, Tiwi Forests and CSIRO, with funding support from various organisations including the Federal Government's Biodiversity Fund. The Tiwi Carbon Study examines the biophysical and economic potential of fire management for greenhouse gas abatement on the Tiwi Islands, as a basis for possible livelihood opportunities for Tiwi people. It also aims to maintain the special biodiversity values of the Tiwi Islands and foster active involvement of the Tiwi people in scientific research. Key to the study are 18 long-term experimental Carbon Plots – each 50 to 100 hectares of native vegetation – in six locations across Melville Island which are subject to different fire management options. In each location, fire management of the three plots – annually burnt, 3 yearly burnt or never burnt plot – has been ongoing since 2009 and the fire program is today managed by Tiwi Plantations Corporation (TPC). Research in the Carbon Plots continues, fostering and involving Tiwi people in scientific research, and is now a partnership between TLC, CSIRO and Charles Darwin University (CDU). All three Imalu Carbon Plots are adjacent to or surrounded by the Solar Precinct – they are located in the wildlife corridors between the Imalu plantations. These plots are the subject of CDU and CSIRO studies in 2022.

In more recent years – 2013 to present – additional scientific studies began on the Tiwi Islands, predominantly focused on the endemic and threatened mammal species. In 2015, a subset of 88 of the original 351 research quadrats were used to conduct population analysis on small to medium sized mammals and detected early species decline, similar to that seen on Kakadu (Davies et al. 2018). The conclusions from this study have gained interest from Federal and Territory bodies on the state of small and medium mammals on the Tiwi



Islands, and further studies have been commissioned since by CDU, the National Environmental Science Program and CSIRO. This work predominately engages the Tiwi Land Rangers and Traditional Owners in the field studies. The Tiwi Islands Science Reference Committee – hosted by the University of Melbourne – coordinates scientific research on the Tiwi Islands and their vision is set by the interests of Traditional Owners.

Since 2001 annual monitoring has been undertaken by TPC for selected threatened fauna species as a condition of EPBC Approval 229/2001. This includes survey of roads and tracks surrounding plantations for Red Goshawk nests, and the presence / absence of Masked Owls and Partridge Pigeons. Results from this monitoring have been made available by TPC for the plantations around the Solar Precinct – Imalu plantations.

Planned road upgrades across Melville Island prompted flora and fauna surveys from 2019 to 2021. These studies detected all threatened species that were surveyed for in road corridors across Melville Island (AECOM 2022 & Connect Environmental 2022). Of these surveys, the Connect Environmental (2022) study had one site – Map 1 – within the Transmission Line Corridor and adjacent the Hydrogen Production Precinct.

While fauna have been extensively surveyed in the recent past and current studies are being undertaken, flora surveys are not as common on Melville Island. Comprehensive plant and vegetation surveys were completed as part of the 2000 to 2002 biodiversity study – i.e. pre-plantation development at the 351 sites across the Tiwi Islands, and in 2008 (Liddle & Elliott 2008); however, none have been completed since, nor were the 2008 sites within the project area. For the planned road upgrades and powerline corridors, targeted *Typhonium* surveys were completed along the roadsides between Paru, Pirlangimpi and Milikapiti for *Typhonium* plants. While these surveys returned numerous new records of individuals, none were within the project area.

2.4 Bioregion

Bioregions are relatively large land areas characterised by broad, landscape-scale natural features and environmental processes that influence the functions of entire ecosystems. They capture the large-scale geophysical patterns across Australia. These patterns in the landscape are linked to fauna and flora assemblages and processes at the ecosystem scale, thus providing a useful means for simplifying and reporting on more complex patterns of biodiversity (NSW 2003). NT bioregions are described in Baker et al. (2005).

The project area occurs within the Tiwi Coburg bioregion which is characterised by its coastal vegetation and tall Eucalyptus open forests on sandy lateritic plains and rises. The Tiwi Islands are home to a large number of endemic flora and fauna species.

2.5 Surface water

The project area lies within three small, unnamed catchments, and the larger Blue Water, Kilu Impini and Woolunga Creek catchments. The three smaller catchments, Blue Water Creek and Woolunga Creek flow west into the Apsley Strait; the Kilu Impini Creek flows north to the Arafura Sea – Figure 3.

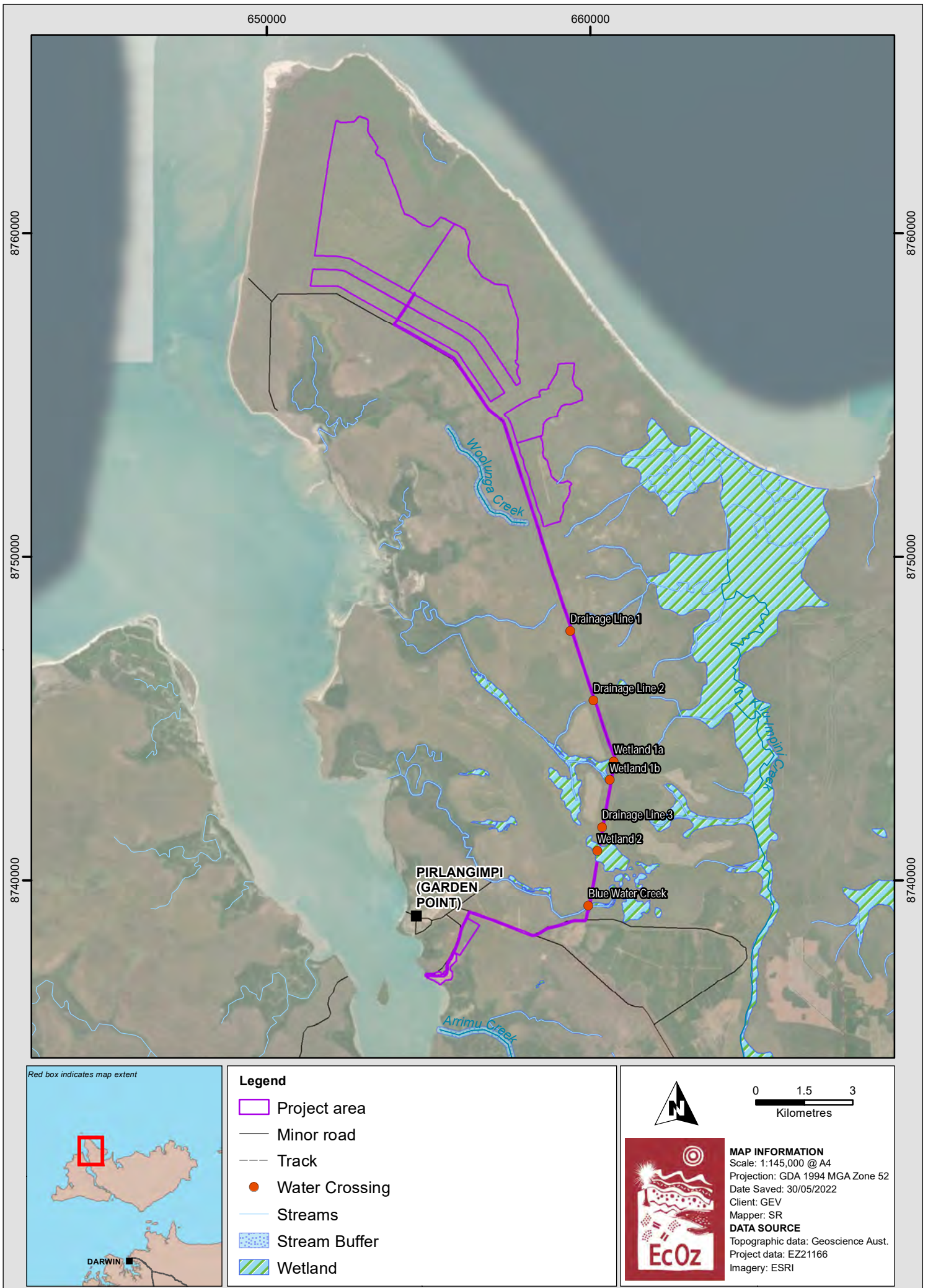
The field visit in April 2022 identified seven water crossings within the Transmission Line Corridor along Pitjimirra Road – namely Blue Water Creek, three first order unnamed, seasonal drainage lines and three wetlands – Figure 3. The head waters of all the watercourses were on the eastern side of the road, with the water crossings and drainage towards the west. Drainage Line 2 drains from a wetland and Drainage Line 3 drains into a wetland before joining a second order stream. The remaining three crossings are points at which the road crosses wetlands – Section 2.8.4.

There are no watercourses within the solar precinct.



Table 1. Locations of streams and wetlands that intersect the project area

Point ID	Latitude (GDA94)	Longitude (GDA94)
Blue Water Creek	-11.401628	130.465872
Drainage Line 1	-11.324807	130.460500
Drainage Line 2	-11.344197	130.467054
Drainage Line 3	-11.379596	130.469720
Wetland 1a	-11.361259	130.472868
Wetland 1b	-11.366458	130.471768
Wetland 2	-11.386286	130.468464



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\EZ21166 - Twi Islands Hydrogen Export Project\01 Project Files\Fig 3 Surface water.mxd

Figure 3. Map of surface water and catchments relevant to the project area



2.6 Land systems

Christian and Stewart (1968) define a land system as ‘an area or group of areas throughout which there is a recurring pattern of topography, soils and vegetation’. These have been mapped across the NT by the government and are at a significantly smaller scale than a bioregion (i.e. bioregions constitute many different land systems).

In this report, land systems will be used for the basis of the threatened species ‘likelihood of occurrence’ assessment. Land systems provide a finer level of detail than other types of regional mapping data, such as National Vegetation Information System. Within each land system, a set of component land units is defined. In some areas of the NT, mapping has been undertaken to the level of detail of land units. However, there is no land unit mapping for the project area.

Land system mapping of the western half of Melville Island was undertaken by Wells et al. (1978) at a scale of 1:250,000. This was prior to the broad scale land clearing for development of the plantations. Wells et al. (1978) maps the land system, describes associated land units and identifies four land systems within the project area – Table 2 and Figure 6. These four land systems were ground-truthed during the 2022 field visit for this project. Rapid vegetation assessment sites were undertaken within each land system – complemented with photo-points – and then within areas of visual, structural or floristic difference within the land system. Features assessed at each rapid assessment site were:

- Landform – indicating topography of the land, aspect and slope (%).
- Soil and landform types based on surface characteristics (i.e. presence of surface gravel/rock outcrops or inundation areas) and digital photos of surface soils.
- Drainage potential (rapid, well, or poor).
- Broad vegetation description for characterisation to a standard that is equivalent to Level 5 in the National Vegetation Information System, and in line with the *NT guidelines and field methodology for vegetation survey and mapping* (Brocklehurst et al. 2007). Within each stratum (upper, mid, and ground), the three dominant species were recorded, and general structure was noted.
- Disturbance – presence of weeds, fire history, and signs of feral animals.

Table 2. Summary of the land systems relevant to the project area

Land system	Landform	Soil	Vegetation
Lateritic plains			
Dundas	Undulating terrain with common intermittent streams and drainage depressions, small areas of internally draining estuarine plains, dominantly Quaternary deposits of silt, fine sand and minor gravel alluvium overlying Van Diemen sandstone	Sandy or loamy red earths – rises, mottled sandy or clayey soils – depressions	Open Eucalypt forest – rises, Variable shrubland – depressions
Piper	Flat to very gently sloping sand plains, poorly consolidated Quaternary sand and silt overlying Tertiary Van Diemen sandstone	Predominantly red earthy sands	Open Eucalypt forest
Tiwi	Gently undulating terrain between central plateau surface areas and northern sand plains, poorly consolidated Quaternary sand and silt overlying Tertiary Van Diemen sandstone	Deep sandy red earths	Open Eucalypt forest
Sandstone plains and rises			
Callemondah	Colluvial slopes – includes weathered plateau remnants and plateau foot slopes – small areas occur adjacent to plateau surface, weathered lateritised Van Diemen sandstone	Frequently shallow sandy and gravelly red massive earths	Open Eucalypt forest

Nine rapid vegetation assessments (VS) and 27 photo-points (PP) were undertaken across the four land systems – Figure 6. An additional assessment was completed within the rainforest to the north of the project area – see Section 2.8.2. Full land system descriptions based on field investigations can be found in Appendix B.

Where remnant vegetation was intact, field observations were consistent with land system mapping, except for VS6 wetland which was inconsistent with the Callemondah land system description for wet areas. Callemondah land unit 6 (7a) (creeks, springs and drainage lines) is characterised by a *Grevillia*, *Tristania* and *Pandanus spiralis* wet grassland, which were not present at VS6 – which was a *Lophostemon lactifluus*, *Pandanus spiralis*, and *Planchonia careya* open forest – see Appendix B. In the disturbed areas – plantations and Port Melville – the landscape was altered to the point that a representative site of the land system could not be found.

The Solar Precinct is described by two distinct communities, VS1 and VS2, and 12 associated photo-points. Assessment was undertaken within the plantation and found the two distinct communities represented approximately 60 % and 40 % of the plantations respectively based on aerial imagery – Figure 4. VS1 was typical of areas where the plantation had degraded or failed, reverting to an open transitional site with an understory of monsoon vine species and sub-shrubs. Wild Passionfruit was dense in these places with numerous dead *Acacia* trees. VS2 is described as a closed canopy *Acacia* plantation, with sparse grass ground cover and isolated sub-shrubs. VS2 areas are typical of the intact, commercial *Acacia* plantations across Melville Island. Both communities within the plantations retained red kandosol soils of the Piper land system and dense leaf litter.



PP12 West



VS2 S



PP20 N

VS1



PP7 South

VS2

Figure 4. Photographs of the two types of vegetation within the Solar Precinct

The Transmission Line Corridor traversed all four land systems; Piper is described by VS3, Tiwi by VS5 and Dundas by VS7, VS8, and VS9. A representative site was not found for the Callemondah land system within

the Transmission Line Corridor. VS6 was mapped as Callemondah; however, this site was found to be a *Mealealuca* wetland which is inconsistent with wet areas for the Callemondah land system – see Section 2.8.4. VS4 – outside the project area – was representative of the Callemondah land system.

The vegetation described for Piper was observed at VS3 and the three associated photo-points, a mixed Eucalypt mid-high woodland over *Acacia* shrubland with grass groundcovers and mixed Eucalypt/*Acacia* saplings. VS7 was a wetland within the Dundas land system and was consistent with Dundas Land Unit 4 described by Wells et al (1978), a *Grevillea* low woodland over *Banksia dentata* with poorly drained hydrosols. At the time of the site visit, the wetland was inundated with standing water approximately 40 cm deep. VS8 and PP18 was typical of the Dundas Land Unit 1, a tall Eucalypt woodland over a mid high shrubland of *Grevillea pteridifolia*, *Terminalia ferdinandiana* and *Acacia auriculiformis* with moderately well-drained rudisol yellow/brown clay loam soils.

VS5 and the ten associated photo-points are typical of the Tiwi land system and were represented within the Transmission Line Corridor and the entirety of the Hydrogen Production Precinct. The vegetation within the Hydrogen Production Precinct, while representative of the Tiwi land system, was a tall grassy woodland with minimal shrubs. This differed significantly from the other Tiwi land system area and photo-points along the Transmission Line Corridor which were a mid-high open woodland over a low shrubland – Figure 5. The difference in vegetation is attributed to differing fire regimes between areas.



PPB1 – Hydrogen Production Precinct



PP1 – Transmission Line Corridor



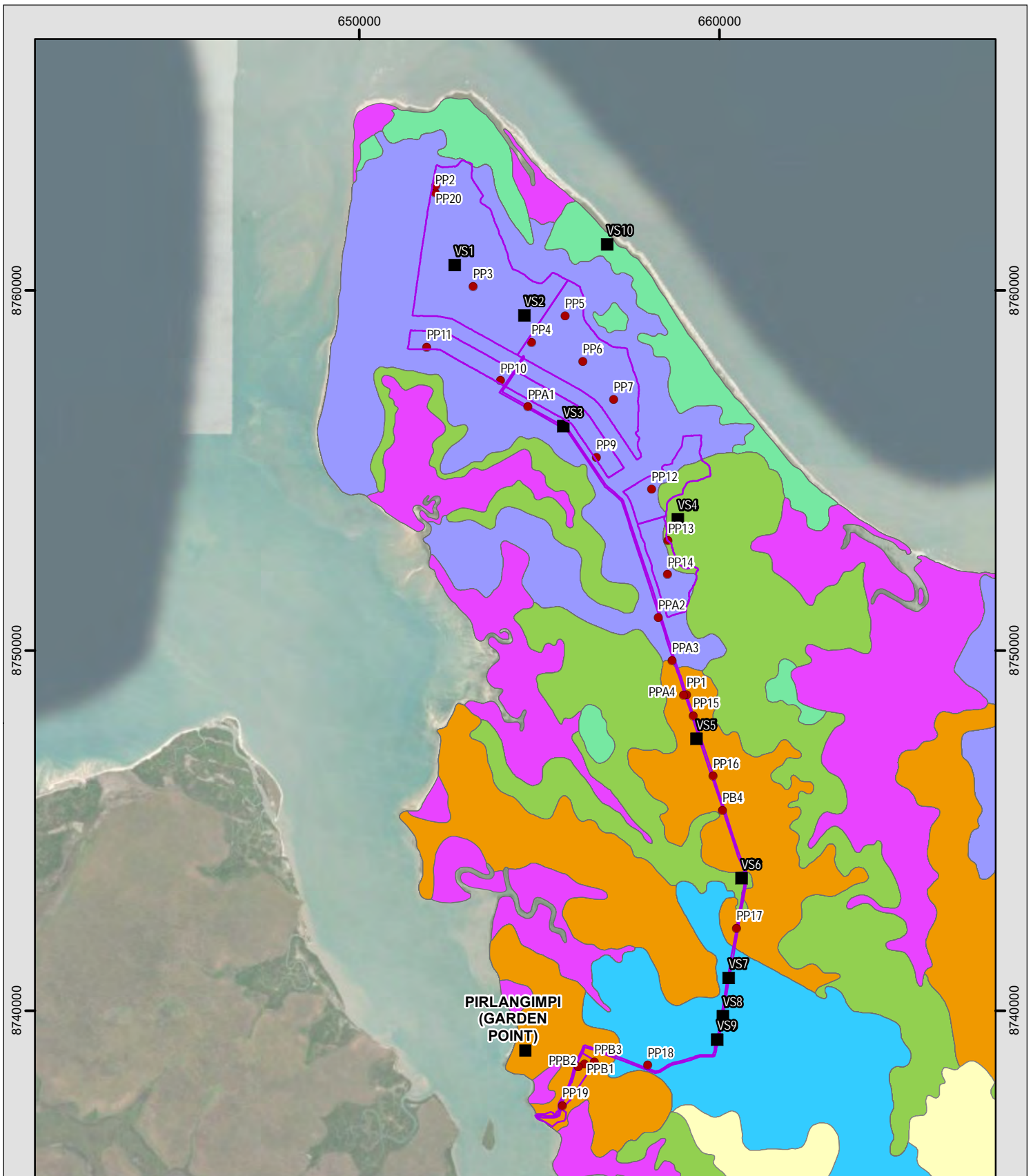
PP19 – Hydrogen Export Precinct



Tannin water – Hydrogen Export Precinct

Figure 5. Photographs showing the vegetation types within the Tiwi land system

Within Port Melville and the Hydrogen Export Precinct there is a small area – 3.2 ha – of native vegetation of the Tiwi land system. This vegetation was similar to that of the Transmission Line Corridor, but with gravelly soils. This area was the location that *Typhonium* plants were found – see Section 3.14. This area has been subject to historic disturbance and was receiving tannin water from the woodchip stockpiles at Port Melville at the time of the site visit.



<ul style="list-style-type: none"> Project area ● Photo Point ■ Vegetation Assessment 	<p>Land Systems</p> <ul style="list-style-type: none"> Callemondah Dundas Littoral Piper Rainforest Tiwi Van Diemen
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MAP INFORMATION
 Scale: 1:145,000 @ A4
 Projection: GDA 1994 MGA Zone 52
 Date Saved: 16/06/2022
 Client: GEV
 Mapper: SR

DATA SOURCE
 Topographic data: Geoscience Aust.
 Project data: EZ21166, PWC
 Imagery: Shaded relief, Landsat

Figure 6. Map of land systems and vegetation assessment points



2.7 Significant areas

Sites of Conservation Significance

The NT Government has identified Sites of Conservation Significance (SOCS) – the most important sites for biodiversity conservation for the NT. The project area is within the Tiwi Islands SOCS which covers the entire Tiwi Islands and is of international significance (Harrison et al. 2009). Due to the isolation and climatic extremes (high rainfall), the Tiwi Islands support a high number of endemic and threatened terrestrial species. The isolation of the Tiwi Islands provides protection from threats the same species and habitats have encountered on the mainland.

Indigenous Protected Area (IPA)

In 2019, consultation began with Tiwi Islanders to consider the Tiwi Islands for inclusion within the National IPA network. Consultation for the IPA is ongoing, with plans to include 90% of the Tiwi Islands for conservation and cultural uses. The IPA will exclude areas with formal lease arrangements under the *Aboriginal Land Rights (Northern Territory) Act 1976*.

2.8 Sensitive and significant vegetation

In the NT, sensitive vegetation types are those considered significant under the *Land Clearing Guidelines* (DEPWS 2021) due to their unique and/or inherently high biodiversity values. Based on desktop analysis, the following sensitive and significant vegetation types occur within or adjacent to the project area:

- Old growth forest containing large trees with hollows suitable for fauna
- Rainforest
- Riparian vegetation
- Wetlands
- Groundwater-dependant ecosystems.

Each of these is discussed in the following sections.

2.8.1 Old growth forest / large hollow-bearing trees

Tree hollows provide valuable habitat for fauna. In the NT, a *Eucalypt* forest that has either five or more *Eucalypt* stems growing greater than 50 cm in diameter at breast height (DBH) per hectare, and/or 30 or more *Eucalypt* stems greater than 40 cm DBH per ha is considered to old growth forest and of high value for biodiversity (DENR 2018d). The higher annual rainfall on Melville Island results in a greater number of large trees and a higher tree hollow densities than the adjacent mainland (Woolley et al. 2018 & Penton et al. 2020a).

Large hollow-bearing trees >40 and 50 cm DBH were found in the areas proposed for the Transmission Line Corridor and the Hydrogen Production Precinct – Figure 7. At the Hydrogen Production Precinct, these trees were numerous and continue to occur in the surrounding native bushland. The Transmission Line Corridor is proposed within the wildlife corridors surrounding the plantations and so large hollow-bearing trees were not found in the surrounding areas – i.e. within the *Acacia mangium* plantations. Trees less than 40 cm DBH with hollows were observed in all the project components and in the surrounding *Eucalypt* forests and woodlands. The *Acacia* plantations in the Solar Precinct may contain trees with hollows, particularly in the VS1 vegetation type with high numbers of dead and fallen trees.



Figure 7. Photograph of large hollow-bearing trees in the Hydrogen Production Precinct

2.8.2 Rainforest

Various types of rainforest, vine forest and vine thicket occur in the NT over a broad range of landforms throughout the region of summer (i.e. monsoonal) rainfall – essentially north of 18°S (Russell-Smith 1991). Although only covering 0.2 % of the NT, these vegetation types contain 13 % of flora species, making them highly diverse and significant vegetation communities. The total rainforest estate in the NT is divided into 15,000 patches (ranging between 1 ha and 4,000 ha, with a median size of 3.6 ha) that are scattered within a vast expanse of mostly Eucalypt-dominated savannah (DENR 2018c).

There are two broad types of rainforest and vine forest on the Tiwi Islands (Woinarski et al. 2000) – *wet* which are spring-fed or riparian and *dry* which rely on rainfall. *Wet* types correspond with Groups 3 and 5 respectively, and *dry* with Group 9 of Russell-Smith (1991) (Woinarski et al. 2000). Both types occur adjacent to the project area and a total of 277 rainforest patches occur within 20 km of the project area – Figure 9.

Relevant to the project area are the following rainforest occurrences:

- The Transmission Line Corridor passes a section of wet riparian rainforest along the Blue Water Creek, the rainforest located 300 m downstream to the west of the road.
- The Hydrogen Production Precinct is adjacent to a 7 ha patch of spring-fed rainforest that connects with a larger 30 ha area of dry rainforest to the south.
- The Hydrogen Export Precinct has a 2.3 ha patch of dry rainforest 340 m to the north-east, along the coast.
- North-east of the Solar Precinct is the largest dry rainforest/vine thicket on the Tiwi Islands, covering >2,000 ha along the coast – Figure 8. This patch is significant due to its size and condition. A rapid vegetation assessment was completed within the rainforest – VS10 in Appendix B – to assess the diversity and quality of this patch.

It is a mixed-species, coastal monsoon vine thicket. The vegetation structure is low (<10 m tall), and the canopy cover was 70%. Species present are *Terminalia microcarpa*, *Ixora timorensis*, *Diospyros sp.*, *Exocarpos latifolia*, *Flagellaria indica*, *Litsea glutinosa*, *Drypetes deplanchei*, *Opilia amentacea*, *Croton habrophyllus*, *Erythrina vespertilio* and *Strychnos lucida*. The species composition is consistent with key tree species that represent dry rainforest, as described in the



Biodiversity Conservation on the Tiwi Islands, NT (Woinarski et al. 2003). The soils were grey sandy clays that were poorly drained. There was also some minor pig disturbance observed within the dry monsoon patch during field investigations.

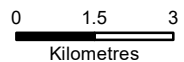


Figure 8. Photograph of dry rainforest vine thicket north of the Solar Precinct



Legend

- Project area **Rainforest**
- Minor road
- Track
- Dry
- Riparian
- Spring
- Rainforest Buffer



MAP INFORMATION
 Scale: 1:145,000 @ A4
 Projection: GDA 1994 MGA Zone 52
 Date Saved: 30/05/2022
 Client: GEV
 Mapper: SR

DATA SOURCE
 Topographic data: Geoscience Aust.
 Project data: EZ21166, DEPWS
 Imagery: ESRI

Figure 9. Map of rainforest areas relevant to the project area

2.8.3 Riparian vegetation

Riparian vegetation is 'a distinct forest community occurring on the banks of rivers or streams that directly influences the adjacent water body' (DENR 2018b). When in good condition, riparian vegetation is considered a sensitive vegetation type because it supports a unique selection of habitat features that are relied upon by a range of flora and fauna species. Riparian vegetation provides refuge habitat and habitat corridors; improves water quality by filtering terrestrial run-off; stabilises banks and reduces erosion; and supports terrestrial and aquatic habitats by maintaining natural light, temperature and oxygen levels within waterways (DENR 2018b).

Of the four drainage lines the Transmission Line Corridor intersects, only two had vegetation distinctly different from the surrounding vegetation, the Blue Water Creek and Drainage Line 2. At both points, there were discernible floristic communities differing from the surrounding savanna. The vegetation was in good condition in each area, supporting a diverse range of species and clear water.

A rapid vegetation assessment was conducted at Blue Water Creek; VS9 in Appendix B details the characteristics of the site. The vegetation was representative of a riparian area, with *Melaleuca viridiflora*, *Lophostemon lactifluus* and *Corymbia ptychocarpa* the dominant species. *Acacia mangium* individuals were present in the creek line and riparian vegetation – Figure 10.

Drainage Line 2 runs from a wetland located approximately 1 km to the east. This site was a slight depression in the landscape, an increase in shrubs and reduction in large trees, with wetland characteristics – *Grevillea pteridifolia* low woodland and standing surface water, but with the occasional *Eucalypt* tree – Figure 11.



Figure 10. Photographs of riparian vegetation along Blue Water Creek



Figure 11. Photographs at Drainage Line 2

2.8.4 Wetlands

In the Top End, wetlands are generally considered to be floodplains, lakes, billabongs and swamps. They support distinct vegetation communities that rely on either permanent or seasonal surface water supply (Brock 1993). These areas often support a shallow water table. Wetlands are considered as a sensitive vegetation type as they provide essential habitat for a diverse range of flora and fauna (including threatened and migratory species) and can be easily impacted upon by poor land management and planning.

Six of the seven water crossings along the Transmission Line Corridor are associated with wetlands, either as the head waters or drainage out of a wetland – Figure 13. Blue Water Creek and Drainage Line 2 drain from wetlands and, by the time of intersection with the Transmission Line Corridor, are streams. Drainage Line 3 runs into Wetland 2, which is intersected by the Transmission Line Corridor further to the south – Figure 13.

Within the Transmission Line Corridor there are three intersections with wetlands, one which is crossed twice – Wetland 1 – and another crossed once – Wetland 2 – Figure 13. Rapid vegetation assessments were taken at two intersections, VS6 and VS7. Wetland 1 is also considered a low potential terrestrial GDE – Section 2.8.5.

VS6 – Wetland 1 – was mapped as Callemondah land system but was not consistent with the wet area description from Wells et al. (1978). The vegetation was a low open forest of *Lophostemon lactifluus*, *Pandanus spiralis*, and the occasional *Planchonia careya*, with isolated (taller) *Corymbia confertiflora* and *Grevillea pteridifolia* trees. There were isolated patches of grass and the soil was a poorly-drained red sandy clay loam. The wetland is in good condition, despite silt run-off from the road that extended at least 100 m, dispersing into the wetland. *Acacia mangium* individuals were also present in the wetland, drainage line and surrounding area.

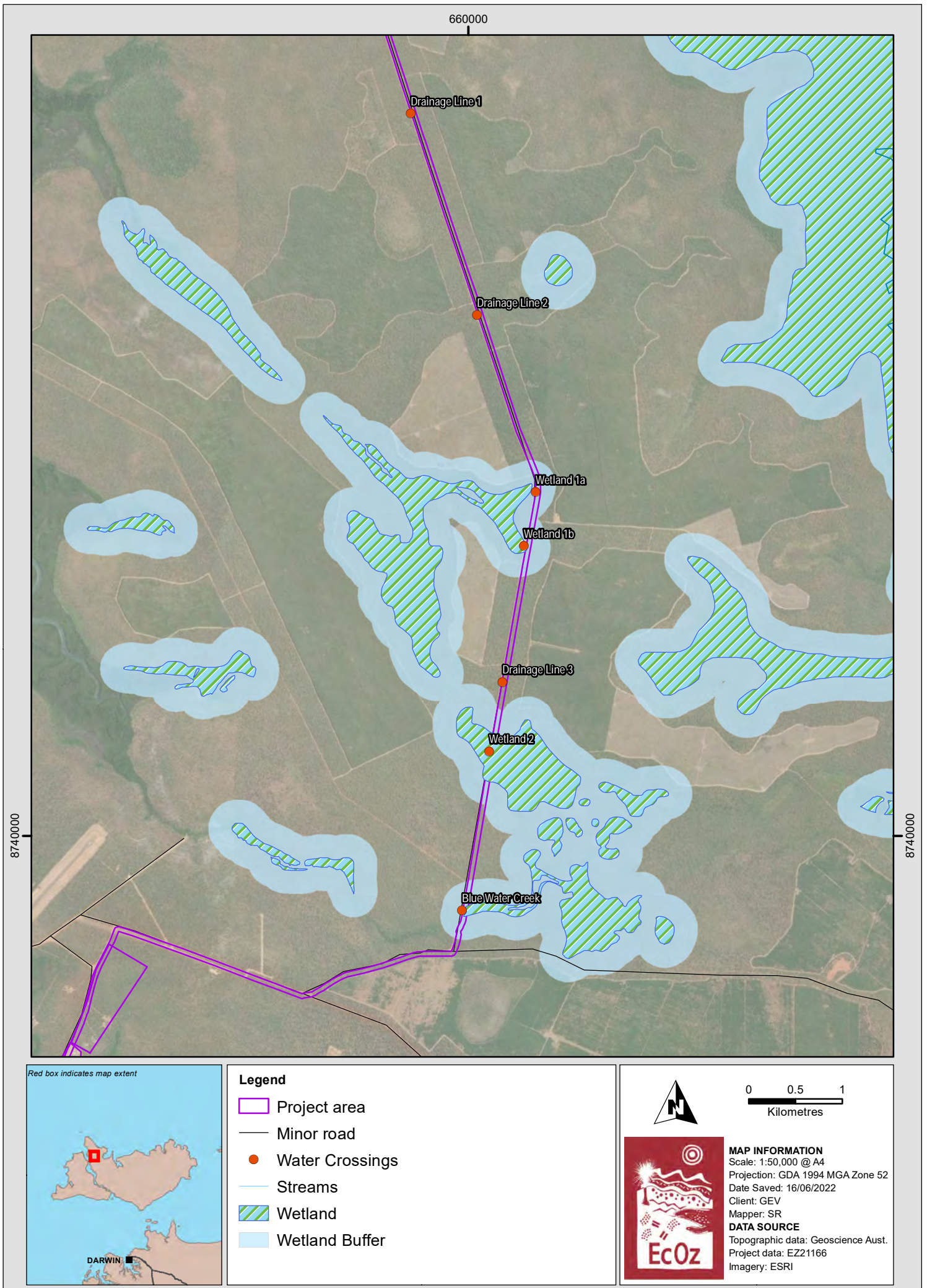
VS7 – Wetland 2 – is a wetland within the mapped Dundas land system and was consistent with Dundas Land Unit 4 described by Wells et al (1978), a *Grevillea* low woodland over *Banksia dentata* with poorly-drained hydrosols. At the time of the site visit, the wetland was inundated with standing clear water approximately 40 cm deep. This wetland was also in good condition and showed less signs of disturbance, with no weeds or silt run-off from the road.



Wetland 1 at VS6

Wetland 2 at VS7

Figure 12. Photographs of wetlands intersecting the project area



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\EZ21166 - Twi Islands Hydrogen Export Project\01 Project Files\Fig 13 Wetlands.mxd

Figure 13. Map of wetlands and associated drainage lines



2.8.5 Groundwater-dependant ecosystems

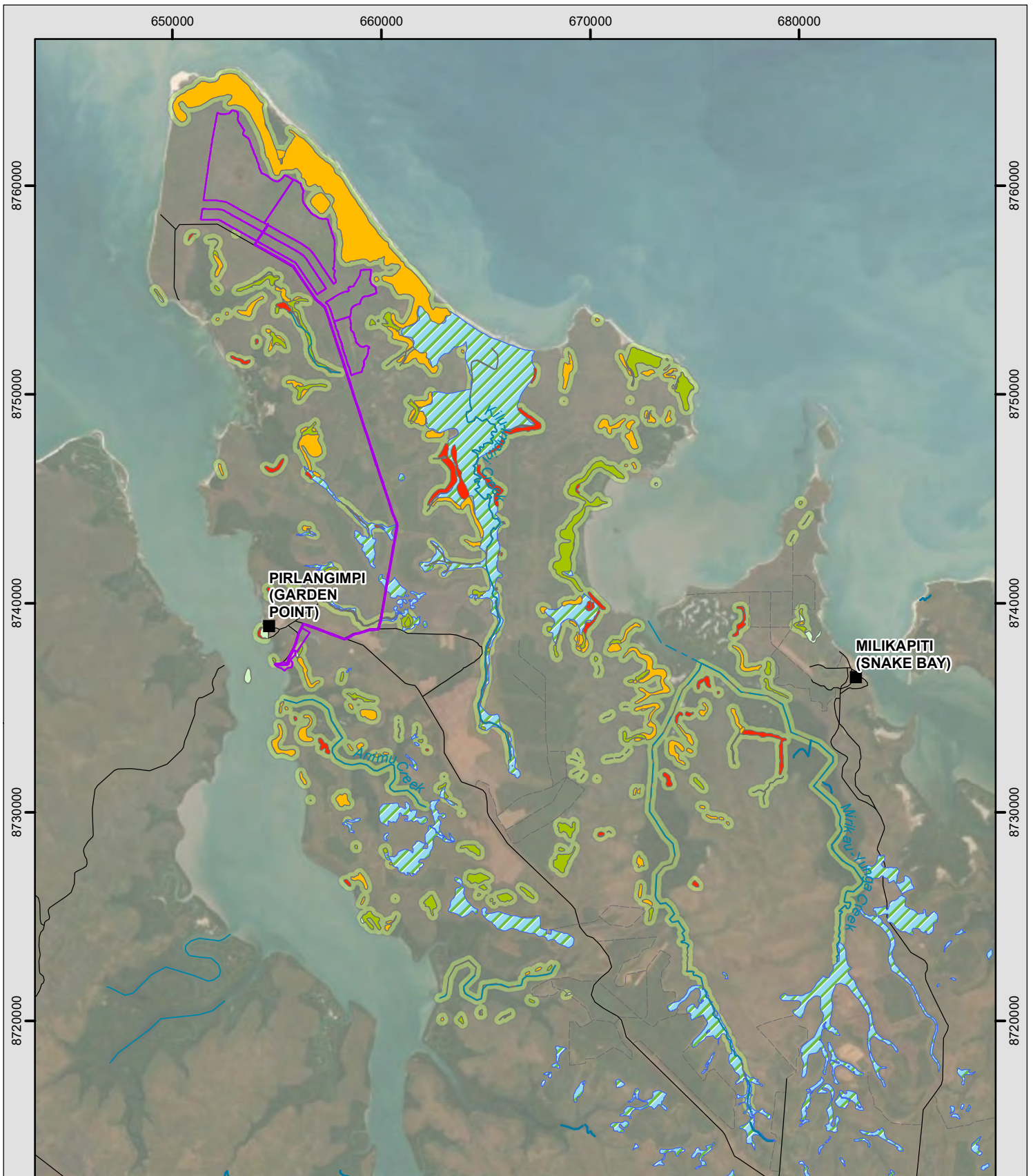
Groundwater-dependent ecosystems (GDE's) refer to 'natural ecosystems that require access to groundwater to meet all or some of their water requirements on a permanent or intermittent basis, so as to maintain their communities of plants and animals, ecosystem processes and ecosystem services' (Richardson et al. 2011). Groundwater is especially important to ecosystems in arid and semi-arid parts of the country and when there are extended dry periods, during which evaporation markedly exceeds precipitation and so surface water is scarce (Eamus et al. 2006). These areas provide essential habitat for a diverse range of flora and fauna, and can be easily impacted by poor land management and planning.

Based on definitions from Eamus et al. (2006), the [Atlas of Groundwater Dependent Ecosystems](#) maps three types of GDE – *subterranean*, *aquatic* (i.e. ecosystems dependant on surface expression of groundwater) and *terrestrial* (i.e. ecosystems dependent on the sub-surface presence of groundwater, often accessed when roots penetrate via the capillary fringe which lies above the saturated zone of the water table). The Atlas classes each mapped GDE according to the degree of certainty that it is, indeed, a GDE.

Rainforest and wetlands on Melville Island are considered terrestrial GDE's – see Section 2.8.2 and 2.8.4. The abundance of aquatic and terrestrial GDE's within 20 km of the project area are shown in Table 3. Of these, the project area intersects with three low potential terrestrial GDE's at the Blue Water Creek crossing – Figure 14.

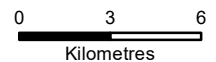
Table 3. GDE's within 20 km of the project area

Aquatic GDE	
Known GDE - from regional studies	25
High potential GDE - from national assessment	2
Moderate potential GDE - from national assessment	4
Terrestrial GDE	
High potential GDE - from national assessment	74
Moderate potential GDE - from national assessment	151
Low potential GDE - from national assessment	66
TOTAL	322



Legend

- | | |
|--------------|----------------------|
| Project area | GDE Potential |
| Minor road | Known |
| Track | High potential |
| Streams | Moderate potential |
| Wetland | Low potential |
| Rainforest | GDE Buffer |



MAP INFORMATION
 Scale: 1:250,000 @ A4
 Projection: GDA 1994 MGA Zone 52
 Date Saved: 30/05/2022
 Client: GEV
 Mapper: SR
DATA SOURCE
 Topographic data: Geoscience Aust.
 Project data: EZ21166
 Imagery: ESRI

Figure 14. Map of GDE's within 20 km of the project area on Melville Island



2.9 Existing threatening processes

There are a number of threatening processes to biodiversity as a consequence of human presence in the region.

2.9.1 Fire

The northern savannas constitute the most fire-prone landscapes in Australia (Russell-Smith & Whitehead 2015), and regular fires have always been a natural part of the environment in the Top End. However, frequent fires can result in fewer flora species and reduced structural complexity (McKay 2017), both of which can also significantly diminish the habitat quality for fauna and facilitate weed invasion.

Fires are a regular occurrence in the Tiwi Coburg bioregion. Regional fire history and fire scar mapping was obtained through the [Northern Australia and Rangelands Fire Information](#) website.

The plantation area and 'never burnt' Imalu carbon plot are managed to exclude all fire. The plantation area has not been burnt since establishment. The Imalu 'never burnt' carbon plot was burnt in 2017 by wildfire, however, remains excluded from the annual fire program. The Transmission Line Corridor, Hydrogen Production Precinct, Hydrogen Export Precinct and surrounding areas are part of the fire management program conducted by the Tiwi Land Rangers and Tiwi Plantations Corporation (TPC). These areas are part of the asset protection program and are burnt annually in the early dry season to manage fuel loads. Annual burning is a very high frequency, likely to the detriment of native species – see Price and Baker (2007).

2.9.2 Weeds

Some species of introduced flora are declared to be weeds under the NT *Weeds Management Act* because of the environmental and/or economic harm they can cause. Class A weeds are to be eradicated by land-owners and occupiers. Class B weeds must have their growth and spread controlled by land-owners and occupiers. The remaining introduced flora species are referred to as *environmental weeds*. The Commonwealth Government has also categorised some species as Weeds of National Significance (WoNS). WoNS were not detected within the project area.

In addition to legislative controls, weed management is also addressed through the *Darwin Regional Weed Strategy 2021-2026* (DRWS) (DEPWS 2021). This plan focusses on weeds that are most important to the Darwin region, categorising them as either:

- Category 1 – Priority weeds for eradication
- Category 2 – Priority weeds for strategic control (including eradication of outliers)
- Category 3 – Weeds of concern – prevent spread
- Category 4 – Hygiene or biosecurity weeds – prevent spread
- Category 5 – Alert weeds eradication on detection

Weed management is a shared responsibility on the Tiwi Islands by Tiwi Land Rangers, OTL and TPC. Due to the isolation and sea barrier surrounding the Tiwi Islands, there are relatively few weed species present and there is a real potential to eradicate and prevent the introduction of new species to the Tiwi Islands. The Tiwi Islands remain free of Gamba Grass and strict quarantine measures are in place to prevent the introduction of it and other weed species.

A review of the NT Weed Branch weed dataset contains records up to 2014 from NT Government organisations and shows 15 weed records within the project area, and 468 within a 20 km radius. This dataset has limitations due to the low rates of data upload by local weed management organisations and is unlikely to be an accurate representation of the current environment. However, this dataset does provide useful information on species that have been found in historic surveys.

The species with most records in this dataset are *Sida acuta* and Annual Mission Grass (*Cenchrus pedicellatus*). Of the 85 species recorded within 20 km of the project area, species that were observed during fieldwork for this project are listed in Table 4.



Within the project area, weed distribution corresponded to areas of environmental disturbances, namely within the community and outstations, in the plantations, at Port Melville, and along roads and tracks. Weed distribution is often associated with herbivore grazing and feral animals. Weeds are common throughout the project area; however, most occurrences were on the edges of native vegetation and plantations, not spread throughout the native vegetation or plantations and confined to disturbed areas – i.e. drains, grading windrows, plantations and Port Melville.

The most frequent weed observed during the site visit was *Sida acuta* and Mission Grass along roads and tracks and at Port Melville. Mission Grass and Wild Passionfruit were the most frequently observed species within the plantations. Mission Grass was most prevalent along the road and track edges, at some points spreading up to 20 m into the plantations and the occasional individual plant within the plantation. The Wild Passionfruit was well established and common in degraded / vine thicket plantation areas – VS2. *Acacia mangium* was also observed outside the plantation within the wildlife corridors, wetlands and the surrounding savanna.

Table 4. Table of weed species observed within the project area

Common Name	Botanical Name	Declared Class	DRWS
Black Wattle	<i>Acacia mangium</i>	-	-
Mossman River Grass	<i>Cenchrus echinatus</i>	B	4
Mission Grass – Annual	<i>Cenchrus pedicellatus</i>	-	3
Mission Grass – Perennial	<i>Cenchrus polystachios</i>	B	2
Calopo Vine	<i>Calopogonium mucunoides</i>	-	-
Rubber vine – Ornamental	<i>Cryptostegia madagascariensis</i>	A	1
Hyptis	<i>Mesosphaerum suaveolens</i>	B	4
Senna – Sicklepod	<i>Senna obtusifolia</i>	B	4
Senna – Coffee	<i>Senna occidentalis</i>	B	4
Sida – Spiny head	<i>Sida acuta</i>	B	4
Sida – Flannel Weed	<i>Sida cordifolia</i>	B	4
Sida – Paddys Lucerne	<i>Sida rhombifolia</i>	B	4
Caltrop – Cistoides	<i>Tribulus cistoides</i>	B	-
Wild Passionfruit	<i>Passiflora foetida</i>	-	-

2.9.3 Pest animals

Based on the author's experience in the region, as well as NT Fauna Atlas records, the following introduced fauna species are expected to occur within the project area:

- **Feral Pig** (*Sus scrofa*)

Widely-distributed, environmental and agricultural pest. This species is listed as a 'key threatening process' under the *EPBC Act* because of native fauna predation, contribution to habitat loss and competition with native fauna. The threats associated with Feral Pig are largely confined to riparian and wetland habitats, where rooting, wallowing, tusking and rubbing impact upon native flora and fauna, and water quality. On Melville Island, Feral Pigs are confined to the north-western area of Melville Island, where they have caused damage to tracks and fire-breaks by rooting and erosion. Pig sign was observed during the site visit in the northern part of the Imalu plantations, in the savanna and into the large area of rainforest.

- **Feral Cat** (*Felis catus*)

Occur throughout the Australian mainland in a wide variety of different habitats. The species is considered a 'key threatening process' under the *EPBC Act*. Feral Cats play a significant role in the



decline of native fauna and have been recognised as contributing to the decline of several ground-nesting birds and small to medium-sized mammals. Feral Cats are widespread on both Melville and Bathurst Islands.

- **Feral Horse (*Equus caballus*)**

Occur across the Australian mainland in a wide variety of different habitats. The Feral Horse causes erosion of soil and watercourses, weed spread, trampling and consumption of native flora, and sedimentation and increased nutrient levels in watercourses. Feral Horses are common on Melville Island and often found in family groups in varying states of health. Feral Horses were easily observed during the site visit.

- **Feral Buffalo**

Widely-distributed, major environmental pest in the Top End. Feral Buffalo have the ability to significantly alter the character of floodplains, wetlands and riparian areas through disturbance from wallowing, trampling, grazing and pollution of water. Impacts from Feral Buffalo herds are concentrated in the dry season when they congregate at permanent water sources. Feral Buffalos are common across Melville Island, causing damage to tracks and fire breaks in wallows, trampling and consumption of native flora, and weed spread.

In addition, Wild Dogs and Asian House Geckos are present, but are restricted to around the populated areas. The Tropical Fire Ant (*Solenopsis geminata*) was introduced in the early 2000's and were considered eradicated in 2015; however, surveillance programs for pest ants continue. Cane Toads are not present on Melville Island, with strict quarantine measures in place to prevent the introduction.

3 THREATENED SPECIES

This section outlines the procedure and results of the threatened species ‘likelihood of occurrence’ assessment conducted for this report. The assessment was undertaken using available desktop information, as well as databases of existing records and potential species.

The purpose of this assessment is to identify those species that may need to be included within the project’s risk assessment, and those that can be reasonably excluded from further consideration because they are unlikely to occur within the project area.

Note: This process is not a risk assessment as it does not take into account project activities and their potential impacts.

The International Union for the Conservation of Nature nominates a set of criteria used to identify species at risk of extinction. These criteria are used to define categories of risk (see Figure 15) which are used by the NT Government to determine which threatened species are listed under the *Territory Parks and Wildlife Conservation Act (TPWC Act)*, and by the Commonwealth Government to determine which threatened species are listed under the *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*. This report focusses on species that are listed as Vulnerable, Endangered or Critically Endangered under either Act.

The *EPBC Act* also protects important habitat for, and significant occurrences of, migratory species. NT Atlas records and land unit mapping indicate that the project area contains neither.

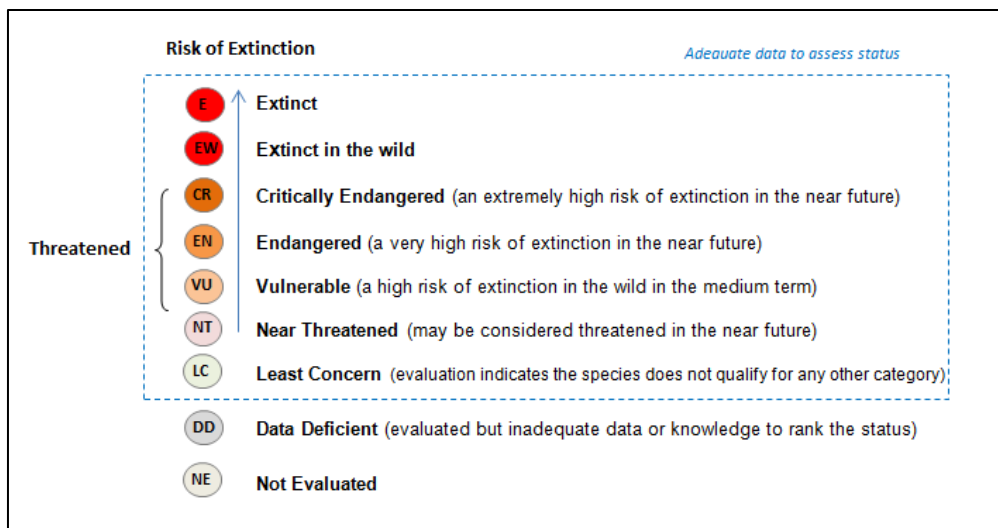


Figure 15. The IUCN categories of risk for species

3.1 Methodology

3.1.1 Desktop assessment

The following procedure was used to determine which terrestrial threatened species have the potential to occur in the project area:

- Species records from the latest version of the [NT Atlas](#) were clipped to Melville Island. Usually, for these assessments, EcOz would clip that data to include species from a larger area (i.e. bioregion) because of the paucity of records in most parts of the NT. However, as explained in Section 2.3, the Tiwi Islands are a well surveyed area for which there exist many fauna and flora records, and so a more localised list is adequate. Records are shown in Figure 16 to Figure 18.
- The [EPBC Protected Matters Search Tool](#) (PMST) was used to generate a report using a 20 km buffer from the project area. This is an online enquiry tool managed by the Commonwealth Department of the Environment and Energy which interrogates a range of existing flora and fauna



data, as well as predictive modelling to speculate on the presence of species within a search area. The PMST uses a grid system to determine which protected matters it encapsulates for a particular search. The PMST report – Appendix A – was generated on 21 January 2022.

- For each threatened species, the likelihood of it occurring within the project area was then assessed based on desktop information that relates to habitat requirements, distribution, number and dates of proximate records (obtained from NT Atlas), and the ecological information described in Section 2. Likelihood ratings are defined in Table 5.

Table 5. Ratings for the desktop threatened species likelihood of occurrence assessment

Rating	Definition
HIGH	It is expected that this species occurs within the project area because there is core habitat and recent (post-2000) proximate records or knowledge that the species occurs in the local area.
MEDIUM	Species may occur within the project area because there is suitable habitat; however, there is evidence that lowers its likelihood of occurrence (known range contraction of the species in the region, no recent records within the search area, substantial loss of habitat within the project area since previous records, species is naturally-rare or occurs at a low density etc.).
LOW	Species may occur, as a vagrant, within the project area; only marginally-suitable habitat is expected.
NONE	There is strong evidence that this species will not occur within the project area (i.e. there is no suitable habitat and/or the species is considered to be regionally-extinct).

A total of 48 terrestrial threatened species were considered in the 'likelihood of occurrence' assessment. The results from the threatened species 'likelihood of occurrence' assessment are detailed in Appendix C and summarised as follows:

- Ten species have a high likelihood of occurring, meaning it is expected that these species occur within the project area (at least seasonally) because of the presence of suitable habitat, and/or there are recent proximate records.
- Four species have a medium likelihood of occurring, meaning that the species may occur within the project area because there is suitable habitat; however, there is evidence that lowers its likelihood of occurrence (known range contraction of the species in the region, no recent records with the search area, substantial loss of habitat within the project area since previous records, species is naturally-rare or occurs at a low density etc.)
- The remainder have a low or no likelihood of occurring, meaning that apart from the occasional vagrant, it is not expected that these species occur within the project area.

Table 6. Desktop threatened species 'likelihood of occurrence' assessment summary

Likelihood	Species	Class	Status		Habitat
			EPBC	TPWC	
HIGH	Red Goshawk (<i>Erythrotriorchis radiatus</i>)	Bird	VU	VU	Open forest & woodland Riparian areas
	Partridge Pigeon (<i>Geophaps smithii smithii</i>)	Bird	VU	VU	Open forest & woodland
	Masked Owl (Tiwi Islands' subspecies) (<i>Tyto novaehollandiae melvillensis</i>)	Bird	EN	EN	Open forest & rainforest
	Brush-tailed Rabbit-rat (<i>Conilurus penicillatus</i>)	Mammal	VU	EN	Open forest & woodland



Likelihood	Species	Class	Status		Habitat
			EPBC	TPWC	
	Black-footed Tree-rat (<i>Mesembriomys gouldii melvillensis</i>)	Mammal	VU	VU	Open forest & woodland
	Pale Field-rat (<i>Rattus tunneyi</i>)	Mammal	-	VU	Riparian areas
	Northern Brushtail Possum (<i>Trichosurus vulpecula arnhemensis</i>)	Mammal	VU	NT	Open forest & rainforest
	Darwin Cycad (<i>Cycas armstrongii</i>)	Plant	-	VU	Woodland
	<i>Typhonium jonesii</i>	Plant	EN	EN	Woodland, rainforest
	<i>Typhonium mirabile</i>	Plant	EN	EN	Woodland
MEDIUM	Northern Brush-tailed Phascogale (<i>Phascogale pirata</i>)	Mammal	VU	EN	Open forest
	Butler's Dunnart (<i>Sminthopsis butleri</i>)	Mammal	VU	VU	Open forest
	Mertens' Water Monitor (<i>Varanus mertensi</i>)	Reptile	-	VU	Riparian areas
	Floodplain / Yellow Spotted Monitor (<i>Varanus panoptes</i>)	Reptile	-	VU	Woodlands
LOW	Hooded Robin (Tiwi Islands' subspecies) (<i>Melanodryas cucullata melvillensis</i>)	Bird	CR	CR	Open forest, treeless plains
	Horsfield's Bushlark (Tiwi Islands' subspecies) (<i>Mirafra javanica melvillensis</i>)	Bird	VU	VU	Tussock grasslands
	Shorebirds – various species	Bird	VU to CR	VU to CR	Tidal mudflats
	Fawn Antechinus (<i>Antechinus bellus</i>)	Mammal	VU	EN	Open forests & woodlands
	Bare-rumped Sheath-tailed Bat (<i>Saccolaimus saccolaimus nudicluniatus</i>)	Mammal	VU	-	Open forests & woodlands
	Water Mouse (<i>Xeromys myoides</i>)	Mammal	VU	-	Wetlands
	Atlas Moth (<i>Attacus wardi</i>)	Invertebrate	-	VU	Rainforest edge
	<i>Calochilus caeruleus</i>	Plant	-	VU	Swamps, Melaleuca woodlands
NONE	Grey Falcon (<i>Falco hypoleucos</i>)	Bird	-	VU	Lowland plains
	Plains Death Adder (<i>Acanthophis hawkei</i>)	Reptile	VU	VU	Floodplains
	Tiwi Islands Treesnail (<i>Amphidromous cognatus</i>)	Invertebrate	-	VU	Rainforest
	Melville Squat-keeled Snail (<i>Trochomorpha melvillensis</i>)	Invertebrate	-	VU	Rainforest
	<i>Burmanna sp. Bathurst Island</i>	Plant	EN	EN	Rainforest
	<i>Dendromyza reinwardtiana</i>	Plant	-	VU	Rainforest
	<i>Elaeocarpus miegei</i>	Plant	-	CR	Rainforest
	Native Walnut (<i>Endiandra limnophila</i>)	Plant	-	VU	Rainforest
	Narrow-leaf Climbing Pandan (<i>Freycinetia excelsa</i>)	Plant	-	VU	Rainforest
	<i>Freycinetia percostata</i>	Plant	-	VU	Rainforest
	<i>Garcinia warrenii</i>	Plant	-	EN	Rainforest
	<i>Hoya australis oramicola</i>	Plant	VU	VU	Rainforest



Likelihood	Species	Class	Status		Habitat
			EPBC	TPWC	
	Luisia Orchid (<i>Luisia corrugata</i>)	Plant	-	VU	Rainforest edge
	<i>Mapania macrocephala</i>	Plant	-	VU	Rainforest
	<i>Mitrella tiwiensis</i>	Plant	VU	VU	Rainforest
	<i>Tarennoidea wallichii</i>	Plant	-	EN	Rainforest
	<i>Thrixspermum congestum</i>	Plant	-	VU	Rainforest
	<i>Xylopia monosperma</i>	Plant	EN	EN	Rainforest

3.1.2 Field surveys

The results of the desktop assessment were then used to inform planning of field surveys for threatened species. Of the 14 species with high or medium likelihood of occurrence, the following survey effort was applied:

- The two *Typhonium* species were subject to targeted surveys because these species have not been surveyed for in the project area, have restricted ranges, and cannot avoid potential impacts by moving away.
- Red Goshawk nests and Darwin Cycads are readily observable if present, and so would be detected as part of the vegetation assessment process.
- The remaining twelve species were not the subject of targeted surveys. Based on previous fauna surveys on Melville Island, knowledge of the species' habitat requirements, and the widespread distribution of the species on the Tiwi Islands, these species are all likely to occur wherever there is suitable habitat – including within some parts of the project area. However, the largest component of project area – the Solar Precinct – is *Acacia* plantations which is not the preferred habitat for these species. Rather than undertaking costly trapping surveys for these species, it is most time and cost effective to assume they are present and assess the potential impacts that the project may have on them.

Field surveys were conducted in the project areas provided by Provaris on 3 March 2022 – see Section 2. Ecologists Nicole Clark and Sarah Ryan completed field surveys with the assistance of the Tiwi Land Rangers and accompanied by Munupi Traditional Owners from 23 to 25 March and 29 March to 1 April 2022. The targeted *Typhonium* survey is described in Section 3.14 and the results of the other surveys are discussed at the species level in this section.

3.1.3 Impact assessment

When assessing whether a project will have a significant impact on a threatened species known, or likely, to occur in the project footprint, it is necessary to first determine whether it does so in an *important population* – as defined in *MNES Significant Impact Guidelines 1.1*. This is because, in most circumstances, by definition, a project's activities can only have a significant impact on an 'important population' of a threatened species.

The guidelines define any occurrence of a Critically Endangered or Endangered species within the project footprint as constituting a population, and all populations are 'important'. For threatened species that are listed as Vulnerable, an 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified in recovery plans and/or that are:

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

A 'population of a species' is defined under the *EPBC Act* as an occurrence of the species in a particular area – including (but not limited to):



- A geographically-distinct regional population, or collection of local populations, or
- A population, or collection of local populations, that occurs within a particular bioregion.

For threatened species likely to occur as an important population within a project footprint, the final step is to determine whether project activities are likely to have a significant impact on that population. This will be done in the NT Referral document using the criteria within *MNES Significant Impact Guidelines 1.1*, which varies depending on the threatened category that has been assigned to the species.

3.2 Red Goshawk (*Erythrotriorchis radiatus*)

The Red Goshawk utilises a mix of vegetation types – including tall open forest, woodland, lightly-treed savannah and the edge of rainforest – but its preferred habitat is tall, open Eucalypt forest and riparian areas. (DoE 2022a). Red Goshawks forage across a broad range of Top End habitats, but have much more specific breeding and roosting habitat requirements. The Red Goshawk constructs basket-shaped stick nests, typically in trees taller than 20 m and within 1 km of a watercourse (Aumann & Baker-Gabb 1991). The same nests are often reused by established breeding pairs in successive years. The nests are constructed from May with eggs laid from July to September and fledging occurring until December (Aumann & Baker-Gabb 1991). The home range of the Red Goshawk is thought to be up to 200 km² (Czechura & Hobson, 2000).

The Red Goshawk is listed as Vulnerable both federally and in the Territory. The population on the Tiwi Islands is considered an important population necessary for maintaining genetic diversity as there is recent evidence of range contraction over several decades in the mainland population which has not been seen on the Tiwi Islands (Garnett & Baker 2021). Recent studies indicate Red Goshawks travel further than initially thought, suggesting there may be only one population, not two sub-populations – Tiwi and mainland (Chris MacColl pers. comms).

In the Northern Territory, the Tiwi Islands are recognised as a stronghold for the species, with around 15% of the total Australian population (Woinarski et al. 2000), or approximately 100 pairs of Red Goshawk. Species decline has occurred due to loss of habitat from land clearing, particularly on Melville Island (Woinarski et al. 2003; Woinarski et al. 2007). The Red Goshawk is of cultural significance to Indigenous peoples on the Tiwi Islands (TSSC 2015a). Core habitat for this species is found across the Tiwi Islands and the population is monitored annually with long term datasets on population trends.

The Transmission Line Corridor and Hydrogen Production Precinct contain vegetation and large trees that are suitable for nesting by Red Goshawks – taller than 20 m and within 1 km of water. Roadsides and corridors on the Tiwi Islands contain some of the largest trees due to their placement along ridgelines – i.e. where the tallest trees grow (Baker-Gabb pers. comms 2019). Red Goshawks are known to tolerate some disturbance and human activity around nests (Aumann & Baker Gabb 1991, Baker-Gabb pers. comms. 2019) and may continue to nest in areas of high traffic and activity – i.e. along roadsides and in corridors. Field observations did not detect the presence of Red Goshawk nests within the project area at the time of the survey, March 2022. While not the preferred nesting habitat, the Solar Precinct is likely to be used for foraging and roosting due to the presence of prey species within the plantations.

Tiwi Plantations Corporation undertake annual surveys for Red Goshawk along all tracks, roads and fire breaks surrounding the plantations. The most recent Red Goshawk nest in western Melville Island was detected in 2018 outside of the project area (TPC 2022).

Analysis of the available nest data indicates that five breeding females have been recorded within 20 km of the project area and have collectively nested in at least 14 sites, with the greatest number of nest sites attributed to an individual bird being six. The majority of those sites are outside the project area – i.e. they are greater than 5 km away, therefore the bird's territory does not extend to the area of impact. Moreover, for some named females, there have been no recent sightings – i.e. since 2018, or earlier – and it is assumed that that bird has moved nests. This leaves three breeding birds who are likely to have extant nesting territories within the area of potential impact from the Transmission Line Corridor. Between them, these breeding birds have used six different nesting sites.

While the project area contains vegetation that may be suitable for Red Goshawk nesting, there are no recent records of nesting by Red Goshawks within it, likely due to the presence of higher quality habitat available in



other parts of Melville Island and the increase in forestry activities since 2015. While nests have not been detected within the project area, it is within the home range of known Red Goshawk pairs and they are highly likely to use vegetation within the project area as foraging habitat.

3.3 Partridge Pigeon (*Geophaps smithii smithii*)

The Partridge Pigeon is a medium-sized ground dwelling bird which forages, roosts and breeds entirely on the ground (Fraser 2000), rarely flying, except when flushed. The species is largely sedentary and typically occurs singly or in small family groups. Larger aggregations may occur around waterholes. The Partridge Pigeon nests on the ground, preferentially in lowland eucalypt open forests and woodlands at sites with relatively dense grass cover. This is in contrast to the relatively open and often burnt areas the species prefers for feeding, which suggests that fire regimes may significantly affect the species. Nesting occurs mostly in the early dry season (DEPWS 2021j). Pigeons are multi-brooded in captivity and thought to be so in the wild; however, limited data is available on incubation and success rates. Fraser (2000) observed most breeding to occur between May and August, with a fledgling 6 – 14 days after hatching. Young and parents remained around the nest for up to five weeks after fledging (Fraser 2000). Densities of this species on Melville Island remained similar from 2002 to 2019 at 0.30 birds/ha with occurrences in native forest and plantation areas observed (Garnett & Baker 2021).

As discussed in Section 3.1.2, a targeted survey was not completed for Partridge Pigeons; however, they were easily observed during site visit and field surveys in March 2022 in all the project components, including within the plantations, while driving and walking *Typhonium* transects.

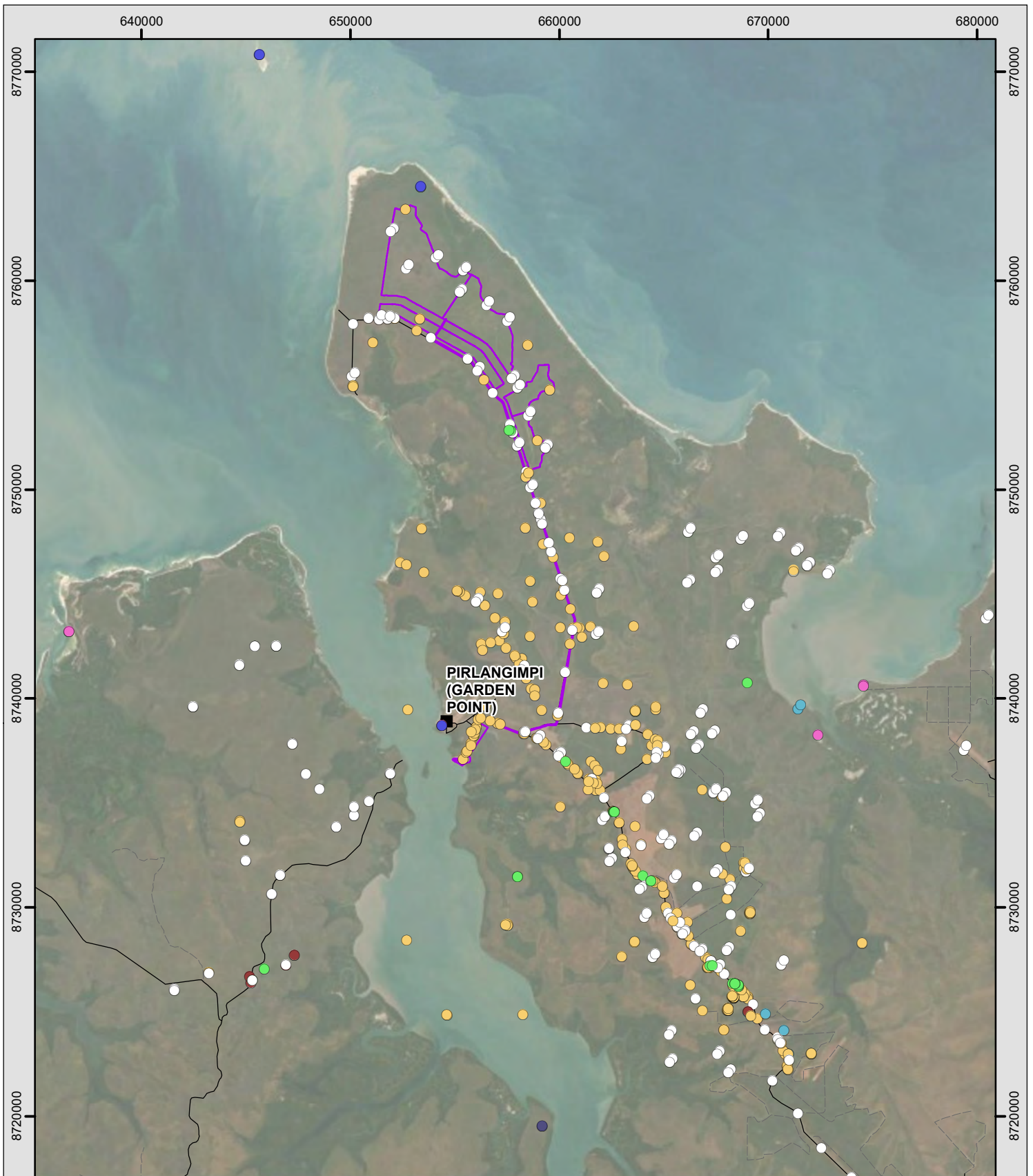
The Tiwi sub-population of Partridge Pigeons, listed as Vulnerable both federally and in the Territory, is considered an important population as there is historic range contraction on the mainland, whereas the Tiwi population has remained stable (Garnett & Baker 2021) and is necessary for maintaining genetic diversity of the species. Partridge Pigeons are highly likely to be present within the project area.

3.4 Tiwi Masked Owl (*Tyto novaehollandiae melvillensis*)

The Masked Owl (Tiwi Islands) (*Tyto novaehollandiae melvillensis*) is a subspecies endemic to the Tiwi Islands (DEPWS 2021f). The Tiwi Masked Owl occurs on both Melville and Bathurst Island, mainly within tall open Eucalypt forests, especially those dominated by Darwin Woollybutt (*Eucalyptus miniata*), Darwin Stringybark (*E. tetradonta*) and Melville Island Bloodwood (*Corymbia nesophila*) (Woinarski et al. 2003). The Tiwi Masked Owl is most commonly recorded in the higher rainfall areas of north-west Melville Island, where Eucalypt forests are tallest and there are many small patches of monsoon rainforest (Woinarski et al. 2003). Nesting takes place in large tree hollows (Higgins 1999) during the dry season (Ward 2010).

The native vegetation within the Solar Precinct, Transmission Line Corridor and Hydrogen Production Precinct contains vegetation and large trees – greater than 40 cm DBH – that are likely to contain hollows large enough for nesting by Tiwi Masked Owls. There are numerous records of the species on Melville Island, however the highest density occurs along the road corridor from the Solar Precinct and along the Transmission Line Corridor (TPC 2022). The presence of Tiwi Masked Owls in these areas suggests there is suitable habitat within the project area and the owls are within their home ranges; however, the higher proportion of results along roads and corridors is a factor of past survey effort being focussed in easily accessible areas around the forestry developments. Tiwi Masked Owls have also been observed within the plantations, foraging in open areas and roosting within plantation trees, including trees smaller than 40 cm DBH. In March 2022, TPC staff completed the most recent Tiwi Masked Owl call back survey. Of relevance to this project, the survey recorded four responses of Tiwi Masked Owls along the road adjacent to the Transmission Line Corridor from the Solar Precinct to the Main Road intersection, indicating presence of the species.

Tiwi Masked Owls are listed as Endangered both federally and within the Territory, and therefore the Tiwi Islands population is considered an important population. The subspecies is highly likely to be present and/or using the project area.



Legend

- Project area
- Minor road
- Track
- Far Eastern Curlew
- Greater Sand Plover
- Hooded Robin (Tiwi)
- Horsfield's Bushlark (Tiwi)
- Lesser Sand Plover
- Masked Owl (Tiwi)
- Partridge Pigeon (eastern)
- Red Goshawk



0 2.5 5
Kilometres



MAP INFORMATION
 Scale: 1:250,000 @ A4
 Projection: GDA 1994 MGA Zone 52
 Date Saved: 30/05/2022
 Client: GEV
 Mapper: SR

DATA SOURCE
 Topographic data: Geoscience Aust.
 Project data: EZZ1166, DEPWS, TPC
 Imagery: ESRI

Figure 16. Map of threatened bird species records within 20 km of the project area



3.5 Brush-tailed Rabbit-rat (*Conilurus penicillatus*)

A medium-sized, partly arboreal rodent, the Brush-tailed Rabbit-rat is known to occur from the Kimberly to southern New Guinea, including on various NT islands. Recently, the range and records of the species have been reduced to the Coburg Peninsula, Groote Eylandt, Bathurst, Melville and Inglis islands (DEPWS 2021d). There are three recognised subspecies, with *Conilurus penicillatus melibius* endemic to the Tiwi Islands. This species' preferred habitat is tall open Eucalypt forests (Firth et al 2006), but it is known to occur in grasslands and woodlands. Brush-tailed Rabbit-rats shelter and den in tree hollows or crowns of pandanus or sand palms, but can be found foraging on the ground (DEPWS 2021d).

Brush-tailed Rabbit-rats were recently the focus of a study adjacent to the Solar Precinct in Imalu, which found den sharing and range cross-over with Black-footed Tree-rats and Northern Brushtail Possum (Penton et al. 2020b). Brush-tailed Rabbit-rats have small home ranges and recent tracking found individuals will forage in nearby vegetation and return to tree hollows for denning. The vegetation within the plantations are food sources for many fauna species and it is therefore likely that Brush-tailed Rabbit-rats include plantation areas in their home ranges. Penton et al. (2021) found that despite the reliance on hollows, abundance is tied to understory characteristics, protection from predators and access to food resources. This study, and another by Georgina Neave, found Imalu was the only place the Brush-tailed Rabbit-rat could be reliably detected on Melville Island (Penton, Neave pers. comms). Connect Environmental (2022) surveys in March 2021 detected the presence of Brush-tailed Rabbit-rats in vegetation adjacent to the Hydrogen Production Precinct.

The Brush-tailed Rabbit-rat is listed as Vulnerable federally and as Endangered in the Northern Territory. The Tiwi population is likely to be the largest remaining subpopulation, is considered an important population as all *Conilurus* subpopulations are considered important due to their importance for the species long-term survival (Woinarski et al. 2017). As well as using the plantations in the Solar Precinct for foraging and as corridors, vegetation with trees likely to contain hollows for nesting and shelter are present within the Solar Precinct, Transmission Line Corridor and Hydrogen Production Precinct. The Brush-tailed Rabbit-rat is therefore highly likely to occur across the project area.

3.6 Northern Brush-tailed Phascogale (*Phascogale pirata*)

The Northern Brush-tailed Phascogale is an elusive and poorly known mammal. It is an intermediate sized, hollow-dwelling, carnivorous marsupial weighing 150 to 200 g (DEPWS 2021h). The Northern Brush-tailed Phascogale is endemic and restricted to the coastal savannas in the Top End (Geyle et al. 2020). A small number of records exist, including on Melville Island from tall open Eucalypt forests (DEPWS 2021h). While few records exist, there is evidence of a decline in both population and distribution of this species across the Top End (Woinarski et al 2014). The Northern Brush-tailed Phascogale is difficult to detect through general wildlife surveys, which was addressed in a 2019 study by CDU and the Threatened Species Recovery Hub to determine an effective survey and monitoring methodology on Melville Island at Taracumbi (Geyle et al. 2020). A targeted detection methodology was developed, using cameras and arboreal live traps. Cameras deployed for this study detected Northern Brush-tailed Phascogales 16 times over 10 months, mostly on large Eucalyptus trees during the wet season (Geyle et al. 2020). The study area in Taracumbi is similar to that surrounding the project area – open eucalypt forest – and the studies were conducted within the Taracumbi CSIRO carbon plots. The Taracumbi carbon plots are approximately 55 km from the project area. Recent general wildlife surveys by Connect Environmental (2022) near the Hydrogen Production Precinct did not detect the presence of Northern Brush-tailed Phascogales.

The Northern Brush-tailed Phascogale is listed as Vulnerable federally and as Endangered in the Northern Territory. Melville Island is a stronghold for small to medium mammals and this is an important population for the species long-term survival due to species not being recorded on the mainland for more than twenty years, despite targeted survey effort (Geyle et al. 2020). All areas of native vegetation within the project area have trees likely to contain hollows, including areas of significant vegetation with large Eucalyptus trees, that may be used by this species for nesting and shelter. As Geyle et. al. (2020) suggested that most detections were on large (>40 cm DBH) trees, the likelihood of this species being detected within the plantations is lower than



in the surrounding native vegetation. The Northern Brush-tailed Phascogale is likely to occur in the project area.

3.7 Black-footed Tree-rat (*Mesembriomys gouldii melvillensis*)

The Black-footed Tree-rat (*Mesembriomys gouldii melvillensis*) occurs as a subspecies endemic to Melville Island (Firth et al. 2006). It is a medium-sized nocturnal rodent that dens mostly in tree hollows but may also use clumps of *Pandanus spiralis*. The species is largely arboreal but also forages on the ground. The Black-footed Tree-rat generally requires fruit and seed resources – including *Pandanus* fruits, fruiting trees and shrubs (Rankmore 2006). The Black-footed Tree-rat predominantly occurs in woodlands and lowland open forests with large trees dominated by *Eucalyptus miniata* and/or *E. tetradonta* and a moderately dense and diverse mid-storey of small trees and shrubs (DEPWS 2021c). A Black-footed Tree-rats' home range is thought to be large (60 to 70 ha) based on another subspecies and they may make movements up to 500 m in a night (TSSC 2015b).

The subspecies is thought to be more prevalent in woodlands with infrequent and low intensity fires (Price & Baker 2007) with greater fruiting species diversity to support a greater abundance of Black-footed Tree-rat individuals (Rankmore 2006). Tree hollows are an important resource for the species and frequently burnt landscapes may contain fewer larger trees that provide hollows; however, natural events such as cyclones may also reduce the number of trees and hence hollow availability (Woinarski & Westaway 2008). Penton (2021) found that despite the reliance on hollows, abundance is tied to understory characteristics, protection from predators and access to food resources. Rankmore (2006) found that this species was not known to use highly modified habitat of open pasture and mango orchards, and requires forested corridors connecting remnant patches of intact woodland.

Black-footed Tree-rats were recently part of a study adjacent to the project area in Imalu, which found den sharing and range cross-over with Brush-tailed Rabbit-rat and Northern Brushtail Possum (Penton et al. 2020b). This study also suggested individuals use the plantations for transport or foraging before returning to den in trees hollows adjacent in native vegetation or wildlife corridors (Cara Penton pers. comms).

The Black-footed Tree-rat is listed as Vulnerable federally and in the Northern Territory. Melville Island is a stronghold for small to medium mammals. The Melville Island population is important population for the long-term survival of the species by maintaining genetic diversity as this population is of an endemic subspecies, and overall the species is experiencing declines on the mainland associated with habitat loss (TSSC 2015b). Recent general wildlife surveys by Connect Environmental (2022) adjacent to the Hydrogen Production Precinct detected the presence of Black-footed Tree-rats. The Solar Precinct, Transmission Line Corridor and Hydrogen Production Precinct contain native vegetation with trees likely to contain hollows used by this species for nesting and shelter and understory food resources. The Black-footed Tree-rat is highly likely to occur across the project area.

3.8 Pale Field-rat (*Rattus tunneyi*)

The Pale Field-rat is a medium-sized rodent that was once a widespread species in the Top End (DEPWS 2021i). Historically, this species occurred in lowland *Eucalyptus* open forests and grasslands that have sandy surface soil characteristics, but the Pale Field-rat is now recorded primarily in dense vegetation along creeks (Aplin et al. 2008). The fire regime of an area seems to have little effect on population numbers (Braithwaite & Griffiths 1996); instead, the level of groundwater irrigating the riparian system and, to a lesser extent, current rainfall have a much stronger influence (Braithwaite & Griffiths 1996). Due to a combination of threats, the overall population of the species is estimated to have declined by up to 30% in the past ten years (Woinarski et al. 2014). The recent records of the Pale Field-rat on Melville Island have come from the AECOM (2022) and Connect Environmental (2022) general wildlife surveys associated with road upgrades. Both surveys detected the Pale Field-rat in riparian vegetation and tall, open Eucalypt forests (AECOM 2022 & Connect Environmental 2022). The Pale Field-rat was detected in March 2021 in Eucalypt forest adjacent to the Hydrogen Production Precinct (Connect Environmental 2022).



The Pale Field-rat is listed as Vulnerable under NT legislation and there are records within the Transmission Line Corridor. Given the recent declines of this species, the recent detections in riparian and open forest habitat on Melville Island support the growing evidence that Melville Island as a stronghold for small to medium mammals. This population is an important population to maintain the genetic diversity and for the long-term survival of the species. The presence of suitable habitat in in the project and surrounding areas, recent detections adjacent to and the intersection of watercourses within the project area indicate the Pale Field-rat is highly likely to be present.

3.9 Butler's Dunnart (*Sminthopsis butleri*)

Butler's Dunnart is a small, terrestrial, carnivorous mammal restricted to the Tiwi Islands. Individuals of Butler's Dunnarts have not been detected in WA since 1966 nor on the mainland despite targeted surveys. Butler's Dunnarts are thought to occur at low densities (DoE 2022b) across both Tiwi Islands in a range of habitats. Their preferred habitats are Eucalyptus open forests and woodlands dominated by *E. tetradonta*, *E. miniata* and *Corymbia nesophila* (DEPWS 2021e). The main threats are loss of habitat from land clearing, altered fire regimes, increased spread of weeds, habitat changes from feral herbivores and predation by feral cats (DEPWS 2021e). Butler's Dunnarts are difficult to detect, requiring a targeted survey using deep pitfall traps which still yields low detectability of individuals. Like many other endemic Tiwi species, there is a lack of information on the Butler's Dunnart (DoE 2022b).

Butler's Dunnart is listed as Vulnerable both federally and in the Territory. The nearest Butler's Dunnart records are from 2001 and 2013 from general fauna surveys by the NT Government; however, targeted survey for Butler's Dunnarts have never been conducted within the project area. While difficult to detect, a targeted survey methodology was developed on Melville Island for Butler's Dunnarts and they are still reliably detected as recently as 2021 (AECOM 2022). The March 2021 survey completed by Connect Environmental detected the presence of Dunnarts adjacent to the Hydrogen Production Precinct, with one thought to be a Butler's Dunnart, however this was a camera detection and unable to be confirmed to a species as the Butler's and Red-Cheeked Dunnarts both require live trapping for accurate identification (Potter et al. 2018). The Melville Island population of Butler's Dunnart is important (DoE 2022b). Their preferred habitat is found within the native vegetation of the Solar Precinct, Transmission Line Corridor and the Hydrogen Production Precinct; however, targeted surveys have not been undertaken within plantations and they could occur here as well. Butler's Dunnarts are likely to be present across the project area.

3.10 Northern Brushtail Possum (*Trichosurus vulpecula arnhemensis*)

The northern subspecies of Brushtail Possum was recently listed as Vulnerable under the *EPBC Act* due to the decline of its populations in the Top End and reduction of its home range across the Northern Territory, mostly as a consequence of too frequent fire and predation by feral cats (Stobo-Wilson et al. 2019). This subspecies occurs continuously from the Gulf of Carpentaria hinterland near Borroloola, in the Northern Territory, to the Kimberley, in Western Australia (Morris et al. 2016). It mainly inhabits tall Eucalypt open forests with large hollow-bearing trees, particularly where the understorey includes some shrubs that bear fleshy fruits, but also occurs in mangrove communities – especially where these contain hollow-bearing trees – rainforests and semi-urban areas, notably around Darwin (TSSC 2021). The Northern Brushtail Possum has been frequently recorded in general mammal surveys across the Tiwi Islands, including a targeted study with GPS tracking of individuals in 2019 by Penton et al. (2020b), which found den sharing and range cross-over with Black-footed Tree-rat and Brush-tailed Rabbit-rat. The study showed records of GPS-tracked individuals using the plantations for foraging at night before returning to den in tree hollows in the adjacent native vegetation (Cara Penton pers. comms). The Northern Brushtail Possum was detected in March 2021 in Eucalypt forest adjacent to the Hydrogen Production Precinct (Connect Environmental 2022).

The Northern Brushtail Possum is listed as Vulnerable federally, but is not listed under Territory legislation. The population of Brushtail Possums on Melville Island is important because this species has experienced decline on the mainland whereas the island population is healthy, with a density higher than Kakadu National Park after the species' decline there (Davies et al. 2021). Trees likely to contain hollows used by this species for nesting and shelter are present within the Solar Precinct, Transmission Line Corridor and Hydrogen



Production Precinct. Areas with understory food resources occur within or adjacent to all components of the project, including the plantations within the Solar Precinct. The Northern Brushtail Possum is highly likely to be present within the project area.

3.11 Mertens' Water Monitor (*Varanus mertensi*)

The Mertens' Water Monitor has a broad geographic range, occupying coastal and inland waters across the far north of Australia from the Kimberley to the west side of Cape York Peninsula. It has been recorded across most of the Top End and the Gulf Region in the NT. It is a semi-aquatic monitor seldom seen far from water and feeds mainly on fish, frogs and carrion, and also eat insects and small terrestrial vertebrates. The Mertens' Water Monitor is susceptible to Cane Toad poisoning (DEPWS 2021g).

There are limited NT Fauna Atlas records for the Tiwi Islands; however, water monitors are recorded in Tiwi Indigenous knowledge as a food source (TLC 2001), are often seen on Melville Island and an individual was recorded during the AECOM surveys along Paru Road (AECOM 2022). The Connect Environmental surveys did not detect Mertens' Water Monitors; however, the report acknowledges limitations for this species as trapping was not conducted along creek lines.

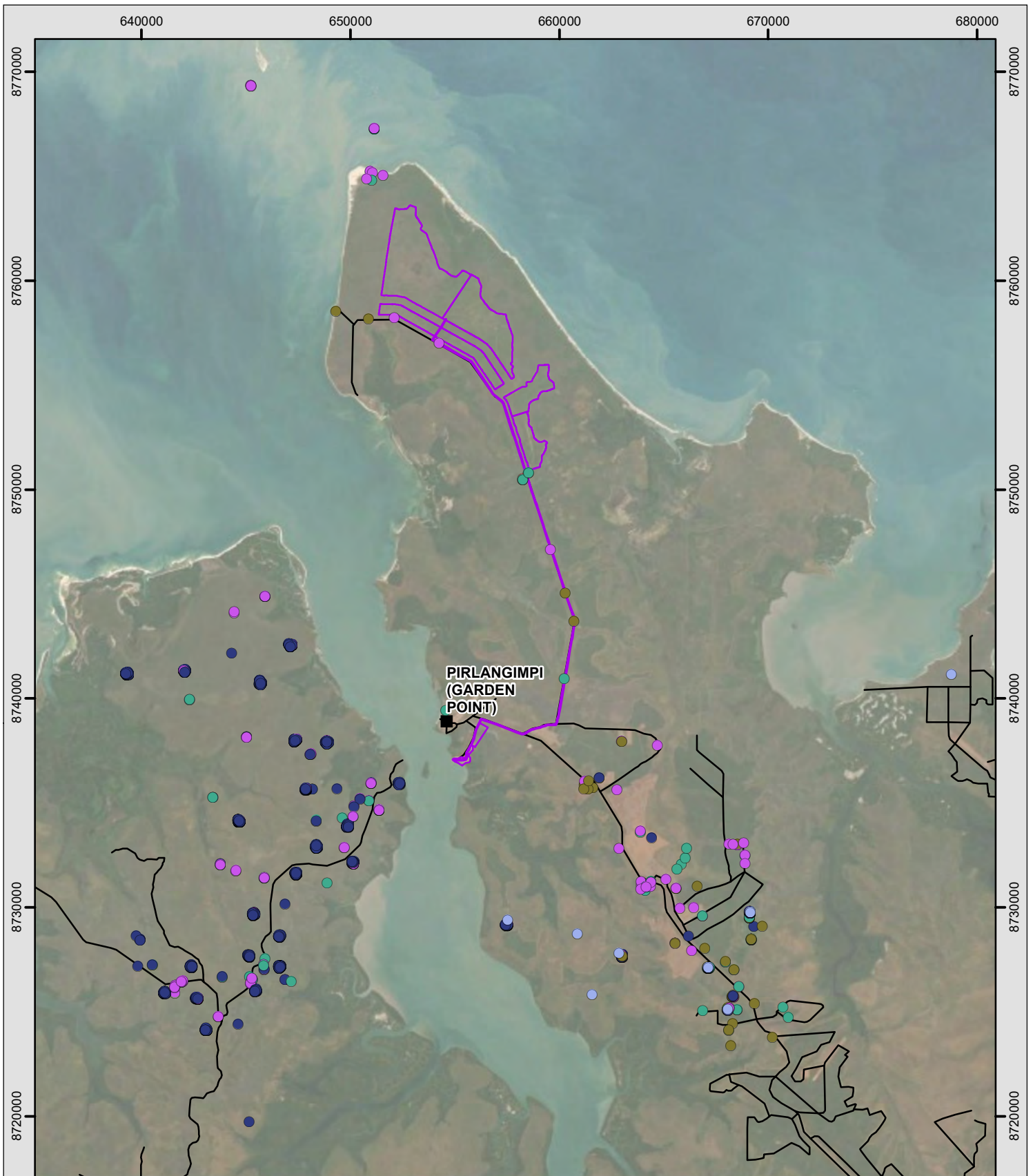
The NT conservation objective for the Mertens' Water Monitor includes maintaining populations on Cane Toad free islands, of which Melville Island is one of three, that Mertens Water Monitors have been detected on (DEPWS 2021g). The Melville Island population is therefore important for the long-term survival of the Mertens' Water Monitor given its toad-free status. The Transmission Line Corridor intersects multiple watercourses, and the other components are not far from the coast. Consequently, the Mertens' Water Monitor is likely to occur wherever riparian habitat intersects the project area.

3.12 Floodplain / Yellow-spotted Monitor (*Varanus panoptes*)

The Yellow-spotted or Floodplain Monitor is a large terrestrial monitor that can grow up to 1.4 m. It is a robust ground-dwelling monitor occupying a variety of habitats, including coastal beaches, floodplains, grasslands and woodlands (Ward et al. 2012). It feeds primarily on small terrestrial vertebrates and insects, and lays a clutch of eggs in a burrow, usually in the Wet season (Ward et al. 2012).

The species once occurred across the extent of northern Australia. However, its propensity to eat Cane Toads and die from the ingested toxins has caused a significant decline in the population (Ward et al. 2012).

There are limited NT Fauna Atlas records for the Tiwi Islands; however, water monitors are recorded in Tiwi knowledge as a food source (TLC 2001) and are often seen on Melville Island. As with the Mertens' Water Monitor, the NT conservation objective for the Yellow-spotted Monitor includes maintaining populations on Cane Toad free islands, of which Melville Island is one of four, with detections of the Yellow-spotted Monitor (Ward et al. 2012). The Melville Island population is important for the long-term survival of the Yellow-spotted Monitor given its toad-free status. The Yellow-spotted Monitor is likely to occur across the project area, due to the areas of woodlands and the proximity to the coast, and is highly likely within the Transmission Line Corridor at intersects of wetlands.



- Project area
- Roads
- Black-footed Tree-rat (Melville Island)
- Brush-tailed Rabbit-rat
- Butler's Dunnart
- Common Brushtail Possum (north-western)
- Northern Brush-tailed Phascogale
- Pale Field-rat
- Water Mouse

0 2.5 5
Kilometres

MAP INFORMATION
 Scale: 1:250,000 @ A4
 Projection: GDA 1994 MGA Zone 52
 Date Saved: 16/06/2022
 Client: GEV
 Mapper: SR

DATA SOURCE
 Topographic data: Geoscience Aust.
 Project data: EZ21166, DEPWS, TPC
 Imagery: ESRI

Figure 17. Map of threatened mammal species records within 20 km of the project area

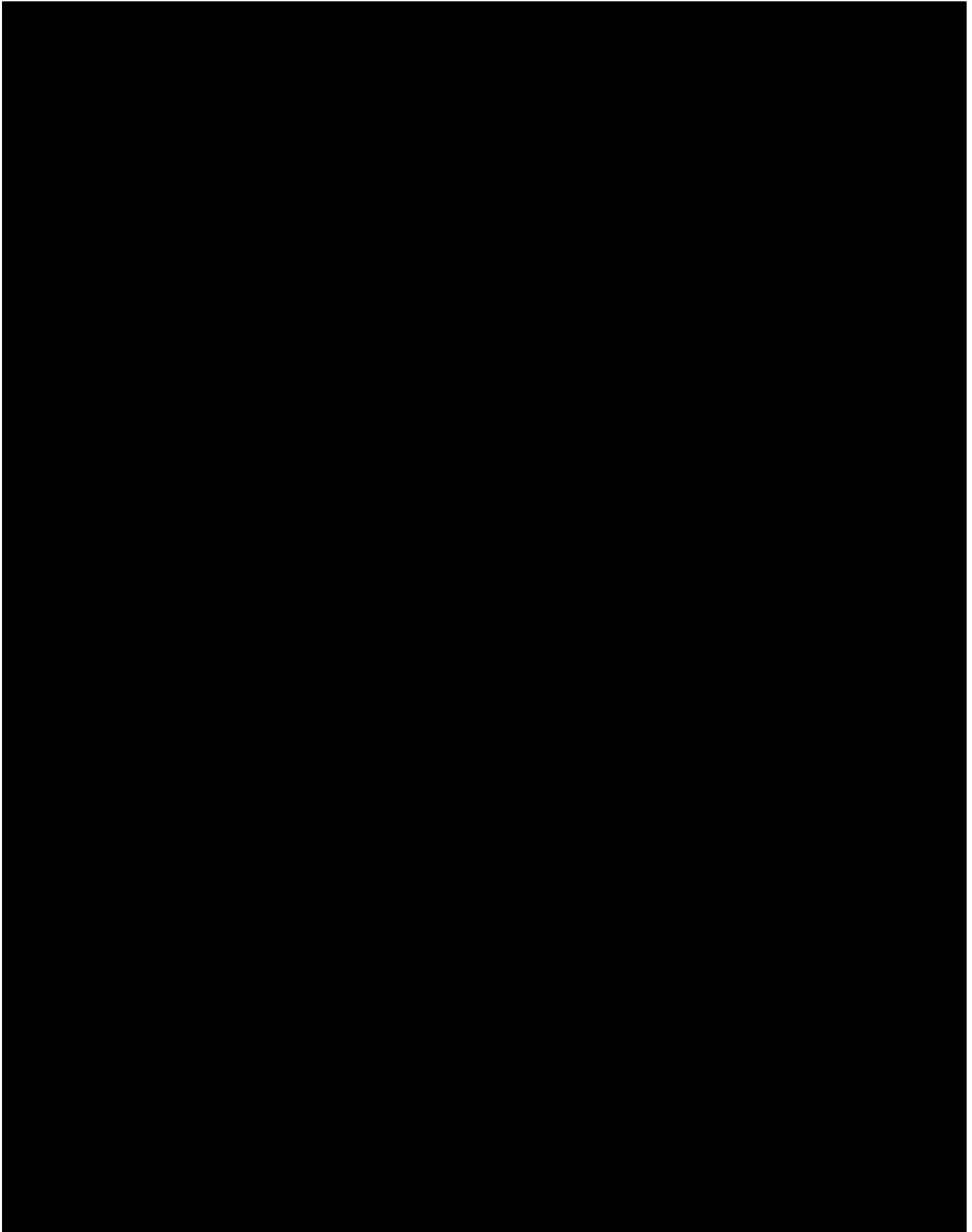


Figure 18. Map of other threatened species records within 20 km of the project area

3.13 Darwin Cycad (*Cycas armstrongii*)

The Darwin Cycad (*Cycas armstrongii*) is a small to medium-sized cycad with a slender trunk. The species occurs in open grassy woodlands where adequate draining appears to be a limiting factor. It also occurs on rocky outcrops, undulating hills and plains (Kerrigan et al. 2012). Prime cycad habitat has deep loamy, well-drained soil and the species is frequently associated with *Eucalyptus miniata* and *Eucalyptus tetradonta* (Liddle 2009). Darwin Cycads are endemic to the Top End, with abundant populations occurring throughout the greater Darwin region, often forming dense stands (Kerrigan et al. 2012). Nevertheless, their long-term conservation has to be considered because they are long-lived, have a slow reproductive rate and localised distribution (Liddle 2009).

Within the preferred habitat and when conditions are favourable, the Darwin Cycad can occur at densities ranging from several to more than 1,000 individuals per ha (Watkinson and Powell 1997; Liddle 2004). Areas with high-density stands of cycads are important for maintaining the species' diversity and function (Hill 2020).

Darwin Cycads were observed throughout all project components during the site visit in March 2022, including occasionally within the plantations. The Transmission Line Corridor, Hydrogen Production and Export Precincts contained the highest density of plants, including many individuals taller than 2 m – see Figure 19. No areas of high density – i.e. >1,000 individuals per ha – were identified.



PP16 Transmission Line Corridor



PP15 Transmission Line Corridor



PPA3 Hydrogen Production Precinct



Hydrogen Export Precinct

Figure 19. Photographs of Darwin Cycads within the project area



3.14 *Typhonium* species

3.14.1 *Typhonium jonesii*

Typhonium jonesii is a geophytic perennial herb with erect annual aerial parts and a starchy tuber. The flower emerges along with new season leaves in December (Kerrigan and Cowie 2006). The above-ground annual shoots are seasonally-dormant and die back in the dry season, making the species highly cryptic (DENR 2018a). Pollination most likely occurs by insect vectors (Mayo et al. 1997), specifically Rove Beetles (Family *Staphylinidae*, as in the related *T. praetermissum*) (DENR 2018a). The species occurs in *Eucalyptus tetrodonta*, *E. miniata* and *Corymbia nesophila* dominated open forest on deep, well-drained sandy soils supporting relatively sparse grass layer (Kerrigan & Cowie 2006; DENR 2018a).

Threatening processes for this species include the clearing of habitat for land development; habitat degradation by feral buffalo, cattle and horses; and the invasion of exotic plants through increased activity, clearing, road development in the area around known populations (Kerrigan & Cowie 2006). *Typhonium jonesii* is known only from the Tiwi Island and habitat modelling shows high likelihood of occurrence within the project area. Prior to the surveys discussed in this report, there were approximately 1991 records of *T. jonesii* associated with between 15 to 20 subpopulations. The Connect Environmental (2022) surveys in March 2021 had added 1,322 records of this species to the dataset. The new records closest to the project area were in a location with previous *Typhonium* records – approx. 800 m from the Transmission Line Corridor and not considered a new sub-population.

3.14.2 *Typhonium mirabile*

Typhonium mirabile is a small tuberous herb with annual aerial parts. Flowering occurs in October and fruiting in December; the above-ground shoots are seasonally-dormant and die back during the dry season (Kerrigan et al. 2007). *T. mirabile* occurs in *Eucalyptus tetrodonta*, *E. miniata* and *C. nesophila* dominated open forest on deep, well-drained sandy red-brown kandosol soils supporting a relatively sparse grass layer (DENR 2018a). It is found sporadically in groups, often near the bases of young *Cycas* plants or in shade (Kerrigan et al. 2007).

Threatening processes for this species include the clearing of habitat for development; habitat degradation by feral buffalo, cattle and horses; and the invasion of exotic plants through increased activity, clearing and road development in the area around known populations (DoE 2022c).

Typhonium mirabile is restricted to Bathurst Island and the western half of Melville Island. *T. mirabile* was found to occur sparsely during targeted surveys in 2014 on Melville Island (DENR 2018a). *T. mirabile* is widespread and common in the northern Bathurst Island area (DENR 2018a). An estimate of the number of subpopulations on the Tiwi Islands is between 15 to 30 (DENR 2018a); however, this is a conservative estimate based on the difficulties in delineating sub-populations due to uncertainties surrounding the pollination and seed dispersal syndromes for the species and specific vectors involved.

Prior to the surveys discussed in this report, the total number of records consisting of one or more plants, held by the NT Flora Atlas was approximately 1,000 including results of the Connect Environmental (2022) surveys in March 2021. Of these records, the individuals closest to the project area were in a location with previous *Typhonium* records – approx. 800 m from the Transmission Line Corridor. A March 2022 EcOz survey on southern Bathurst Island found over 700 new plants which are yet to be added to the NT Flora Atlas, bringing the known population to over 1,700.

3.14.3 Survey results

The NT Flora Atlas shows no records of *Typhonium jonesii* and *Typhonium mirabile* within the project area. Desktop analysis of DEPWS habitat modelling showing the likelihood of occurrence of *Typhonium* species was used to identify areas to survey. High likelihood modelled habitat within the project area was selected for survey in accordance with the *Draft Typhonium Survey Guidelines* provided by DEPWS.

Surveys were conducted on 24, 25, 29, 30 March and 1 April 2022 in accordance with the *Draft Typhonium Survey Guidelines* in areas of high likelihood modelled habitat, walking 17 m transect lines through all high likelihood modelled habitat and recording a GPS point for each individual plant detected. Wherever plants were detected, 10 m transects were walked in the vicinity to determine the density of the population. Reference sites with known *Typhonium* plants were visited twice during the site visit to confirm plants were visible and to assist in training of the Cultural Monitors and Tiwi Rangers. With the assistance of the Tiwi Rangers and Tiwi Traditional Owners, 48 km of transects were surveyed over five days across all project components. Maps of the area surveyed and locations of the plants found are presented in Appendix D.

Typhonium plants were detected on the last day of survey, within the Port Melville lease area and Hydrogen Export Precinct – Figure 21. A total of 66 plants were recorded – Appendix D. Plants were not detected within the Solar Precinct, Transmission Line Corridor or Hydrogen Production Precinct. *Typhonium* plants were detected in areas of high, moderate and no modelled likelihood. The soil composition at the site within Port Melville where *Typhonium* was found was different to other assessment sites with the presence of surface gravels and good drainage.



Figure 20. Photographs of *Typhonium* plants found at Port Melville

Genetic samples were taken in accordance *Typhonium praetermissum Population Genetic Sampling Guidelines* (provided by DEPWS) from plants for genetic identification. Samples were sent to James Cook University for analysis on 7 April 2022. Results are expected in July 2022.



Table 7. *Typhonium* records from April 2022 survey

Modelled Likelihood of Occurrence	Number of records
High	12
Moderate	30
Low	24
Total records	66

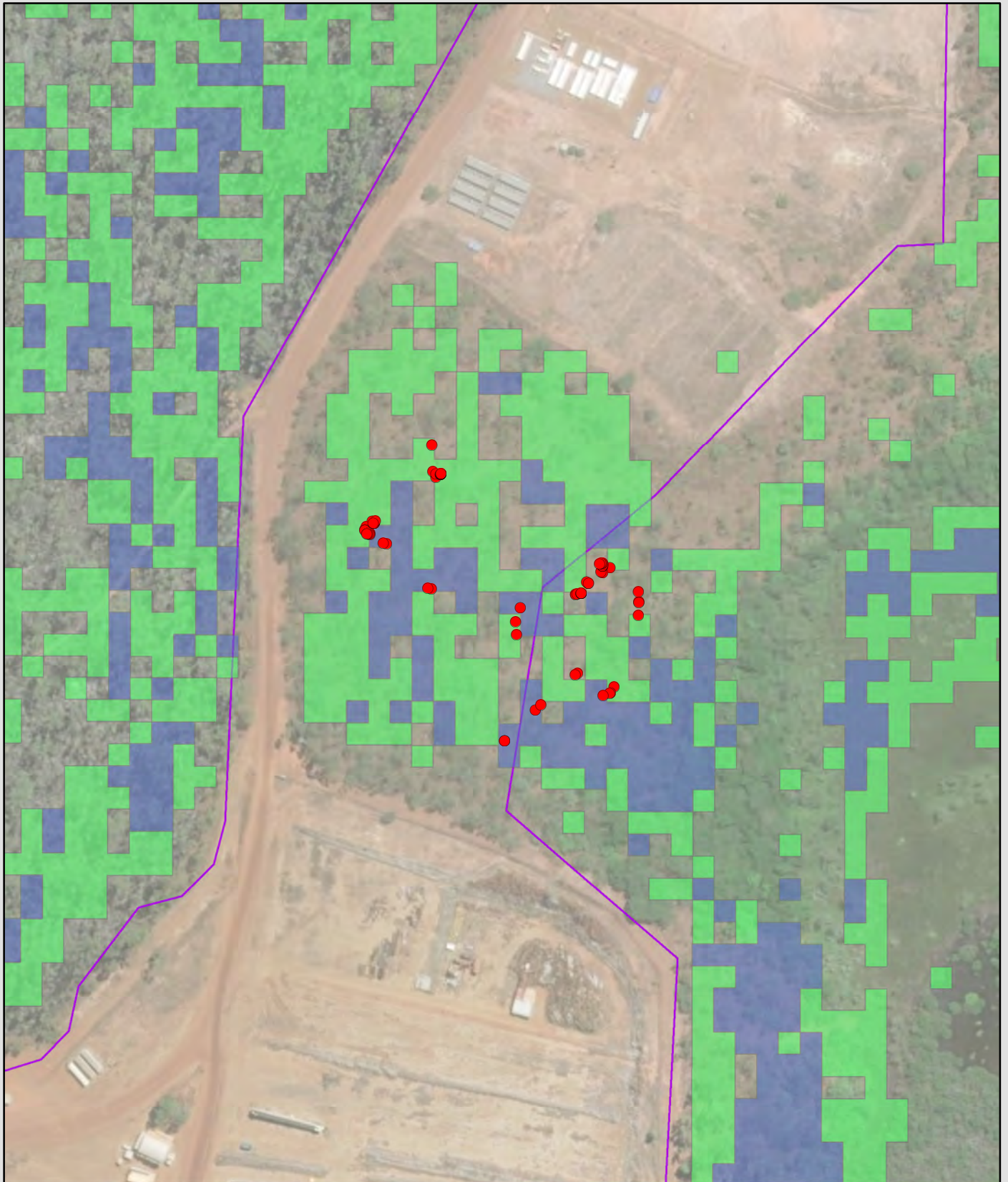
As described above, prior to this survey, there were 15 – 20 sub-populations for *T. jonesii* across the Tiwi Islands and the nearest records to this population on Melville Island are over 14 km away. There are closer records – 6.5 km away; however, these are within the plantation two years after land clearing and have not been confirmed as true records by DEPWS.





In contrast, *T. mirabile* records have been found recently in 2018, only 3.6 km away, in corridors along the main road. Prior to the 2021 and 2022 surveys for *T. mirabile* there were 15 – 30 sub-populations with most records on northern Bathurst Island.

Once genetic identification has been confirmed as either species, this survey will add 66 new records in an area with no previous records of *Typhonium* and hence would be a new sub-population for either species.

The Extent of Occurrence (EoO) and Area of Occupancy (AoO) are statistics used by the International Union for Conservation of Nature (IUCN) to assess the conservation significance of a species (IUCN 2022). The EoO is defined in IUCN (2021) as the area contained within the shortest continuous imaginary boundary which can be drawn to encompass all the known sites of present occurrence of a species. The AoO is a subset of the EoO and is the area which is actually occupied by the species, acknowledging that a species will not usually occur throughout the entire area of its EoO because it may contain unsuitable or unoccupied habitats.

The IUCN assessment process uses 2 km x 2 km grid cells (IUCN 2021) to assess AoO; if the grid cell contains individuals of the species, it is included in the AoO. Calculation of AoO is determined by multiplying the number of cells containing the species by the area of each cell. When setting the AoO for assessment against the threatened status of the species, the IUCN guidelines require the grid be positioned to intercept the minimum number of cells (IUCN 2021). The records found in this survey are within the existing EoO for both species and this occurrence will add one additional grid cell to the AoO of either species.



-  Hydrogen Export Precinct
 -  Typhonium plants
- Modelled Likelihood**
-  High
 -  Moderate



0 25 50
Metres



MAP INFORMATION
 Scale: 1:2,500 @ A4
 Projection: GDA 1994 MGA Zone 52
 Date Saved: 30/05/2022
 Client: GEV
 Mapper: SR

DATA SOURCE
 Topographic data: Geoscience Aust.
 Project data: EZZ1166, DEPWS
 Imagery: ESRI

Figure 21. Map of Typhonium plants detected during surveys



4 KEY VALUES

Significant environmental values were detected throughout, adjacent to and in the region of the project area. Most of the significant values were found within the remnant native vegetation and wildlife corridors; however, all components of the project area provided habitat values to flora and fauna species.

Sensitive and significant vegetation was found in or adjacent to all project areas – constituting large old growth trees, hollow-bearing trees, riparian vegetation, wetlands and water courses. Rainforest communities and GDE's are present in close proximity to project components.

The *Land Clearing Guidelines* (DEPWS 2021a) requires consideration of retention of native vegetation, particularly sensitive and significant vegetation types.

Of the 14 threatened flora and fauna species identified in the desktop analysis as having a high or medium likelihood of occurrence, five were confirmed present in the field and the other nine are considered highly likely to be present – Table 8. From the field surveys, a significant finding was a new sub-population of *Typhonium* plants within the Port Melville lease area.

While most of the environmental values found are associated with remnant native vegetation, the Solar Precinct under plantation also holds habitat value for threatened fauna species due to its size (>2,600 ha) and by providing foraging and roosting habitat, shelter, cover and contiguous vegetation for important populations of threatened species.

Table 8. Threatened species likelihood of occurrence in the project area

Species	Likelihood			
	Solar Precinct	Transmission Line Corridor	Hydrogen Production Precinct	Hydrogen Export Precinct
Red Goshawk (<i>Erythrotriorchis radiatus</i>)	High	High	High	Medium
Partridge Pigeon (<i>Geophaps smithii smithii</i>)	Known	Known	Known	Known
Masked Owl (Tiwi Islands' subspecies) (<i>Tyto novaehollandiae melvillensis</i>)	High	Known	High	Medium
Brush-tailed Rabbit-rat (<i>Conilurus penicillatus</i>)	Medium	Known	Known*	Medium
Black-footed Tree-rat (<i>Mesembriomys gouldii melvillensis</i>)	High	Known	Known*	Medium
Northern Brush-tailed Phascogale (<i>Phascogale pirata</i>)	High	High	High	Medium
Pale Field-rat (<i>Rattus tunneyi</i>)	Low	Known*	Known*	Medium
Butler's Dunnart (<i>Sminthopsis butleri</i>)	Medium	High	High	Medium
Northern Brushtail Possum (<i>Trichosurus vulpecula arnhemensis</i>)	High	Known	Known*	High
Mertens' Water Monitor (<i>Varanus mertensi</i>)	Low	High	High	High
Floodplain / Yellow Spotted Monitor (<i>Varanus panoptes</i>)	Low	High	High	High
Darwin Cycad (<i>Cycas armstrongii</i>)	Known	Known	Known	Known
<i>Typhonium jonesii</i> or <i>Typhonium mirabile</i>	Low	Low	Low	Known

* Assigned as 'Known' due to survey records in adjacent continuous vegetation within 500m



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APPENDIX A PROTECT MATTERS SEARCH TOOL (PMST) REPORT



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.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 07/09/21 08:54:11

[Summary](#)

[Details](#)

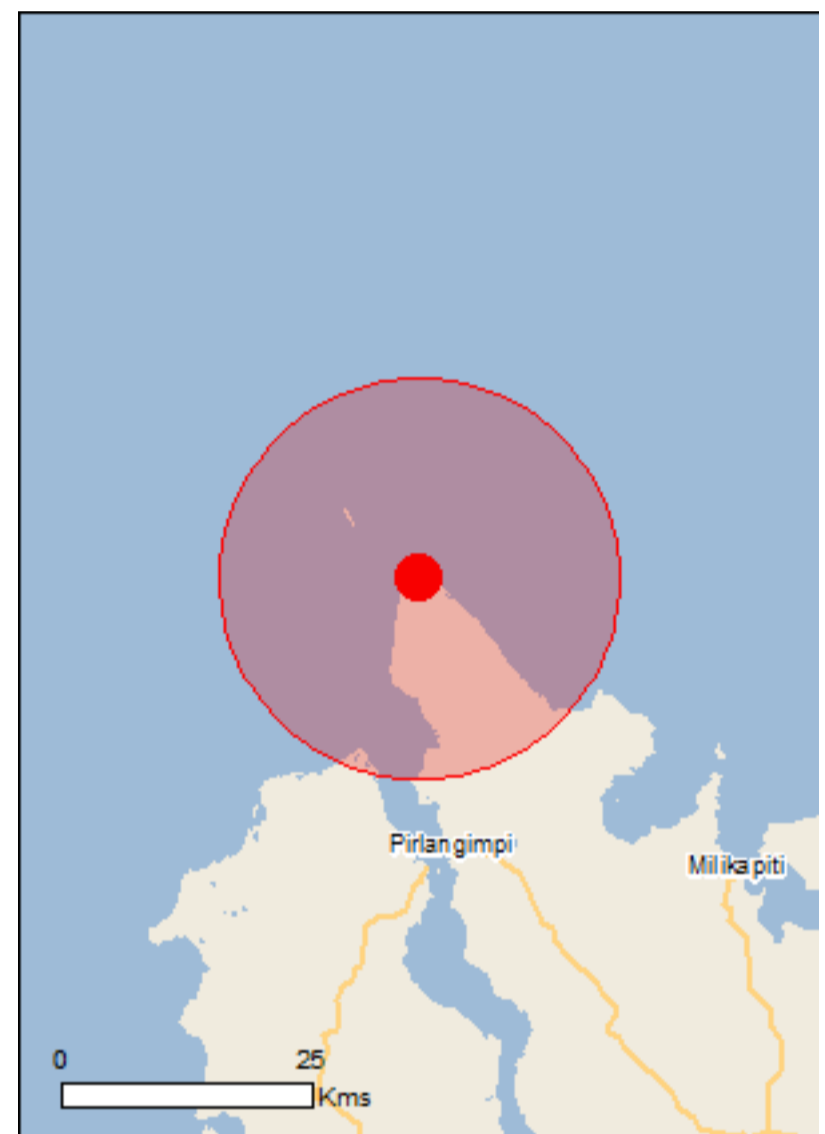
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)



This map may contain data which are
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[Coordinates](#)

Buffer: 20.0Km



Summary

Matters of National Environmental 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:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	39
Listed Migratory Species:	46

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 <http://www.environment.gov.au/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 Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	85
Whales and Other Cetaceans:	12
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	11
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Commonwealth Marine Area

[\[Resource Information \]](#)

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area. Generally the Commonwealth Marine Area stretches from three nautical miles to two hundred nautical miles from the coast.

Name

EEZ and Territorial Sea

Marine Regions

[\[Resource Information \]](#)

If you are planning to undertake action in an area in or close to the Commonwealth Marine Area, and a marine bioregional plan has been prepared for the Commonwealth Marine Area in that area, the marine bioregional plan may inform your decision as to whether to refer your proposed action under the EPBC Act.

Name

[North](#)

Listed Threatened Species

[\[Resource Information \]](#)

Name	Status	Type of Presence
Birds		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area
Geophaps smithii smithii Partridge Pigeon (eastern) [64441]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica baueri Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may occur within area
Melanodryas cucullata melvillensis Tiwi Islands Hooded Robin, Hooded Robin (Tiwi Islands) [67092]	Critically Endangered	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur

Name	Status	Type of Presence within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Tyto novaehollandiae melvillensis Tiwi Masked Owl, Tiwi Islands Masked Owl [26049]	Endangered	Species or species habitat known to occur within area
Mammals		
Antechinus bellus Fawn Antechinus [344]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Conilurus penicillatus Brush-tailed Rabbit-rat, Brush-tailed Tree-rat, Pakooma [132]	Vulnerable	Species or species habitat known to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat may occur within area
Mesembriomys gouldii melvillensis Black-footed Tree-rat (Melville Island) [87619]	Vulnerable	Species or species habitat known to occur within area
Phascogale pirata Northern Brush-tailed Phascogale [82954]	Vulnerable	Species or species habitat likely to occur within area
Saccolaimus saccolaimus nudicluniatus Bare-rumped Sheath-tailed Bat, Bare-rumped Sheath-tail Bat [66889]	Vulnerable	Species or species habitat may occur within area
Sminthopsis butleri Butler's Dunnart [302]	Vulnerable	Species or species habitat likely to occur within area
Trichosurus vulpecula arnhemensis Northern Brushtail Possum [83091]	Vulnerable	Species or species habitat likely to occur within area
Xeromys myoides Water Mouse, False Water Rat, Yirrkoo [66]	Vulnerable	Species or species habitat known to occur within area
Plants		
Burmanna sp. Bathurst Island (R.Fensham 1021) [82017]	Endangered	Species or species habitat likely to occur within area
Typhonium jonesii a herb [62412]	Endangered	Species or species habitat likely to occur within area
Typhonium mirabile a herb [79227]	Endangered	Species or species habitat likely to occur within area
Xylopia monosperma a shrub [82030]	Endangered	Species or species habitat known to occur within area
Reptiles		
Acanthophsis hawkei Plains Death Adder [83821]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area

Sharks

Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Glyphis garricki Northern River Shark, New Guinea River Shark [82454]	Endangered	Species or species habitat may occur within area
Glyphis glyphis Speartooth Shark [82453]	Critically Endangered	Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species

[[Resource Information](#)]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Migratory Marine Species		
Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Dugong dugon Dugong [28]		Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding known to occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat may occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River	Vulnerable	Species or species

Name	Threatened	Type of Presence
Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756] Pristis zijsron		habitat known to occur within area
Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442] Rhincodon typus	Vulnerable	Species or species habitat known to occur within area
Whale Shark [66680] Sousa chinensis	Vulnerable	Species or species habitat may occur within area
Indo-Pacific Humpback Dolphin [50] Tursiops aduncus (Arafura/Timor Sea populations)		Species or species habitat known to occur within area
Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Migratory Terrestrial Species		
Cecropis daurica Red-rumped Swallow [80610]		Species or species habitat may occur within area
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Migratory Wetlands Species		
Acrocephalus orientalis Oriental Reed-Warbler [59570]		Species or species habitat may occur within area
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Thalasseus bergii Greater Crested Tern [83000]		Breeding likely to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [\[Resource Information \]](#)

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Acrocephalus orientalis Oriental Reed-Warbler [59570]		Species or species habitat may occur within area
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundo daurica Red-rumped Swallow [59480]		Species or species habitat may occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Sterna bergii Crested Tern [816]		Breeding likely to occur within area
Fish		
Bhanotia fasciolata Corrugated Pipefish, Barbed Pipefish [66188]		Species or species habitat may occur within area
Campichthys tricarinatus Three-keel Pipefish [66192]		Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
Corythoichthys haematopterus Reef-top Pipefish [66201]		Species or species habitat may occur within area
Corythoichthys intestinalis Australian Messmate Pipefish, Banded Pipefish [66202]		Species or species habitat may occur within area
Corythoichthys schultzi Schultz's Pipefish [66205]		Species or species habitat may occur within area
Cosmocampus banneri Roughridge Pipefish [66206]		Species or species habitat may occur within area
Doryrhamphus dactyliophorus Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
Festucalex cinctus Girdled Pipefish [66214]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Halicampus dunckeri Red-hair Pipefish, Duncker's Pipefish [66220]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Halicampus spirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
Hippichthys cyanospilos Blue-speckled Pipefish, Blue-spotted Pipefish [66228]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Hippichthys parvicarinatus Short-keel Pipefish, Short-keeled Pipefish [66230]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus spinosissimus Hedgehog Seahorse [66239]		Species or species habitat may occur within area
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Mammals		
Dugong dugon Dugong [28]		Species or species habitat known to occur within area
Reptiles		
Acalyptophis peronii Horned Seasnake [1114]		Species or species habitat may occur within area
Aipysurus duboisii Dubois' Seasnake [1116]		Species or species habitat may occur within area
Aipysurus eydouxii Spine-tailed Seasnake [1117]		Species or species habitat may occur within area
Aipysurus laevis Olive Seasnake [1120]		Species or species habitat may occur within

Name	Threatened	Type of Presence area
Astrotia stokesii Stokes' Seasnake [1122]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Disteira kingii Spectacled Seasnake [1123]		Species or species habitat may occur within area
Disteira major Olive-headed Seasnake [1124]		Species or species habitat may occur within area
Enhydrina schistosa Beaked Seasnake [1126]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Hydrophis atriceps Black-headed Seasnake [1101]		Species or species habitat may occur within area
Hydrophis coggeri Slender-necked Seasnake [25925]		Species or species habitat may occur within area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area
Hydrophis inornatus Plain Seasnake [1107]		Species or species habitat may occur within area
Hydrophis mcdowellii null [25926]		Species or species habitat may occur within area
Hydrophis ornatus Spotted Seasnake, Ornate Reef Seasnake [1111]		Species or species habitat may occur within area
Hydrophis pacificus Large-headed Seasnake, Pacific Seasnake [1112]		Species or species habitat may occur within area
Lapemis hardwickii Spine-bellied Seasnake [1113]		Species or species habitat may occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Breeding known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Parahydrophis mertoni Northern Mangrove Seasnake [1090]		Species or species

Name	Threatened	Type of Presence
Pelamis platurus Yellow-bellied Seasnake [1091]		habitat may occur within area Species or species habitat may occur within area
Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat may occur within area
Orcaella brevirostris Irrawaddy Dolphin [45]		Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat known to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

Invasive Species

[[Resource Information](#)]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name	Status	Type of Presence
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Plants		
Andropogon gayanus Gamba Grass [66895]		Species or species habitat likely to occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Mimosa pigra Mimosa, Giant Mimosa, Giant Sensitive Plant, Thorny Sensitive Plant, Black Mimosa, Catclaw Mimosa, Bashful Plant [11223]		Species or species habitat likely to occur within area
Pennisetum polystachyon Mission Grass, Perennial Mission Grass, Missiongrass, Feathery Pennisetum, Feather Pennisetum, Thin Napier Grass, West Indian Pennisetum, Blue Buffel Grass [21194]		Species or species habitat may occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area
Ramphotyphlops braminus Flowerpot Blind Snake, Brahminy Blind Snake, Cacing Besi [1258]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, 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 distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for 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 reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

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

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

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

Coordinates

-11.1681 130.39065

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 B RAPID VEGETATION ASSESSMENT

Survey site	VS1	Photo-points	PP2, PP3, PP9, PP11, PP12, PP14, PP20	Slope	<2 %	Area (ha)	1653.9
Land system	Acacia plantation. Transitional site with understorey of monsoon vine species, and sub-shrubs.						
Vegetation type	Acacia mangium mid open woodland, over Eucalyptus tetradonta, Trema tomentosa var. aspera and Planchonia careya mid shrubland, over patches of Eriachne trisetata and Cymbopogon bombycinus. Other species present in the mid-strata include Grevillea pteridifolia, Breytia cernua, Buchanania obovata, Caelospermum reticulatum and Clerodendrum floribundum.				 <p style="text-align: center;">VS1 Surface soil</p>		
Vegetation	Upper stratum	Mid stratum	Ground stratum				
Dominant species	Acacia mangium	Eucalyptus tetradonta Trema tomentosa var. aspera Planchonia careya	Eriachne trisetata Cymbopogon bombycinus Passiflora foetida				
Soil description	Moderately well drained. Kandosol soils; Reddish/brown loams. Dense leaf litter (10cm).						
Other site notes	x12 dead Acacia's present (within 10m radius of site). Passiflora foetida very dense in this vegetation community. Some Eucalyptus recruits present. Degraded / failed plantation areas, open canopy with non-plantation species dominant.						
Site photos and location							
 <p style="text-align: center;">VS1 - West</p>		 <p style="text-align: center;">VS1 - South</p>		 <p style="text-align: center;">VS1 - North</p>			



Survey sites	VS2	Photo-points	PP4, PP5, PP6, PP7, PP10	Slope	<2 %	Area (ha)	976.1
Land system	Acacia plantation. Acacia open forest with sparse grass cover and isolated sub-shrubs present.						
Vegetation type	Acacia mangium open forest, over Pandanus spiralis, Planchonia careya, Alphitonia excelsa low sparse shrubland, over sparse understorey comprised of isolated patches of Eriachne trisetata, Ampelocissus acetosa, and mixed vines. Vines include Brachystelma glabriflorum, Other grass species include Cymbopogon bombycinus, Eriachne burkittii, Setaria sp. Other species present within this vegetation type include isolated shrubs comprised of Petalostigma pubescens, Alstonia actinophylla, Ficus aculeata, Vitex acuminata, Ixora timorensis, Caelospermum reticulatum, Exocarpos latifolius and Clerodendrum floribundum.			 <p style="text-align: center;">VS2 Surface soil</p>			
Vegetation	Upper stratum	Mid stratum	Ground stratum				
Dominant species	Acacia mangium	Pandanus spiralis Planchonia careya Alphitonia excelsa	Eriachne trisetata Ampelocissus acetosa Mixed vines Monsoon vine species saplings				
Soil description	Moderately well drained. Kandosol soils; Reddish/brown loams.						
Other site notes	Dense leaf litter (10cm). Eucalyptus species uncommon, intact plantation stands with closed canopy.						

Site photos and location



VS2 - South







VS2 - East







VS2 - North







Survey sites	VS3	Photo-points	PPA1, PPA2, PPA3	Slope	<2 %	Area (ha)	19.0
Land system	Piper – Natural bushland within wildlife corridor						
Vegetation type	Mixed Eucalyptus mid high woodland, over <i>Acacia auriculiformis</i> , <i>Acacia difficilis</i> and <i>Persoonia falcata</i> shrubland (occasionally dense mixed <i>Acacia</i> sp. shrubland), over ground cover of <i>Eriachne trisetata</i> , <i>Heteropogon triticeus</i> , <i>Ampelocissus acetosa</i> , and mixed Eucalyptus/ <i>Acacia</i> saplings. Other species present include <i>Planchonia careya</i> , <i>Clerodendrum floribundum</i> and <i>Pandanus spiralis</i> .			 <p style="text-align: center;">VS3 Surface soil</p>			
Vegetation	Upper stratum	Mid stratum	Ground stratum				
Dominant species	<i>Eucalyptus miniata</i> <i>Eucalyptus tetradonta</i> <i>Corymbia nesophila</i>	<i>Acacia auriculiformis</i> <i>Acacia difficilis</i> <i>Persoonia falcata</i>	<i>Eriachne trisetata</i> <i>Ampelocissus acetosa</i> Mixed Euc saplings				
Soil description	Moderately well drained. Kandosol soils; Reddish/brown sandy clay loams.						
Other site notes	Slightly undulating land form, aspect SE						
Site photos and location							
 <p style="text-align: center;">VS3 - West</p>		 <p style="text-align: center;">VS3 - South</p>		 <p style="text-align: center;">VS3 - North</p>			



Survey sites	VS4	Photo-points	PP13	Land system	Callemondah	Slope	<2 %	Area (ha)	114.3
Vegetation type	Mixed Eucalyptus mid high woodland, over mixed <i>Acacia sp.</i> , <i>Erythrophleum chlorostachys</i> and <i>Livistona humilis</i> shrubland, over <i>Ampelocissus acetosa</i> , and Mixed Eucalyptus saplings. No grass cover present. Other species present include <i>Corymbia confertiflora</i> .					 <p style="text-align: center;">VS4 Surface soil</p>			
Vegetation	Upper stratum	Mid stratum		Ground stratum					
Dominant species	<i>Eucalyptus miniata</i> <i>Eucalyptus tetradonta</i> <i>Corymbia nesophila</i>	Mixed <i>Acacia sp.</i> <i>Erythrophleum chlorostachys</i> <i>Livistona humilis</i>		<i>Ampelocissus acetosa</i> Mixed Eucalyptus saplings					
Soil description	Moderately well drained. Kandosol soils; Reddish/brown sandy loams. Dense leaf litter								
Other site notes	Slightly undulating land form, aspect NE. VS4 vegetation was fire affected from burning annually.								
Site photos and location									
 <p style="text-align: center;">VS4 - West</p>			 <p style="text-align: center;">VS4 - South</p>			 <p style="text-align: center;">VS4 - East</p>			



Survey sites	VS5	Land system	Tiwi	Slope	<2 %	Area (ha)	96.8
Photo-points	PP1, PP15, PP16, PP17, PP19, PPA4, PPB1, PPB2, PPB3, PPB4						
Vegetation type	<i>Eucalyptus tetradonta</i> , <i>Eucalyptus nesophila</i> , <i>Eucalyptus miniata</i> mid high open woodland, over <i>Livistona humilis</i> , <i>Acacia auriculiformis</i> , <i>Lophostemon lactifluus</i> low (<5m tall) shrubland, over <i>Eriachne sp.</i> , <i>Cymbopogon bombycinus</i> and <i>Eriachne burkittii</i> mid tussock grassland. Other species present include <i>Corymbia confertiflora</i>			 <p style="text-align: center;">VS5 Surface soil</p>			
Vegetation	Upper stratum	Mid stratum	Ground stratum				
Dominant species	<i>Corymbia nesophila</i> <i>Eucalyptus tetradonta</i> <i>Eucalyptus miniata</i>	Mixed <i>Acacia sp.</i> <i>Erythrophleum chlorostachys</i> <i>Livistona humilis</i>	<i>Eriachne sp.</i> <i>Cymbopogon bombycinus</i> <i>Eriachne burkittii</i> <i>Sorghum spp.</i>				
Soil description	Moderately well drained. Kandosol soils; Yellowish/brown clay loams.						
Other site notes	Slightly undulating land form, aspect NE. Fire 1-2 years ago. Cycads present. PP19 high disturbance and <i>Typhonium</i> found. PPB1 and PPB2 have a dense grassy understorey and different species composition (i.e. <i>Sorghum spp.</i>) compared to other sites. This could be due to varying fire regimes within the Hydrogen Production precinct. Site PPB4 represents a broad drainage area, comprised of <i>Grevillea pteridifolia</i> and <i>Lophostemon lactifluus</i>						
Site photos and location							
 <p>VS5 – West – Acacia and other mixed shrubs understorey with dense leaf litter</p>		 <p>PPB3 – North – Acacia and other mixed shrubs understorey with dense leaf litter</p>		 <p>PP16 – South – Acacia and other mixed shrubs understorey with dense leaf litter</p>			



PPB2 – Dense Tussock Grass understorey understorey with shrubs present







PPB1 - Dense Tussock Grass understorey understorey with less shrubs present







PPB4 – Broad drainage area







Survey sites	VS6	Land system	Drainage area / wetland		Slope	1-2 %	Area (ha)	0.0
Vegetation type	Drainage area - <i>Lophostemon lactifluus</i> , <i>Pandanus spiralis</i> , and occasional <i>Planchonia careya</i> low open forest, with isolated (taller) trees comprised of <i>Corymbia confertiflora</i> and <i>Grevillea pteridifolia</i> , over isolated patches of <i>Eriachne sp.</i> , <i>Eriachne sp.</i> , <i>Cymbopogon bombycinus</i> and <i>Eriachne burkittii</i> .				 <p style="text-align: right;">VS6 Surface soil</p>			
Vegetation	Upper stratum	Mid stratum	Ground stratum					
Dominant species	<i>Lophostemon lactifluus</i>	Mixed <i>Acacia sp.</i> <i>Erythrophleum chlorostachys</i> <i>Livistona humilis</i>	<i>Eriachne sp.</i> <i>Cymbopogon bombycinus</i> <i>Eriachne burkittii</i>					
Soil description	Poorly drained; Red sandy clay loam							
Other site notes	Slightly undulating land form, aspect SW. Inconsistent with land system (Callemondah) description of wet areas.							
Site photos and location								
 <p style="text-align: center;">VS6 – West</p>			 <p style="text-align: center;">VS6 - East</p>			 <p style="text-align: center;">VS6 - North</p>		







Survey sites	VS7	Land system	Dundas - swamp	Slope	<2%	Area (ha)	2.3
Vegetation type	<i>Grevillea pteridifolia</i> low woodland (8-10m tall), over mid <i>Banksia dentata</i> , <i>Livistona humilis</i> shrubland, over <i>Sorghum plumosum</i> , <i>Eulalia McKinlay</i> and <i>Heteropogon triticeus</i> mid tussock grassland.						 <p style="text-align: center;"><i>VS7- Surface soil</i></p>
Vegetation	Upper stratum	Mid stratum	Ground stratum				
Dominant species	<i>Grevillea pteridifolia</i>	<i>Lophostemon lactifluus</i> <i>Banksia dentata</i> <i>Livistona humilis</i>	<i>Sorghum plumosum</i> <i>Eulalia McKinlay</i> <i>Heteropogon triticeus</i>				
Soil description	Poorly drained; Hydrosols; Yellowish/brown sandy clay soils with high organic matter on surface. Soils saturated at the time of the survey.						
Other site notes	Slightly undulating landform, aspect SW						
Site photos and location							
 <p style="text-align: center;"><i>VS7 - South</i></p>		 <p style="text-align: center;"><i>VS7 - East</i></p>		 <p style="text-align: center;"><i>VS7 - North</i></p>			







Survey sites	VS8	Photo-points	PP18	Land system	Dundas	Slope	<2%	Area (ha)	27.8			
Vegetation type	<i>Eucalyptus nesophila</i> , <i>Eucalyptus miniata</i> mid high woodland, over <i>Grevillea pteridifolia</i> , <i>Terminalia ferdinandiana</i> , <i>Acacia auriculiformis</i> mid high shrubland, over <i>Eriachne trisetata</i> , <i>Eriachne ciliata</i> , <i>Imperata cylindrica</i> . Other species present within the mid strata include <i>Banksia dentata</i> , <i>Livistona humilis</i> , <i>Buchanania obovata</i> and <i>Wrightia saligna</i>					 <p style="text-align: center;">VS8- Surface soil</p>						
Vegetation	Upper stratum	Mid stratum	Ground stratum									
Dominant species	<i>Corymbia nesophila</i> <i>Eucalyptus miniata</i>	<i>Grevillea pteridifolia</i> <i>Terminalia ferdinandiana</i> <i>Acacia auriculiformis</i>	<i>Eriachne trisetata</i> <i>Eriachne ciliata</i> <i>Imperata cylindrica</i>									
Soil description	Moderately well drained. Rudosol soils; Yellowish/brown clay loams.											
Other site notes	Slightly undulating land form, aspect W.											
Site photos and location												
 <p style="text-align: center;">VS8 – South</p>			 <p style="text-align: center;">VS8 - East</p>			 <p style="text-align: center;">VS8 - West</p>						



Survey sites	VS9	Land system	Callemondah - Riparian vegetation along creek line		Slope	<2%	Area (ha)	0.6
Vegetation type	<p><i>Melaleuca viridiflora</i>, <i>Lophostemon lactifluus</i> and <i>Corymbia ptychocarpa</i> open forest, over <i>Lophostemon lactifluus</i>, <i>Corymbia ptychocarpa</i> and <i>Erythrophleum chlorostachys</i> mid-storey. Other mid canopy species include <i>Pandanus spiralis</i>, <i>Livistona humilis</i>, <i>Planchonia careya</i> and scattered <i>Cycas armstrongii</i>. Understorey is comprised of <i>Imperata cylindrica</i>, <i>Eriachne trisetata</i>, and Eucalypts/Lophostemon saplings. Other ground cover species present include <i>Chrysopogon latifolia</i> and <i>Mnesithea rottboellioides</i></p>							
Vegetation	Upper stratum	Mid stratum	Ground stratum					
Dominant species	<p><i>Melaleuca viridiflora</i> <i>Lophostemon lactifluus</i> <i>Corymbia ptychocarpa</i></p>	<p><i>Lophostemon lactifluus</i> <i>Corymbia ptychocarpa</i> <i>Erythrophleum chlorostachys</i></p>	<p><i>Imperata cylindrica</i> <i>Eriachne trisetata</i> Corymbia/Lophostemon sp. saplings</p>					
Soil description	Poorly drained (seasonal waterlogging/inundation expected). Hydrosols; Brownish/grey clayey loam							
Other site notes	Small gravel mounds present; north-east aspect							
Site photos and location								
								
VS9 – South			VS9 – East			VS9 - North		



Survey sites	VS10	Land system	Rainforest	Slope	<2%	Area (ha)	0.0
Vegetation type	Mixed-species coastal monsoon vine thicket (vegetation low <10m tall, with greater than 70% cover)						
Vegetation	Upper stratum	Mid stratum	Ground stratum				
Dominant species	<i>Terminalia microcarpa</i>	<i>Ixora timorensis</i> <i>Diospyros sp.</i> <i>Exocarpos latifolia</i> <i>Flagellaria indica</i> <i>Litsea glutinosa</i> <i>Drypetes deplanchei</i> <i>Opilia amentacea</i> <i>Croton habrophyllus</i> <i>Erythrina vespertilio</i> <i>Strychnos lucida</i>	-				
Soil description	Grey sandy clay soils; poorly drained.						
Other site notes	Ground disturbed by pigs/buffalo.						
Site photos and location							
							
VS10 – South		VS10 - East		VS10 - North			



APPENDIX C DESKTOP THREATENED SPECIES 'LIKELIHOOD OF OCCURRENCE' ASSESSMENT

Table data

EPBC PMST based on a 20 km search buffer from the project area.

Northern Territory Flora and Fauna Atlas records on Melville Island

Data provided from Tiwi Plantations Corporation from annual threatened species surveys within 20km of the project area.

Likelihood of occurrence assessment made by reviewing the above desktop resources.

TPWC species status key

- EX = Extinct
- CR = Critically Endangered
- EN = Endangered
- VU = Vulnerable
- NT = Near Threatened
- DD = Data Deficient
- LC = Least Concern

EPBC species status key

- **EX** = Extinct
- **CR** = Critically Endangered
- **EN** = Near Threatened
- **VU** = Vulnerable
- - = not listed

Refer to Section 3 for the procedure for determining likelihood of occurrence of terrestrial species.



Name	Status		Summary	Likelihood of occurrence
	Cth	NT		
BIRDS				
Red Goshawk <i>Erythrotriorchis radiatus</i>	VU	VU	<p>Habitat: Prefers tall, open Eucalypt forest and riparian areas. Nests in large trees, frequently the tallest and most massive in a tall stand, nest trees are invariably within 1 km of permanent water (Debus & Czechura 1988; Aumann & Baker-Gabb 1991). Rarely breeds in areas with fragmented native vegetation (Aumann & Baker-Gabb 1991; Czechura 2001). Home range of up to 200 km² (Czechura & Hobson 2000).</p> <p>Distribution: Solitary and secretive hawk that is sparsely distributed across much of northern Australia, from the Kimberley in WA to south-eastern Qld. Within this range, generally confined to taller forests characteristic of higher rainfall coastal and sub-coastal areas (Debus 1998), but there are some isolated records of wandering birds from central Australia (Woinarski 2006).</p>	<p>HIGH</p> <ul style="list-style-type: none"> • Suitable habitat within the project area • No recent records within the project area, but records across Melville Island • Nest sites have not been recorded within the project area since 2006 • Nesting likelihood is low, but likelihood of foraging within the area is high.
<p>Aumann, T. and Baker-Gabb, D. (1991). <i>A Management Plan for the Red Goshawk</i>. RAOU Report 75, Royal Australasian Ornithologists Union, Melbourne.</p> <p>Czechura G.V. and Hobson R.G. (2000). <i>The Red Goshawk Erythrotriorchis radiatus in northern Queensland: status and distribution</i>. Report to Queensland Parks and Wildlife Service.</p> <p>Czechura G.V. (2001). <i>The status and distribution of the Red Goshawk Erythrotriorchis radiatus on Cape York Peninsula, Queensland</i>. Unpublished report to Birds Australia.</p> <p>Debus, S. and Czechura, G. (1988). Field identification of the Red Goshawk <i>Erythrotriorchis radiatus</i>. <i>Australian Bird Watcher</i>, Vol. 12, pp. 154-159.</p> <p>Debus, S. (1998). <i>The Birds of Prey of Australia</i>. Oxford University Press, Melbourne.</p> <p>Department of the Environment (2022). <i>Erythrotriorchis radiatus</i> in Species Profile and Threats Database, Department of the Environment, Canberra. Available at: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=942 [Accessed 27 Jan 2022]</p> <p>Woinarski, J. (2006). <i>Threatened Species of the Northern Territory - Red Goshawk - Erythrotriorchis radiatus</i>. Northern Territory Department of Environment and Natural Resources. [online] Available at: https://nt.gov.au/_data/assets/pdf_file/0018/206352/red-goshawk.pdf [Accessed 27 Jan 2022].</p>				
Grey Falcon <i>Falco hypoleucos</i>	-	VU	<p>Habitat: A generally solitary desert falcon that occurs in areas of lightly-timbered lowland plains, typically on inland drainage systems, where the average annual rainfall is less than 500 mm (Ward 2012).</p> <p>Distribution: Sparsely distributed through much of the arid and semi-arid regions of Australia but has been recorded from all mainland states and territories. In the NT, the majority of records are from the southern half, but there are records all the way up to Darwin (Ward 2012). A study of breeding records from 2003 to 2011 documented 38 breeding events – all within the hottest climate classes of Australia – with the northern-most record occurring south of Daly Waters (Schoenjahn 2013).</p>	<p>NONE</p> <ul style="list-style-type: none"> • Suitable habitat does not occur within the project area nor on Melville Island • Vagrant to the Tiwi Islands.
<p>Schoenjahn, J. (2013), A hot environment and one type of prey: investigating why the Grey Falcon (<i>Falco hypoleucos</i>) is Australia's rarest falcon, <i>Emu</i>, Vol. 113, pp. 19-25.</p> <p>Department of Environment, Parks and Water Security (2021). <i>Threatened Species of the Northern Territory - Grey Falcon - Falco hypoleucos</i>. Northern Territory Government [online] Available at: https://nt.gov.au/_data/assets/pdf_file/0020/206354/grey-falcon.pdf [Accessed 27 Jan 2022].</p>				
Partridge Pigeon (eastern subspecies) <i>Geophaps smithii smithii</i>	VU	VU	<p>Habitat: Open forests and woodlands with an understorey of grasses (Woinarski 2006). Prefers woodland dominated by <i>Eucalyptus tetradonta</i> and <i>E. miniata</i> (Braithwaite 1985; Garnett et al. 2011; Higgins & Davies 1996). According to Fraser (2001), favour a structurally-patchy savanna understorey at a relatively intricate scale. In all seasons, prefer to feed in areas that have an open ground layer (e.g. following fire); however, more</p>	<p>HIGH</p> <ul style="list-style-type: none"> • Suitable habitat within the project area • Recent records within the project area.



Name	Status		Summary	Likelihood of occurrence
	Cth	NT		
			<p>likely to nest where there is dense vegetation cover. Require the seeds of certain perennial grasses and sedges that are available early in the wet season when seed is otherwise scarce, particular the perennial grass species <i>Alloteropsis semialata</i> and <i>Chrysopogon</i>. The presence of these grasses may be crucial for survival at this time (Fraser 2001). Largely sedentary; however, can travel distances of 5 to 10 km in the wet season on search of food and water resources (Fraser 2001). Home ranges vary seasonally between 8 – 31 hectares Fraser (2001).</p> <p>Distribution: Historically, across the Top End (from Kununurra in WA to Borrooloola in the NT). Since early 20th century a severe range contraction from the western, eastern and southern parts of the former distribution (Higgins & Davies 1996; Woinarski et al. 2007). Currently, distribution is limited to sub-coastal NT from Yinberrie Hill in the south, Litchfield NP in the west and (western) Arnhem Land in the east (Garnett et al. 2011).</p>	
			<p>Braithwaite, R.W. (1985). <i>The Kakadu fauna survey: an ecological survey of Kakadu National Park</i>. Australian National Parks & Wildlife Service, Canberra.</p> <p>Fraser, F. (2000). Species profile: Partridge Pigeon <i>Geophaps smithii</i>. <i>Northern Territory Naturalist</i> 16, 38-39.</p> <p>Fraser, F., Lawson V., Morrison S., Christophersen P., McGregor S. and Rawlinson M. (2003). Fire management experiment for the declining partridge pigeon, Kakadu National Park. <i>Ecological Management and Restoration</i> 4, 94–102.</p> <p>Garnett, S.T., Szabo, J.K. and Dutton, G. (2011). <i>The Action Plan for Australian Birds 2010</i>. Birds Australia, CSIRO Publishing, Melbourne.</p> <p>Higgins, P.J. and Davies S.J.J.F. (eds) (1996). <i>Handbook of Australian, New Zealand and Antarctic Birds. Volume Three: Snipe to Pigeons</i>. Oxford University Press. Melbourne, Victoria.</p> <p>Woinarski, J.C.Z. (2006). <i>Threatened Species of the Northern Territory - Partridge Pigeon (eastern subspecies) - Geophaps smithii</i>. Northern Territory Department of Environment and Natural Resources. [online] Available at: https://nt.gov.au/_data/assets/pdf_file/0003/206355/partridge-pigeon.pdf [Accessed 1 May 2018].</p> <p>Woinarski, J., Pavey, C., Kerrigan, R., Cowie, I. and Ward, S. (Eds) (2007). <i>Lost from Our Landscape: Threatened Species of the Northern Territory</i>. Northern Territory Government, Darwin.</p>	
<p>Hooded Robin (Tiwi Islands' subspecies) <i>Melanodryas cucullata melvillensis</i></p>	CR	CR	<p>Habitat: Eucalypt tall open forests, Acacia shrublands and treeless plains (Woinarski & Ward 2012).</p> <p>Distribution: Restricted to Melville and Bathurst Islands in the Tiwi Islands of the NT, where last recorded in December 1991 and January 1992 from two sites (one on each island) (Woinarski & Ward 2012).</p>	<p>LOW</p> <ul style="list-style-type: none"> • Suitable habitat within the project area • May be locally extinct – last record for Melville Island is from January 1992.
			<p>Woinarski, J. and Ward, S. (2012). <i>Threatened species of the Northern Territory - Hooded Robin (Tiwi subspecies) - Melanodryas cucullata melvillensis</i>. Northern Territory Department of Environment and Natural Resources. [online] Available at: https://nt.gov.au/_data/assets/pdf_file/0015/206340/hooded-robin.pdf [Accessed 1 May 2018].</p>	
<p>Horsfield's Bushlark (Tiwi Islands' subspecies) <i>Mirafra javanica melvillensis</i></p>	VU	VU	<p>Habitat: Perennial tussock grasslands with rank cover; becoming less numerous as tree-cover increases (Ward 2012).</p> <p>Distribution: Restricted to the Tiwi Islands in the NT, and all records so far have come from Melville Island (Garnett et al. 2011).</p>	<p>LOW</p> <ul style="list-style-type: none"> • Suitable habitat does not occur within the project area; however, does occur elsewhere on Melville Island • No recent records within the project area, but records elsewhere on Melville Island from 1991.
			<p>Garnett, S.T., Szabo, J.K. and Dutton, G. (2011). <i>The Action Plan for Australian Birds 2010</i>. CSIRO Publishing. Collingwood, Australia.</p> <p>Ward, S. (2012). <i>Threatened species of the Northern Territory – Horsfield's Bushlark (Tiwi Island subspecies), Singing Bushlark – Mirafra javanica melvillensis</i>. Northern Territory Department of Environment and Natural Resources. [online] Available at: https://nt.gov.au/_data/assets/pdf_file/0006/373551/horsfields-bushlark.pdf [Accessed 1 May 2018].</p>	



Name	Status		Summary	Likelihood of occurrence
	Cth	NT		
Masked Owl (Tiwi Islands' subspecies) <i>Tyto novaehollandiae melvillensis</i>	EN	EN	Habitat: Mostly Eucalypt tall open forests, but often roosting in monsoon rainforests and foraging in open vegetation types. Probably have large territory sizes (Woinarski et. al 2003) Distribution: Restricted to Melville and Bathurst Islands in the Tiwi Islands of the NT (Woinarski et. al 2003)	HIGH <ul style="list-style-type: none"> • Presence of suitable habitat within the project area • Recent records within the project area.
Woinarski, J.C.Z., Brennan, K., Hempel, C., Armstrong, M., Milne, D. and Chatto, R. (2003). <i>Biodiversity Conservation on the Tiwi Islands, Northern Territory Part 2 Fauna</i> . A report to the Tiwi Land Council, Parks and Wildlife Commission of the Northern Territory.				
Red Knot Great Knot Bar-tailed Godwit (2 subspecies) Eastern Curlew Asian Dowitcher Greater Sand Plover Lesser Sand Plover Curlew Sandpiper	CR to VU	CR to VU	Habitat: Coastal and estuarine areas with tidal mudflats. May roost during high tide on nearby beaches. May also be found at near-coastal swamps and lakes (apart from Red and Great Knot) Distribution: Mostly widespread around the northern Australian coast, less common in the south, with few inland records. Eastern Curlew is uncommon across Australia while Asian Dowitcher is rare. Every year these species breed in the northern hemisphere in the summer, and migrate to Australia for the southern hemisphere (austral) summer. Some birds, primarily juveniles, remain in Australia during the winter. [Information above summarised from Chatto (2003), DoE (2015) and Garnett et al. (2011)].	LOW <ul style="list-style-type: none"> • Suitable habitat adjacent to the project area • No recent records within the project area, but records occur for Melville Island • The project is located away for the shoreline; however, there are tidal mudflats surrounding Port Melville. There is limited information on the use of these areas by shorebirds.
Chatto, R. (2003). <i>The distribution and status of shorebirds around the coast and coastal wetlands of the Northern Territory</i> . Technical Report 73, Parks and Wildlife Commission of the Northern Territory, Darwin. [online] Available at: https://dtc.nt.gov.au/_data/assets/pdf_file/0008/279917/2003_shorebirds_rpt76.pdf [Accessed 1 May 2018]. Department of the Environment (2015). <i>EPBC Act Policy Statement 3.21 - Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species</i> . Commonwealth of Australia, Canberra, ACT. http://www.environment.gov.au/epbc/publications/shorebirds-guidelines [Accessed 1 May 2018]. Garnett, S.T., Szabo, J.K. and Dutton, G. (2011). <i>The Action Plan for Australian Birds 2010</i> . CSIRO Publishing. Collingwood, Australia.				
MAMMALS (TERRESTRIAL)				
Fawn Antechinus <i>Antechinus bellus</i>	VU	EN	Habitat: Mostly in open forests and woodlands dominated by <i>Eucalyptus miniata</i> and/or <i>E. tetradonta</i> , particularly where these forests have a relatively dense shrubby understorey (Friend 1985; Friend & Taylor 1985). Declines in areas with frequent intense fires (Corbett et al. 2003) but not necessarily common in areas where fire has been excluded for long periods (>20 years; Woinarski et al. 2004). Breeding occurs mid-June to late August, after which a synchronous male die-off occurs (TSSC 2015). Distribution: Restricted to the Top End of the NT (Watson & Calaby 2008), with one record from Melville Island. Recent surveys have failed to record it across central and eastern Arnhem Land (TSSC 2015).	LOW <ul style="list-style-type: none"> • Suitable habitat within the project area • No recent records within the project area despite considerable survey effort
Corbett L. K., Andersen, A.N. and Muller, W.J. (2003). Terrestrial vertebrates. In: Andersen, A.N., Cook, G.D. and Williams, R.J. (eds.). <i>Fire in Tropical Savannas: The Kapalga Experiment</i> . Springer-Verlag, New York: pp. 126–152. Davies, H.F., McCarthy, M.A., Firth, R.S.C, Woinarski, J.C.Z, Gillespie, G.R, Anderson, A.N., Rioli, W., Puruntatameri, J., Roberts, W., Kerinauia, C., Kerinauia, V., Brooks Womatakimi, K. and Murphy, B.P (2018). Declining populations in one of the last refuges for threatened mammal species in northern Australia. <i>Austral Ecology</i> , Vol 43, pp.602 -612. Friend, G.R. and Taylor, J.A. (1985). Habitat preferences of small mammals in tropical open-forest of the Northern Territory. <i>Australian Journal of Ecology</i> , Vol. 10, pp. 173-185.				



Name	Status		Summary	Likelihood of occurrence
	Cth	NT		
			<p>Friend, G.R. (1985). Ecological studies of a population of <i>Antechinus bellus</i> (Marsupalia: Dasyuridae) in tropical Australia. <i>Australian Wildlife Research</i>, Vol. 12 (No. 2), pp. 151-162.</p> <p>Threatened Species Scientific Committee (2015). <i>Approved Conservation Advice for Antechinus bellus – Fawn Antechinus</i>. Canberra: Department of the Environment. In effect under the EPBC Act from 03-Dec-2015. Available at: http://www.environment.gov.au/biodiversity/threatened/species/pubs/344-conservation-advice-2015123.pdf [Accessed 1 May 2018].</p> <p>Watson, M.L. and Calaby, J.H. (2008). Fawn Antechinus: <i>Antechinus bellus</i>. In: Van Dyck, S. and Strahan, R. (eds.). <i>The Mammals of Australia: 3rd Edition</i>. Reed New Holland, Sydney.</p> <p>Woinarski, J.C.Z., Risler, J. and Kean, L. (2004). The response of vegetation and vertebrate fauna to 23 years of fire exclusion in a tropical Eucalyptus open forest, Northern Territory, Australia. <i>Austral Ecology</i>, Vol. 29, pp. 156–176.</p>	
Brush-tailed Rabbit-rat <i>Conilurus penicillatus</i>	VU	EN	<p>Habitat: Largely restricted to mixed <i>Eucalypt</i> open forest and woodland, or on dunes with <i>Casuarina</i> – seeming to prefer habitats that are not burnt annually, that have an understorey of predominantly perennial grasses and a sparse-to-moderate middle storey (Firth et al. 2006; Firth 2007; Kemper & Firth 2008).</p> <p>Distribution: Formerly widespread across northern Australia, but has declined extensively from Qld and lower rainfall areas of the Kimberley in WA and the Top End in the NT. No recent records from much of the historically-recorded NT range between near the mouth of Victoria River (in the west) and Sir Edward Pellew island group (in east). Most recently known from Cobourg Peninsula, Tiwi Islands, Groote Eylandt and a small area within Kakadu National Park (DEPWS 2021).</p>	<p>HIGH</p> <ul style="list-style-type: none"> • Suitable habitat within the project area • Recent records within the project area.
			<p>Firth, R.S.C. (2007). <i>Ecology and conservation status of the brush-tailed rabbit-rat Conilurus penicillatus</i>. PhD thesis, Charles Darwin University, Darwin, Northern Territory.</p> <p>Firth, R.S.C., Woinarski, J.C.Z. and Noske, R.A. (2006). Home range and den characteristics of the brush-tailed rabbit-rat <i>Conilurus penicillatus</i> in the monsoonal tropics of the Northern Territory, Australia. <i>Wildlife Research</i>, Vol. 33, pp. 397-408.</p> <p>Kemper, C.M. and Firth, R.S.C. (2008). Brush-tailed Rabbit-rat. In: Van Dyck, S. and Strahan, R. (eds). <i>The Mammals of Australia</i>. Reed New Holland, Chatswood, NSW.</p> <p>Department of Environment, Parks and Water Security (2021). <i>Threatened Species of the Northern Territory - Brush-tailed rabbit-rat</i>. Northern Territory Government [online] Available at: https://nt.gov.au/_data/assets/pdf_file/0016/205504/brush-tailed-rabbit-rat.pdf [Accessed 3 Feb 2022].</p>	
Northern Brush-tailed Phascogale <i>Phascogale pirata</i>	VU	EN	<p>Habitat: No detailed studies, but ecology is probably similar to that reported for phascogales in southern Australia (Rhind 1998). Most records are from tall open forests dominated by <i>Eucalyptus miniata</i> and <i>E. tetradonta</i> (Rhind et al. 2008). Brush-tailed Phascogales are primarily arboreal and seldom feed on the ground. Geyle et al (2020) detected <i>P. pirata</i> using camera traps on Melville Island and found detection is most likely on large (DBH >41.5cm) <i>Eucalyptus tetradonta</i> trees during the wet season.</p> <p>Distribution: Probably occurs naturally in low densities (Woinarski et al. 2014). Very few records exist; reported from West Island, east Arnhem Land, Coburg Peninsula, Kakadu, Litchfield and the Tiwi Islands. In the last 10 years only recorded from Kakadu, Coburg Peninsula and the Tiwi Islands, despite many extensive wildlife surveys across regions of the Top End during that time (Woinarski et al. 2014).</p>	<p>MEDIUM</p> <ul style="list-style-type: none"> • Suitable habitat within the project area • No recent records within the project area, however, records occur elsewhere on Melville Island.
			<p>Geyle, H.M., Woolley, L-A., Davies, H.F., Woinarski, J.C.Z. and Murphy, B.P. (2020). Targeted sampling successfully detects the cryptic and declining arboreal marsupial (Phascogale pirata) in northern Australia. <i>Pacific Conservation Biology</i>. DOI: 10.1071/PC20008.</p> <p>Rhind, S.G. (1998). <i>Ecology of the brush-tailed phascogale in jarrah forest of south-western Australia</i>. PhD thesis, Murdoch University, Perth, Western Australia.</p> <p>Rhind, S.G., Woinarski, J. and Aplin, K.P. (2008). Brush-tailed Phascogale. In: Van Dyck, S. and Strahan, R. (eds). <i>The Mammals of Australia</i>. Reed New Holland, Chatswood, NSW.</p> <p>Woinarski, J., Burbidge, A. and Harrison, P. (2014). <i>The Action Plan for Australian Mammals 2012</i>. CSIRO Publishing: pp. 125-127.</p>	



Name	Status		Summary	Likelihood of occurrence
	Cth	NT		
Black-footed Tree-rat (Melville Island subspecies) <i>Mesembriomys gouldii melvillensis</i>	VU	VU	<p>Habitat: A range of habitats on Melville Island, but mostly in tall Eucalypt open forests and woodlands (TSSC 2015). Absent or at low densities in rainforests, coastal habitats (mangroves and dunes), and plantations of exotic trees (Firth et al. 2006).</p> <p>Distribution: Restricted to Melville Island, NT (TSSC 2015). Not on adjacent Bathurst Island.</p>	<p>HIGH</p> <ul style="list-style-type: none"> • Suitable habitat within the project area • Recent records within the project area.
	<p>Firth, R.S.C., Woinarski, J.C.Z., Brennan, K.G. and Hempel, C. (2006). Environmental relationships of the brush-tailed rabbit-rat <i>Conilurus penicillatus</i> and other small mammals on the Tiwi Islands, northern Australia. <i>Journal of Biogeography</i>, Vol. 33, pp. 1820-1837.</p> <p>Threatened Species Scientific Committee (2015). <i>Conservation Advice – Mesembriomys gouldii melvillensis - Black-footed tree-rat (Melville Island)</i>. Canberra: Department of the Environment. In effect under the EPBC Act from 26-June-2015. [online] Available at: http://www.environment.gov.au/biodiversity/threatened/species/pubs/87619-conservation-advice.pdf [Accessed 1 May 2018].</p>			
Pale Field-rat <i>Rattus tunneyi</i>	-	VU	<p>Habitat: Historically occurred in a wide range of habitats, but now primarily in dense vegetation along creeks (Aplin et al. 2008). Fire regime seems to have little effect on population numbers; instead, the level of groundwater irrigating the riparian system and, to a lesser extent, current rainfall have a much stronger influence (Braithwaite & Griffiths 1996).</p> <p>Distribution: Higher rainfall areas of northern Australia, extending from Kimberley in WA to south-eastern Qld, including the Top End of the NT (Cole & Woinarski 2002, Braithwaite & Griffiths 1996). Previously widespread and patchily abundant, particularly in the north-west of the Top End, the Pale Field-rat appears to have declined in lower rainfall areas (Woinarski 2000).</p>	<p>HIGH</p> <ul style="list-style-type: none"> • Suitable habitat within the project area • Recent records within the project area.
	<p>Aplin, K., Braithwaite, R. and Baverstock, P. (2008). Pale Field-rat: <i>Rattus tunneyi</i>. In: Van Dyck, S. and Strahan, R. (eds.). <i>The Mammals of Australia (3rd Edition)</i>. Reed New Holland, Sydney, NSW.</p> <p>Braithwaite, R. and Griffiths, A. (1996). The paradox of <i>Rattus tunneyi</i>: endangerment of a native pest. <i>Wildlife Research</i>, Vol. 23, pp. 1-21.</p> <p>Cole, J. and Woinarski, J. (2002). <i>Field Guide to the Rodents and Dasyurids of the Northern Territory</i>. Surrey Beatty & Sons, Chipping Norton, NSW.</p> <p>Woinarski, J.C.Z. (2000). The conservation status of rodents in the monsoonal tropics of the Northern Territory. <i>Wildlife Research</i>, Vol. 27, pp. 421-435.</p>			
Bare-rumped Sheath-tailed Bat <i>Saccolaimus saccolaimus nudicluniatus</i>	VU	-	<p>Habitat: In the NT, specimens have been collected from Pandanus woodland fringing the sedgelands of the South Alligator River and Eucalypt tall open forests (Friend & Braithwaite 1986; Churchill 1998) with more recent records from Howard Springs (Milne et al 2009). Most records occur within near-coastal habitats with one recent exception (Jasper Gorge) 150 km inland (Woinarski et al. 2014).</p> <p>Distribution: Widely distributed from India through south-east Asia to the Solomon Islands including north-eastern Qld and the NT. The north-eastern Australian population is described as the subspecies <i>S. s. nudicluniatus</i>, although it is not clear whether this should be applied to NT populations (Milne & Woinarski 2006).</p>	<p>LOW</p> <ul style="list-style-type: none"> • Suitable habitat within the project area • No records for the Tiwi Islands.
	<p>Churchill, S. (1998). <i>Australian Bats</i>. Reed New Holland, Sydney.</p> <p>Friend, G.R. and Braithwaite, R.W. (1986). Bat fauna of Kakadu National Park, Northern Territory. <i>Australian Mammalogy</i>, Vol. 9, pp. 43-52.</p> <p>Milne, D.J., Jackling, F.C., Sidhu, M., and Appleton, B.R. (2009). Shedding new light on old species identifications: morphological and genetic evidence suggest a need for conservation status review of the critically endangered bat, <i>Saccolaimus saccolaimus</i>. <i>Wildlife Research</i> 36: 496–508.</p> <p>Milne, D. and Woinarski, J. (2006). <i>Threatened Species of the Northern Territory - Bare-rumped Sheath-tail Bat - Saccolaimus saccolaimus</i>. Northern Territory Department of Environment and Natural Resources. https://nt.gov.au/_data/assets/pdf_file/0007/376117/bare-rumped-sheath-tail-bat.pdf [Accessed 1 May 2018].</p>			



Name	Status		Summary	Likelihood of occurrence
	Cth	NT		
Woinarski, J., Burbidge, A. and Harrison, P. (2014). <i>The Action Plan for Australian Mammals 2012</i> . CSIRO Publishing: pp. 511-514.				
Butler's Dunnart <i>Sminthopsis butleri</i>	VU	VU	<p>Habitat: Little known – found in eucalypt tall open forest. No apparent correlations between the habitats at the localities where collected other than that all are within 20 km of the coast and most occur on sandy soils (Maxwell et al. 1996; Woinarski et al. 1996).</p> <p>Distribution: Only known from Melville and Bathurst Islands, NT. Targeted surveys on the mainland failed to detect this species (Ward & Woinarski 2012).</p>	<p>MEDIUM</p> <ul style="list-style-type: none"> • Suitable habitat within the project area • No recent records within the project area; however, records occur elsewhere on Melville Island.
<p>Maxwell, S., Burbidge, A.A. and Morris, K. (1996). <i>The 1996 Action Plan for Australian Marsupials and Monotremes</i>. Report prepared for the Australian Marsupials and Monotremes Specialist Group, IUCN Survival Commission, Environment Australia, Endangered Species Program.</p> <p>Department of Ward, S. and Woinarski, J.C.Z. (2102). <i>Threatened Species of the Northern Territory - Butler's Dunnart - Sminthopsis butleri</i>. Northern Territory Department of Environment and Natural Resources. [online] Available at: https://nt.gov.au/data/assets/pdf_file/0003/205518/butlers-dunnart.pdf [Accessed 1 May 2018].</p> <p>Woinarski, J.C.Z., Woolley, P.A. and Van Dyck, S. (1996). The distribution of the Dunnart <i>Sminthopsis butleri</i>. <i>Australian Mammalogy</i>, Vol. 19, pp. 27-29.</p>				
Northern Brushtail Possum <i>Trichosurus vulpecula arnhemensis</i>	VU	NT	<p>Habitat: In Northern Australia, mainly tall eucalypt open forests with large, hollow-bearing trees, some mangrove communities, rainforests and semi-urban areas (TSSC 2001). Found in higher abundance when shrub density is high, particularly shrubs that bear large, fleshy fruits (Stobo-Wilson 2019. Kerle 1985, Friend et al 1985).</p> <p>Distribution: Occurs from the Gulf of Carpentaria, NT to the Kimberley, WA. Also occurs on many NT islands, but not on any WA islands. Within its range, distribution is patchy (TSSC 2021). Recently, there have been broad-scale losses and reduction in extensive areas of the NT range (Woinarski 2004; Woinarski et al. 2011; Gibson & McKenzie 2012; Ziembicki et al. 2013; Stobo-Wilson et al. 2019).</p>	<p>HIGH</p> <ul style="list-style-type: none"> • Suitable habitat within the project area • Recent records within the project area.
Water Mouse <i>Xeromys myoides</i>	VU	-	<p>Habitat: Utilises both intertidal and freshwater habitats, with most records from mangrove forests, saltmarsh, sedgeland, clay pans and freshwater <i>Melaleuca</i> wetlands (DoE 2021).</p> <p>Distribution: Three regions of coastal Australia: the NT, central south Qld and south-east Qld (DoE 2021). In the NT, known only from coastal Top End with ten records at six sites – South Alligator River in 1903, Daly River floodplain in 1972, two sites on the Tomkinson River in 1975, Melville Island in 1975 and Glyde River floodplain in 1998 and 1999 (Cole & Woinarski 2002, Woinarski 2006).</p>	<p>LOW</p> <ul style="list-style-type: none"> • No suitable habitat within the project area • No recent records within the project area. One record from 1975 adjacent to the Transmission Corridor project area; however, that record is in unsuitable habitat and its coordinates are generalised such that it is likely from more suitable coastal habitat nearby.
<p>Cole, J. and Woinarski, J. (2002). <i>Field Guide to the Rodents and Dasyurids of the Northern Territory</i>. Surrey Beatty & Sons, Chipping Norton, NSW.</p> <p>Department of the Environment (2021). <i>Xeromys myoides - Water Mouse, False Water Rat, Yirrkoo</i>. Species Profile and Threats Database, Department of the Environment, Canberra. Available at: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=66 [Accessed 27 Jan 2022].</p> <p>Woinarski, J.C.Z. (2006). <i>Threatened Species of the Northern Territory - False water-rat, Water mouse - Xeromys myoides</i>. Northern Territory Department of Environment and Natural Resources. [online] Available at: https://nt.gov.au/data/assets/pdf_file/0008/376136/false-water-rat.pdf [Accessed 27 Jan 2022].</p>				
REPTILES				



Name	Status		Summary	Likelihood of occurrence
	Cth	NT		
Plains Death Adder <i>Acanthophis hawkei</i>	VU	VU	Habitat: Floodplains in the Top End and cracking soil plains inland (Webb et al. 2002). Distribution: Habitat mapping suggests the potential geographic range extends from western Qld, across the sub-coastal north of the NT to the north-eastern Kimberley of WA. Fragmented populations occur in the Mitchell Grass Downs of western Qld, the Barkly Tablelands on the NT/Qld border and east of Darwin (Fogg Dam) in the NT (TSSC 2012; Wuster et al. 2005). Susceptible to ingesting toxic Cane Toads (Phillips et al. 2009).	NONE <ul style="list-style-type: none"> • Suitable habitat does not occur within on the Tiwi Islands. • No records for the Tiwi Islands
			Phillips, B.L., Greenlees, M.J., Brown, G.P. and Shine R (2010). Predator behaviour and morphology mediates the impact of an invasive species: cane toads and death adders in Australia. <i>Animal Conservation</i> , Vol. 13, pp. 53-59. Webb, J.K., Christian, K.A. and Fisher, P. (2002). Fast growth and early maturation in a viviparous sit-and-wait predator, the northern death adder (<i>Acanthophis praelongus</i>) from tropical Australia. <i>Journal of Herpetology</i> , Vol. 36, no. 3, pp. 505-509. Wuster, W., Dumbrell, A.J., Hay, C., Pook, C.E., Williams, D.J. and Fry, B.G. (2005). Snakes across the Strait: trans-Torresian phylogeographic relationships in three genera of Australasian snakes (Serpentes: Elapidae: <i>Acanthophis</i> , <i>Oxyuranus</i> , and <i>Pseudechis</i>). <i>Molecular Phylogenetics and Evolution</i> , Vol. 34, pp. 1-14. Threatened Species Scientific Committee (2015). <i>Approved Conservation Advice – Acanthophis hawkei – Plains Death Adder</i> . Canberra: Department of the Environment. [online] Available at: http://www.environment.gov.au/biodiversity/threatened/species/pubs/83821-conservation-advice.pdf [Accessed 1 May 2018].	
Mertens' Water Monitor <i>Varanus mertensi</i>	-	VU	Habitat: Semi-aquatic, occupying edges of freshwater watercourses and lagoons, but seldom seen far from water (Christian 2004). Distribution: Across far northern Australia from the western Cape York Peninsula in Qld to the Kimberley in WA (Christian 2004). Widespread in the NT, occupying all of the Top End river systems (Ward et al. 2006). The more common water monitor in greater Darwin (outside of Darwin suburbs and coastal area). Susceptible to ingesting toxic Cane Toads resulting in reduced abundance (Griffiths & McKay 2007).	MEDIUM <ul style="list-style-type: none"> • Suitable habitat within the project area • No recent records within the project area; however, records occur elsewhere on Melville Island.
			Christian, K. (2004). <i>Varanus mertensi</i> . In: Pianka et al. (eds.). <i>Varanoid lizards of the world</i> . Indiana University Press, Bloomington, Indianapolis. Griffiths, A.D. and McKay (2007). Cane toads reduce the abundance and site occupancy of Merten's water monitor (<i>Varanus mertensi</i>). <i>Wildlife Research</i> , Vol. 34, pp. 609-615. Ward, S., Woinarski, J., Griffiths, T. and McKay, L. (2006). <i>Threatened Species of the Northern Territory - Mertens Water Monitor - Varanus mertensi</i> . Northern Territory Department of Environment and Natural Resources. [online] Available at: https://nt.gov.au/_data/assets/pdf_file/0018/206460/mertens-water-monitor.pdf [Accessed 1 May 2018].	
Yellow-spotted / Floodplain Monitor <i>Varanus panoptes</i>	-	VU	Habitat: Broad range of habitats from coastal beaches to savannah woodlands (Christian 2004). Also common throughout floodplains grasslands and a variety of native woodlands (Ward et al. 2012). Distribution: Across northern Australia from the Kimberley in WA to Cape York Peninsula, and southwards through most of Qld. In the NT, recorded across most of the Top End and the Gulf Region (Christian 2004). Highly susceptible to Cane Toad poisoning (Ujvari & Madsen 2009) and has experienced significant declines (Doody et al. 2009).	MEDIUM <ul style="list-style-type: none"> • Suitable habitat within the project area • No recent records within the project area, however, records occur elsewhere on Melville Island.
			Christian, K. (2004). <i>Varanus panoptes</i> . In: Pianka et al. (eds.). <i>Varanoid lizards of the world</i> . Indiana University Press, Bloomington, Indianapolis. Doody, J.S., Green, B., Rhind, D., Castellano, C., Sims, R. and Robinson, T. (2009). Population-level declines in Australian predators caused by an invasive species. <i>Animal Conservation</i> , Vol. 12, pp. 46-53. Ujvari, B. & Madsen, T. (2009). Increased mortality of naïve varanid lizards after the invasion of non-native cane toads (<i>Bufo marinus</i>). <i>Herpetological Conservation and Biology</i> , Vol. 4, pp. 248-251.	



Name	Status		Summary	Likelihood of occurrence
	Cth	NT		
Ward, S., Woinarski, J., Griffiths, T. & McKay, L. (2012). <i>Threatened Species of the Northern Territory - Yellow Spotted Monitor, Northern Sand Goanna, Floodplain Monitor - Varanus panoptes</i> . Northern Territory Department of Environment and Natural Resources. [online] Available at: https://nt.gov.au/_data/assets/pdf_file/0006/206466/floodplain-monitor.pdf [Accessed 1 May 2018].				
INVERTEBRATES				
Tiwi Islands Treesnail <i>Amphidromous cognatus</i>	-	VU	Habitat: Monsoon rainforest, most commonly reported in trees and woody vine (<i>Opilia amentacea</i>) (Wilson et al. 2006). Distribution: Endemic to the NT. Originally described in 1907 from three specimens collected at Port Essington on the Coburg Peninsula in 1850. Not recorded since in this area. Other records are from Bathurst and Melville islands collected 1976-80 (Wilson et al. 2006).	NONE <ul style="list-style-type: none"> Suitable habitat does not occur within the project area.
	Wilson, C., Woinarski, J., Kessner, V. and Braby, M. (2006). <i>Threatened Species of the Northern Territory - Cognate Land Snail - Amphidromus cognatus</i> . Northern Territory Department of Environment and Natural Resources. [online] Available at: https://nt.gov.au/_data/assets/pdf_file/0003/206517/amphidromus-cognatus.pdf [Accessed 27 Jan 2022].			
Atlas Moth <i>Attacus wardi</i>	-	VU	Habitat: Coastal monsoon vine forest, where the larval stages feed on the plant <i>Croton habrophyllus</i> at the edges of the forest (Lane et al. 2010). Distribution: The Top End of the NT, with records from Tiwi and Melville Islands, Darwin, Black Point and Cobourg Peninsula. Also records from Lesuer Island in WA (Braby & Nielsen 2011).	LOW <ul style="list-style-type: none"> Suitable habitat does not occur within the project area.
	Braby, M.F. and Nielsen, J. (2011). Review of the conservation status of the Atlas Moth, <i>Attacus wardi</i> Rothschild, 1910 (Lepidoptera: Saturniidae) from Australia. <i>Journal of Insect Conservation</i> , Vol. 15, pp. 603-608. Lane, D., Martin, G. and Weir, R.P. (2010). The life history of <i>Attacus wardi</i> Rothschild (Lepidoptera: Saturniidae) from the Northern Territory, Australia. <i>Australian Entomology</i> , Vol. 37, pp. 115-127.			
Melville Squat-keeled Snail <i>Trochomorpha melvillensis</i>	-	VU	Habitat: Occurs in coastal monsoonal rainforests often found under logs and tree bark (Wilson et al. 2006). Distribution: Very few records, all of which are located on Melville Island (Garden Point, Timarambu creek and Milikapiti) (Wilson et al. 2006). Has possibly always been extremely localised as there is no direct evidence to suggest a decline in numbers.	NONE <ul style="list-style-type: none"> Suitable habitat does not occur within the project area.
	Wilson, C., Woinarski, J., Kessner, V. and Braby, M. (2006). <i>Threatened Species of the Northern Territory - Land Snail - Trochomorpha melvillensis</i> . Northern Territory Department of Environment and Natural Resources. [online] Available at: https://nt.gov.au/_data/assets/pdf_file/0017/206540/trochomorpha-melvillensis.pdf [Accessed 1 May 2018].			
FLORA				
a saprophyte <i>Burmattia</i> sp. Bathurst Island	EN	EN	Habitat: Very little known, although recorded growing out of damp peat in wet spring-fed rainforest areas, often in slightly raised areas (Kerrigan et al. 2007). Distribution: Only known from Bathurst Island, where recorded in five separate rainforest patches in the north (Kerrigan et al. 2007).	NONE <ul style="list-style-type: none"> Suitable habitat does not occur within the project area.
	Kerrigan, R., Cowie, I. and Little, D. (2007). <i>Threatened Species of the Northern Territory - Burmannia sp., Bathurst Island</i> . Northern Territory Department of Environment and Natural Resources. https://nt.gov.au/_data/assets/pdf_file/0018/208422/burmannia.pdf [Accessed 27 Jan 2022].			
an orchid <i>Calochilus caeruleus</i>	-	VU	Habitat: Swamps and seasonally-inundated flats in open forest, wet heathland and <i>Melaleuca</i> woodland (Kerrigan & Cowie 2012). Distribution: Tropical Qld, NT, WA and New Guinea. Within the NT, only known from Melville Island and Cobourg Peninsula. There is probable	LOW <ul style="list-style-type: none"> Suitable habitat within project area.



Name	Status		Summary	Likelihood of occurrence
	Cth	NT		
			negative collection bias but has been considerable survey effort on Melville and Bathurst Islands (Kerrigan & Cowie 2012).	<ul style="list-style-type: none"> No recent records for Melville Island despite extensive survey effort.
Kerrigan, R. and Cowie, I. (2012). <i>Threatened Species of the Northern Territory - Calochilus caeruleus</i> . Northern Territory Department of Environment and Natural Resources. [online] Available at: https://nt.gov.au/_data/assets/pdf_file/0019/208423/calochilus-caeruleus.pdf [Accessed 27 Jan 2022].				
Darwin Cycad <i>Cycas armstrongii</i>	-	VU	<p>Habitat: Open grassy woodland where adequate drainage appears to be a limiting factor (Kerrigan et al. 2006). Prime habitat has deep loamy soil (Liddle 2009). Separate male and female plants, with males flowering in August, and females from March-Nov (Holmes et al. 2007)</p> <p>Distribution: Restricted to the Top End of the NT – from Gunn Point to Hayes Creek, west to within 50km of the coastline and east to the Wildman River catchment (Kerrigan et al. 2006). Also on the Tiwi Islands and Cobourg Peninsula.</p>	<p>HIGH</p> <ul style="list-style-type: none"> Suitable habitat within the project area. Recent records within the project area.
Holmes, J., Bisa, D., Hill, A. and Crase, B. (2007). <i>A Guide to the Threatened, Near Threatened and Data Deficient Plants in the Litchfield Shire of the Northern Territory</i> . WWF-Australia, Darwin.				
Kerrigan, R., Cowie, I. and Liddle, D. (2006). <i>Threatened Species of the Northern Territory - Cycas armstrongii</i> . Northern Territory Department of Environment and Natural Resources. https://nt.gov.au/_data/assets/pdf_file/0017/208430/cycas-armstrongii.pdf [Accessed 27 Jan 2022].				
Liddle, D.T. (2009). <i>Management Program for Cycads in the Northern Territory of Australia 2009-2014</i> . Northern Territory Department of Natural Resources, Environment, the Arts and Sport, Darwin. http://www.territorystories.nt.gov.au/jspui/bitstream/10070/265358/1/Management%20program%20for%20cycads%20in%20the%20Northern%20Territory%20of%20Australia%202009%20to%202014.pdf [Accessed 1 May 2018].				
vine or shrub <i>Dendromyza reinwardtiana</i>	-	VU	<p>Habitat: Perennial wet rainforest, where usually hosted by <i>Calophyllum soulattri</i> and <i>Syzygium eucalyptoides</i> subsp. <i>bleeseri</i> (Dunlop et al. 1995).</p> <p>Distribution: Sumatra through to Papua New Guinea. In Australia, known from Cape York Peninsula and the NT, where only found on Bathurst (3 sites) and Melville (4 sites) Islands (Woinarski et al. 2003).</p>	<p>NONE</p> <ul style="list-style-type: none"> Suitable habitat does not occur within the project area.
Dunlop, C.R., Leach, G.J. and Cowie, I.D. (1995). <i>Flora of the Darwin Region Vol 2</i> . Conservation Commission of the Northern Territory, Darwin.				
Kerrigan, R. and Cowie, I. (2006). <i>Threatened Species of the Northern Territory - Dendromyza reinwardtiana</i> . Northern Territory Department of Environment and Natural Resources. [online] Available at: https://nt.gov.au/_data/assets/pdf_file/0018/208431/dendromyza-reinwardtiana.pdf [Accessed 27 Jan 2022].				
Woinarski, J., Brennan, K., Cowie, I., Kerrigan, R. and Hempel, C. (2003). <i>Biodiversity conservation on the Tiwi islands, Northern Territory</i> . Part 1 - Plants and environments. Department of Infrastructure Planning and Environment, Darwin, pp.144.				
a tree <i>Elaeocarpus miegei</i>	-	CR	<p>Habitat: Moist permanently wet soils in rainforest patches (Kerrigan & Cowie 2006).</p> <p>Distribution: In Australia, only recorded on Tiwi Island from six rainforest patches (Kerrigan & Cowie 2006). No records since 1989, despite concerted search efforts on the Tiwi Islands in 1998-2001. Also known from New Guinea, Malesia and the Solomon Islands (Kerrigan & Cowie 2006).</p>	<p>NONE</p> <ul style="list-style-type: none"> Suitable habitat does not occur within the project.
Kerrigan, R. and Cowie, I. (2006). <i>Threatened Species of the Northern Territory - Elaeocarpus miegei</i> . Northern Territory Department of Environment and Natural Resources. https://nt.gov.au/_data/assets/pdf_file/0019/208432/elaecarpus-miegei.pdf [Accessed 27 Jan 2022].				
Native Walnut <i>Endiandra limnophila</i>	-	VU	<p>Habitat: Well-developed spring-fed rainforests on swampy or very wet substrates along creek margins (Kerrigan & Cowie 2006).</p> <p>Distribution: Endemic to Australia – far north of Cape York Peninsula in Qld, and the Tiwi Islands and Channel point in the NT (Kerrigan & Cowie</p>	<p>NONE</p> <ul style="list-style-type: none"> Suitable habitat does not occur within the project area.



Name	Status		Summary	Likelihood of occurrence
	Cth	NT		
			2006). In the NT, recorded at approximately 22 locations with no more than 6 individuals at any one locality (Liddle et al. 1994). Extensive survey of the Tiwi Islands in 2000-02 yielded no further populations (Woinarski et al. 2003).	
			<p>Kerrigan, R. and Cowie, I. (2006). <i>Threatened Species of the Northern Territory - Endiandra limnophila</i>. Northern Territory Department of Environment and Natural Resources. https://nt.gov.au/_data/assets/pdf_file/0003/208434/endiandra-limnophila.pdf [Accessed 27 Jan 2022].</p> <p>Liddle, D.T., Russell-Smith, J., Brock, J., Leach, G.J. and Connors, G.T. (1994). <i>Atlas of the vascular rainforest plants of the Northern Territory</i>. Flora of Australia Supplementary Series No. 3, Australian Biological Resources Study, Canberra.</p> <p>Woinarski, J., Brennan, K., Cowie, I., Kerrigan, R., and Hempel, C. (2003). <i>Biodiversity conservation on the Tiwi islands, Northern Territory. Part 1. Plants and environments</i>. Department of Infrastructure Planning and Environment, Darwin.</p>	
Narrow-leaf Climbing Pandan <i>Freycinetia excelsa</i>	-	VU	<p>Habitat: Wet lowland rainforest and spring-fed rainforests in sandstone gullies (Kerrigan & Cowie 2006).</p> <p>Distribution: Known from Papua New Guinea, coastal Qld, and in the NT from seven locations between Bathurst Island and the Arafura Swamp (Kerrigan & Cowie 2006).</p>	<p>NONE</p> <ul style="list-style-type: none"> • Suitable habitat does not occur within the project area.
			<p>Kerrigan, R. and Cowie, I. (2006). <i>Threatened Species of the Northern Territory - Freycinetia excelsa</i>. Northern Territory Department of Environment and Natural Resources. https://nt.gov.au/_data/assets/pdf_file/0018/208440/freycinetia-excelsa.pdf [Accessed 27 Jan 2022].</p>	
a climber <i>Freycinetia percostata</i>	-	VU	<p>Habitat: Wet lowland rainforest and spring-fed rainforests in sandstone gullies (Woinarski et al. 2003).</p> <p>Distribution: New Guinea, the Solomon Islands and Australia (Stone 1982). In the NT, recorded from localities on Bathurst Island and the Arafura Swamp (Kerrigan & Cowie 2006). Further surveys are recommended (Kerrigan & Cowie 2006).</p>	<p>NONE</p> <ul style="list-style-type: none"> • Suitable habitat does not occur within the project area.
			<p>Kerrigan, R. and Cowie, I. (2006). <i>Threatened Species of the Northern Territory - Freycinetia percostata</i>. Northern Territory Department of Environment and Natural Resources. [online] Available at: https://nt.gov.au/_data/assets/pdf_file/0019/208441/freycinetia-percostata.pdf [Accessed 27 Jan 2022].</p> <p>Stone, B.C. (1982). The Australian species of Freycinetia (Pandanaceae). <i>Brunonia</i>, Vol. 5, pp. 79-94.</p> <p>Woinarski, J., Brennan, K., Cowie, I., Kerrigan, R. and Hempel, C. (2003). <i>Biodiversity conservation on the Tiwi islands, Northern Territory. Part 1. Plants and environments</i>. Department of Infrastructure Planning and Environment, Darwin, pp. 144.</p>	
a tree <i>Garcinia warrenii</i>	-	EN	<p>Habitat: In the NT, ecology is not well known. In Qld, along watercourses in open and rainforest areas (Kerrigan & Cowie 2006).</p> <p>Distribution: In the NT, known from only one location surrounded by mangroves in the Jessie River, Melville Island area. Also recorded from Cape York Peninsula (Qld.) and New Guinea (Kerrigan & Cowie 2006).</p>	<p>NONE</p> <ul style="list-style-type: none"> • The habitat within which the Melville Island occurrence of this species is located does not occur within the project area.
			<p>Kerrigan, R. and Cowie, I. (2006). <i>Threatened Species of the Northern Territory - Garcinia warrenii</i>. Northern Territory Department of Environment and Natural Resources. https://nt.gov.au/_data/assets/pdf_file/0020/208442/garcinia-warrenii.pdf [Accessed 1 May 2018].</p>	
a vine <i>Hoya australis oramicola</i>	VU	VU	<p>Habitat: Coastal monsoon rainforest on red laterite dunes (Kerrigan & Cowie 2006).</p> <p>Distribution: Thought to be endemic to the NT, only known from Bathurst and Melville Islands. Only collected from five sites within the islands (Kerrigan & Cowie 2006). Considered adequately surveyed, based on</p>	<p>NONE</p> <ul style="list-style-type: none"> • Suitable habitat does not occur within the project area.



Name	Status		Summary	Likelihood of occurrence
	Cth	NT		
			extensive surveys on the Tiwi Islands and rainforest habitats across the Top End (Kerrigan & Cowie 2006).	
Department of the Environment (2016). <i>Hoya australis subsp. Oramicola</i> . Species Profile and Threats Database, Department of the Environment, Australian Government, Canberra. [online] Available at: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=55436 [Accessed 1 May 2018]. Kerrigan, R. and Cowie, I. (2006). <i>Threatened Species of the Northern Territory - Hoya australis subsp. Oramicola</i> . Northern Territory Department of Environment and Natural Resources. https://nt.gov.au/_data/assets/pdf_file/0004/208453/hoya-australis-oramicola.pdf [Accessed 1 May 2018].				
Luisia Orchid <i>Luisia corrugata</i>	-	VU	Habitat: An epiphyte that commonly grows on trees with scaly bark and prefers the areas of bright light (non-shaded area). Host trees include <i>Syzygium spp.</i> , <i>Sterculia quadrifida</i> , <i>Barringtonia acutangula</i> , <i>Canarium australianum</i> and <i>Vitex spp.</i> (FloraNT). Within the NT, collected from the margins of monsoon rainforests. Elsewhere, more common in coastal and near coastal habitats (Kerrigan & Cowie 2012). Distribution: Appears to be endemic to the NT with known populations from Melville Island and the mainland (Bankers Jungle and Crocodile Creek in Black Jungle Conservation Reserve) (Kerrigan & Cowie 2012). It is likely that the existing collections accurately reflect the abundance and distribution of this species (Kerrigan & Cowie 2012).	NONE <ul style="list-style-type: none"> • Suitable habitat does not occur within the project area.
Kerrigan, R. and Cowie, I. (2012). <i>Threatened Species of the Northern Territory - Luisia corrugata</i> . Northern Territory Department of Environment and Natural Resources. https://nt.gov.au/_data/assets/pdf_file/0005/208472/luisia-corrugata.pdf [Accessed 27 Jan 2022].				
a sedge <i>Mapania macrocephala</i>	-	VU	Habitat: Spring-fed rainforests in damp and wet areas (Kerrigan & Cowie 2006). Distribution: Known from only four locations in the NT; two on Bathurst Island, one on Melville Island and one from north east Arnhem Land (Kerrigan & Cowie 2006). Also occurs in coastal north Qld, Papua New Guinea and South-East Asia. Extensive surveys in 2003 (Tiwi Islands and Arafura Swamp area) only located one additional population (Kerrigan & Cowie 2006).	NONE <ul style="list-style-type: none"> • Suitable habitat does not occur within the project area.
Kerrigan, R. and Cowie, I. (2006). <i>Threatened Species of the Northern Territory - Mapania macrocephala</i> . Northern Territory Department of Environment and Natural Resources. https://nt.gov.au/_data/assets/pdf_file/0008/208475/mapania-macrocephala.pdf [Accessed 27 Jan 2022].				
a vine <i>Mitrella tiwiensis</i>	VU	VU	Habitat: Deeply-shaded monsoonal rainforest in areas heavily covered with moist leaf litter. These areas are often associated with perennial springs and groundwater seepages (DoE 2022). Distribution: Known from a number of locations across both Bathurst and Melville Island. Thought to be endemic to the NT with different localities considered geographically distinct subpopulations (DoE 2022). Considered adequately surveyed, based on extensive surveys on the Tiwi Islands and rain forest habitats across the Top End (Russell- Smith 1991; Fensham and Woinarski 1992; Woinarski et al. 2003.).	NONE <ul style="list-style-type: none"> • Suitable habitat does not occur within the project area.
Department of the Environment (2022). <i>Mitrella tiwiensis</i> . Species Profile and Threats Database, Department of the Environment, Australian Government, Canberra. [online] Available at: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=82029 [Accessed 27 Jan 2022].				



Name	Status		Summary	Likelihood of occurrence
	Cth	NT		
			<p>Fensham, R.J. and Woinarski, J.C.Z. (1992). <i>Yawulama: the ecology and conservation of monsoon forest on the Tiwi Islands</i>. Report to DASET. Conservation Commission of the Northern Territory, Darwin.</p> <p>Kerrigan, R. and Cowie, I. (2006). <i>Threatened Species of the Northern Territory - Mitrella tiwiensis</i>. Northern Territory Department of Environment and Natural Resources. [online] Available at: https://nt.gov.au/_data/assets/pdf_file/0011/208478/mitrella-tiwiensis.pdf [Accessed 27 Jan 2022].</p> <p>Russell-Smith, J. (1991). Classification, species richness, and environmental relations of monsoon rain forest in northern Australia. <i>Journal of Vegetation Science</i>, Vol. 2, pp. 259-278.</p> <p>Woinarski, J., Brennan, K., Cowie, I., Kerrigan, R. and Hempel, C. (2003). <i>Biodiversity conservation on the Tiwi islands, Northern Territory</i>. Part 1 - Plants and environments. Department of Infrastructure Planning and Environment, Darwin, pp. 144.</p>	
<p>a tree <i>Tarennoidea wallichii</i></p>	-	EN	<p>Habitat: Drier areas within complex evergreen monsoonal rainforests (Kerrigan & Cowie 2006).</p> <p>Distribution: Widespread in South-East Asia, extending at least as far as India. In the NT, known from only a small set of monsoonal rainforests on Melville Island (Kerrigan & Cowie 2006). Across the NT, preferred habitat has been well sampled (Russell-Smith 1991), and the Tiwi Islands have also been comparatively well sampled (Kerrigan & Cowie 2006).</p>	<p>NONE</p> <ul style="list-style-type: none"> • Suitable habitat does not occur within the project area.
			<p>Department of the Environment (2022). <i>Tarennoidea wallichii</i> in Species Profile and Threats Database, Department of the Environment, Canberra. Available at: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=65173 [Accessed 27 Jan 2022].</p> <p>Kerrigan, R. and Cowie, I. (2006). <i>Threatened Species of the Northern Territory - Tarennoidea wallichii</i>. Northern Territory Department of Environment and Natural Resources. https://nt.gov.au/_data/assets/pdf_file/0010/208495/tarennoidea-wallichii.pdf [Accessed 27 Jan 2022].</p>	
<p>an orchid <i>Thrixspermum congestum</i></p>	-	VU	<p>Habitat: Lowland rainforests and on mangroves in humid, airy situations, often in exposed positions on small branches (Kerrigan & Cowie 2006).</p> <p>Distribution: New Guinea, Queensland and the NT (Jones 1988); where known only from the Tiwi Islands (Kerrigan & Cowie 2006). No further populations were uncovered during extensive surveys on the Tiwi Islands between 1998-2001 (Woinarski et al. 2003). Rainforest habitat has been well sampled (Russell-Smith 1991; Liddle et al. 1994), suggesting apparent restriction may be real. There is an element of data deficiency with flowers recorded as lasting only about 10 hours (Kerrigan & Cowie 2006).</p>	<p>NONE</p> <ul style="list-style-type: none"> • Suitable habitat does not occur within the project area.
			<p>Jones, D.L. (1988). <i>Native Orchids of Australia</i>. Reed, Sydney.</p> <p>Kerrigan, R. and Cowie, I. (2006). <i>Threatened Species of the Northern Territory - Thrixspermum congestum</i>. Northern Territory Department of Environment and Natural Resources. https://nt.gov.au/_data/assets/pdf_file/0011/208496/thrixspermum-congestum.pdf [Accessed 27 Jan 2022].</p> <p>Liddle, D.T., Russell-Smith, J., Brock, J., Leach, G.J. and Connors, G.T. (1994). <i>Atlas of the vascular rainforest plants of the Northern Territory</i>. Flora of Australia Supplementary Series No. 3. ABRIS, Canberra.</p> <p>Russell-Smith, J. (1991). Classification, species richness, and environmental relations of monsoon rain forest in northern Australia. <i>Journal of Vegetation Science</i>, Vol. 2, pp. 259-278.</p> <p>Woinarski, J., Brennan, K., Cowie, I., Kerrigan, R. and Hempel, C. (2003). <i>Biodiversity conservation on the Tiwi islands, Northern Territory</i>. Part 1. Plants and environments. Department of Infrastructure Planning and Environment, Darwin, pp. 144.</p>	
<p>a herb <i>Typhonium jonesii</i></p>	EN	EN	<p>Habitat: Rocky iron rich soils located on hills in Eucalypt woodlands and wet rainforest environments (Kerrigan & Cowie 2006).</p> <p>Distribution: Endemic to the NT, known from western Bathurst Island and eastern Melville Island (Kerrigan & Cowie 2006). In 2017, a targeted Typhonium survey relocated the known populations and uncovered new populations near Milikapiti (DENR 2017)</p>	<p>HIGH</p> <ul style="list-style-type: none"> • Suitable habitat within the project area • No recent records within the project area; however, recent records on Melville Island • DENR modelling has 'high likelihood' habitat within the project area.
			<p>Department of the Environment and Natural Resource (DENR) (2017). <i>Melville Island Typhonium Field Survey: Lot 411 Townsite of Milikapiti</i>. Prepared for Power and Water Corporation.</p>	



Name	Status		Summary	Likelihood of occurrence
	Cth	NT		
			<p>Department of the Environment (2022). <i>Typhonium jonesii</i> in Species Profile and Threats Database, Department of the Environment, Canberra. Available at: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=62412 [Accessed 27 Jan 2022]</p> <p>Kerrigan, R. and Cowie, I. (2006). <i>Threatened Species of the Northern Territory - Typhonium jonesii</i>. Northern Territory Department of Environment and Natural Resources. https://nt.gov.au/_data/assets/pdf_file/0015/208500/typhonium-jonesii.pdf [Accessed 27 Jan 2022].</p>	
<p>a herb</p> <p><i>Typhonium mirabile</i></p>	EN	EN	<p>Habitat: Very sporadically in groups in Eucalypt woodland on lateritic and sandy soils, and in patches where the leaf litter is sparse or absent, mainly near the bases of young Cycas plants or in shade, on hillslopes and ridges (Kerrigan et al. 2007).</p> <p>Distribution: Endemic to the NT, only found on the western half of Melville Island. In 2017, a targeted Typhonium survey relocated the known populations and uncovered a new population near Milikapiti (DENR 2017).</p>	<p>HIGH</p> <ul style="list-style-type: none"> • Suitable habitat within the project area • No recent records within the project area; however, recent records on Melville Island • DENR modelling has 'high likelihood' habitat within the project area.
			<p>Department of the Environment and Natural Resource (DENR) (2017). <i>Melville Island Typhonium Field Survey: Lot 411 Townsite of Milikapiti</i>. Prepared for Power and Water Corporation.</p> <p>Department of the Environment (2022). <i>Typhonium mirabile</i> in Species Profile and Threats Database, Department of the Environment, Canberra. Available at: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=79227 [Accessed 27 Jan 2022].</p> <p>Kerrigan, R., Cowie, I. and Woinarski, J. (2007). <i>Threatened Species of the Northern Territory - Typhonium mirabile</i>. Northern Territory Department of Environment and Natural Resources. [online] Available at: https://nt.gov.au/_data/assets/pdf_file/0016/208501/typhonium-mirabile.pdf [Accessed 27 Jan 2022].</p>	
<p>a shrub / sapling</p> <p><i>Xylopia monosperma</i></p>	EN	EN	<p>Habitat: Around natural springs and wet rainforest areas (Kerrigan & Cowie 2006).</p> <p>Distribution: Thought to be endemic to the NT; only known from five localities across the Tiwi Islands, two on Bathurst and three on Melville Islands (Kerrigan & Cowie 2006). Considered adequately surveyed, based on extensive surveys on the Tiwi Islands and is relatively visible when present (Kerrigan & Cowie 2006).</p>	<p>NONE</p> <ul style="list-style-type: none"> • Suitable habitat does not occur within the project area.
			<p>Department of the Environment (2022). <i>Xylopia monosperma</i> in Species Profile and Threats Database, Department of the Environment, Canberra. Available at: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=82030 Accessed 27 Jan 2022.</p> <p>Kerrigan, R. and Cowie, I. (2006). <i>Threatened Species of the Northern Territory - Xylopia sp. Melville Island</i>. Northern Territory Department of Environment and Natural Resources. https://nt.gov.au/_data/assets/pdf_file/0005/208508/xylopia.pdf [Accessed 27 Jan 2022].</p>	



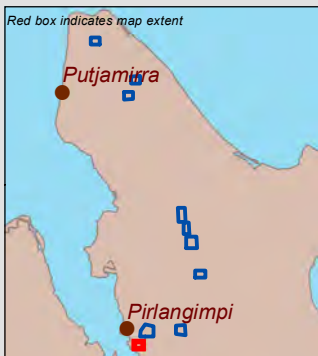
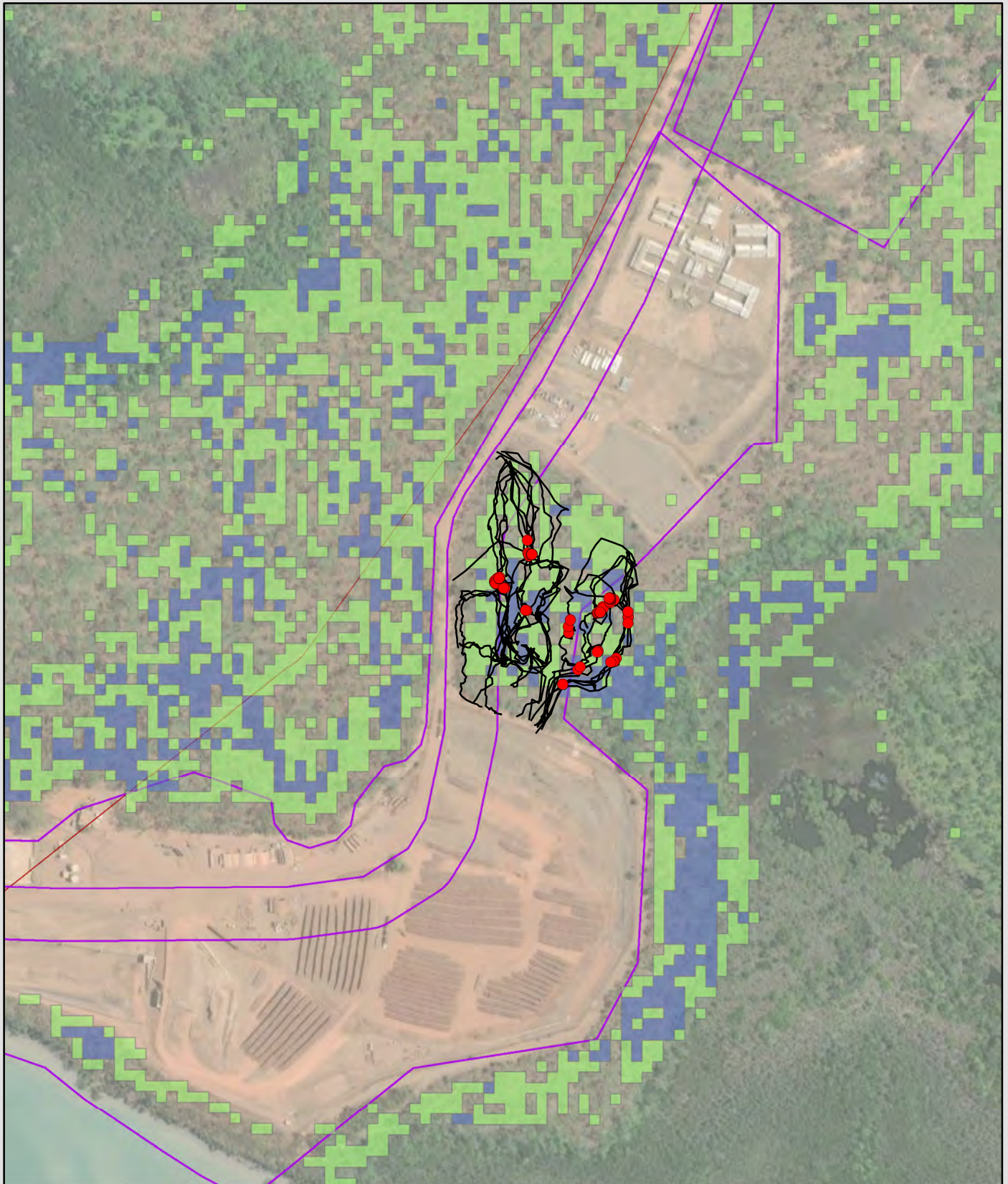
APPENDIX D TYPHONIUM SURVEY RESULTS

Table of location of *Typhonium* plants found.

Observer	Date	Latitude (GDA94)	Longitude (GDA94)	Likelihood	Land Unit
Michaelina Puruntatameri	1/04/2022	-11.418413	130.426242	Moderate	Tiwi
Michaelina Puruntatameri	1/04/2022	-11.418424	130.426235	Moderate	Tiwi
Michaelina Puruntatameri	1/04/2022	-11.418428	130.426235	Moderate	Tiwi
Michaelina Puruntatameri	1/04/2022	-11.418721	130.427397	-	Tiwi
Michaelina Puruntatameri	1/04/2022	-11.418723	130.427397	-	Tiwi
Sarah Ryan	1/04/2022	-11.418440	130.426245	Moderate	Tiwi
Sarah Ryan	1/04/2022	-11.418439	130.426257	High	Tiwi
Sarah Ryan	1/04/2022	-11.418445	130.426257	High	Tiwi
Sarah Ryan	1/04/2022	-11.418444	130.426253	Moderate	Tiwi
Sarah Ryan	1/04/2022	-11.418442	130.426248	Moderate	Tiwi
Sarah Ryan	1/04/2022	-11.418441	130.426243	Moderate	Tiwi
Sarah Ryan	1/04/2022	-11.418672	130.426518	High	Tiwi
Sarah Ryan	1/04/2022	-11.418669	130.426503	High	Tiwi
Sarah Ryan	1/04/2022	-11.418071	130.426516	Moderate	Tiwi
Sarah Ryan	1/04/2022	-11.418861	130.426879	Moderate	Tiwi
Sarah Ryan	1/04/2022	-11.418808	130.426876	Moderate	Tiwi
Sarah Ryan	1/04/2022	-11.418749	130.426894	High	Tiwi
Sarah Ryan	1/04/2022	-11.419078	130.427294	Moderate	Tiwi
Sarah Ryan	1/04/2022	-11.419102	130.427279	Moderate	Tiwi
Sarah Ryan	1/04/2022	-11.419105	130.427274	Moderate	Tiwi
Sarah Ryan	1/04/2022	-11.419113	130.427248	High	Tiwi
Nicole Clark	1/04/2022	-11.418206	130.426534	Moderate	Tiwi
Nicole Clark	1/04/2022	-11.418483	130.426326	High	Tiwi
Nicole Clark	1/04/2022	-11.418481	130.426314	High	Tiwi
Nicole Clark	1/04/2022	-11.419021	130.427138	-	Tiwi
Nicole Clark	1/04/2022	-11.419027	130.427128	-	Tiwi
Nicole Clark	1/04/2022	-11.418645	130.427180	-	Tiwi
Nicole Clark	1/04/2022	-11.418640	130.427175	-	Tiwi
Nicole Clark	1/04/2022	-11.418644	130.427183	-	Tiwi
Nicole Clark	1/04/2022	-11.418580	130.427273	Moderate	Tiwi
Nicole Clark	1/04/2022	-11.418601	130.427242	-	Tiwi
Nicole Clark	1/04/2022	-11.418595	130.427234	-	Tiwi
Nicole Clark	1/04/2022	-11.418573	130.427243	-	Tiwi
Nicole Clark	1/04/2022	-11.418572	130.427242	-	Tiwi
Nicole Clark	1/04/2022	-11.418568	130.427244	-	Tiwi
Nicole Clark	1/04/2022	-11.418562	130.427242	-	Tiwi



Observer	Date	Latitude (GDA94)	Longitude (GDA94)	Likelihood	Land Unit
Nicole Clark	1/04/2022	-11.418562	130.427239	-	Tiwi
Nicole Clark	1/04/2022	-11.418562	130.427234	-	Tiwi
Nicole Clark	1/04/2022	-11.4185640	130.4272290	-	Tiwi
Nikita Puruntatameri	1/04/2022	-11.4183999	130.4262739	Moderate	Tiwi
Nikita Puruntatameri	1/04/2022	-11.4183999	130.4262739	Moderate	Tiwi
Nikita Puruntatameri	1/04/2022	-11.4183999	130.4262739	Moderate	Tiwi
Nikita Puruntatameri	1/04/2022	-11.4191769	130.4269610	High	Tiwi
Nikita Puruntatameri	1/04/2022	-11.4191530	130.4269830	High	Tiwi
Nikita Puruntatameri	1/04/2022	-11.4186920	130.4271280	-	Tiwi
Nikita Puruntatameri	1/04/2022	-11.4186930	130.4271290	-	Tiwi
Nikita Puruntatameri	1/04/2022	-11.4186910	130.4271340	-	Tiwi
Nikita Puruntatameri	1/04/2022	-11.4186869	130.4271529	-	Tiwi
Nikita Puruntatameri	1/04/2022	-11.4186879	130.4271529	-	Tiwi
Nikita Puruntatameri	1/04/2022	-11.4186859	130.4271519	-	Tiwi
Nikita Puruntatameri	1/04/2022	-11.4186859	130.4271529	-	Tiwi
Nikita Puruntatameri	1/04/2022	-11.4186790	130.4273949	-	Tiwi
Nikita Puruntatameri	1/04/2022	-11.4187790	130.4273949	Moderate	Tiwi
Nikita Puruntatameri	1/04/2022	-11.4193059	130.4268310	High	Tiwi
Nikita Puruntatameri	1/04/2022	-11.4193059	130.4268310	High	Tiwi
Nikita Puruntatameri	1/04/2022	-11.4181829	130.4265209	Moderate	Tiwi
Nikita Puruntatameri	1/04/2022	-11.4181910	130.4265339	Moderate	Tiwi
Nikita Puruntatameri	1/04/2022	-11.4181950	130.4265540	Moderate	Tiwi
Nikita Puruntatameri	1/04/2022	-11.4181930	130.4265550	Moderate	Tiwi
Nikita Puruntatameri	1/04/2022	-11.4181920	130.4265560	Moderate	Tiwi
Nikita Puruntatameri	1/04/2022	-11.4181920	130.4265560	Moderate	Tiwi
Nikita Puruntatameri	1/04/2022	-11.4181920	130.4265560	Moderate	Tiwi
Nikita Puruntatameri	1/04/2022	-11.4181920	130.4265560	Moderate	Tiwi
Nikita Puruntatameri	1/04/2022	-11.4183900	130.4262800	Moderate	Tiwi
Nikita Puruntatameri	1/04/2022	-11.4183999	130.4262700	Moderate	Tiwi



- Project area
 - Survey areas
 - Survey Tracks
 - Typhonium plants
- Modelled Likelihood**
- High
 - Moderate

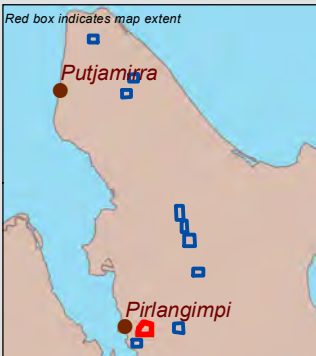
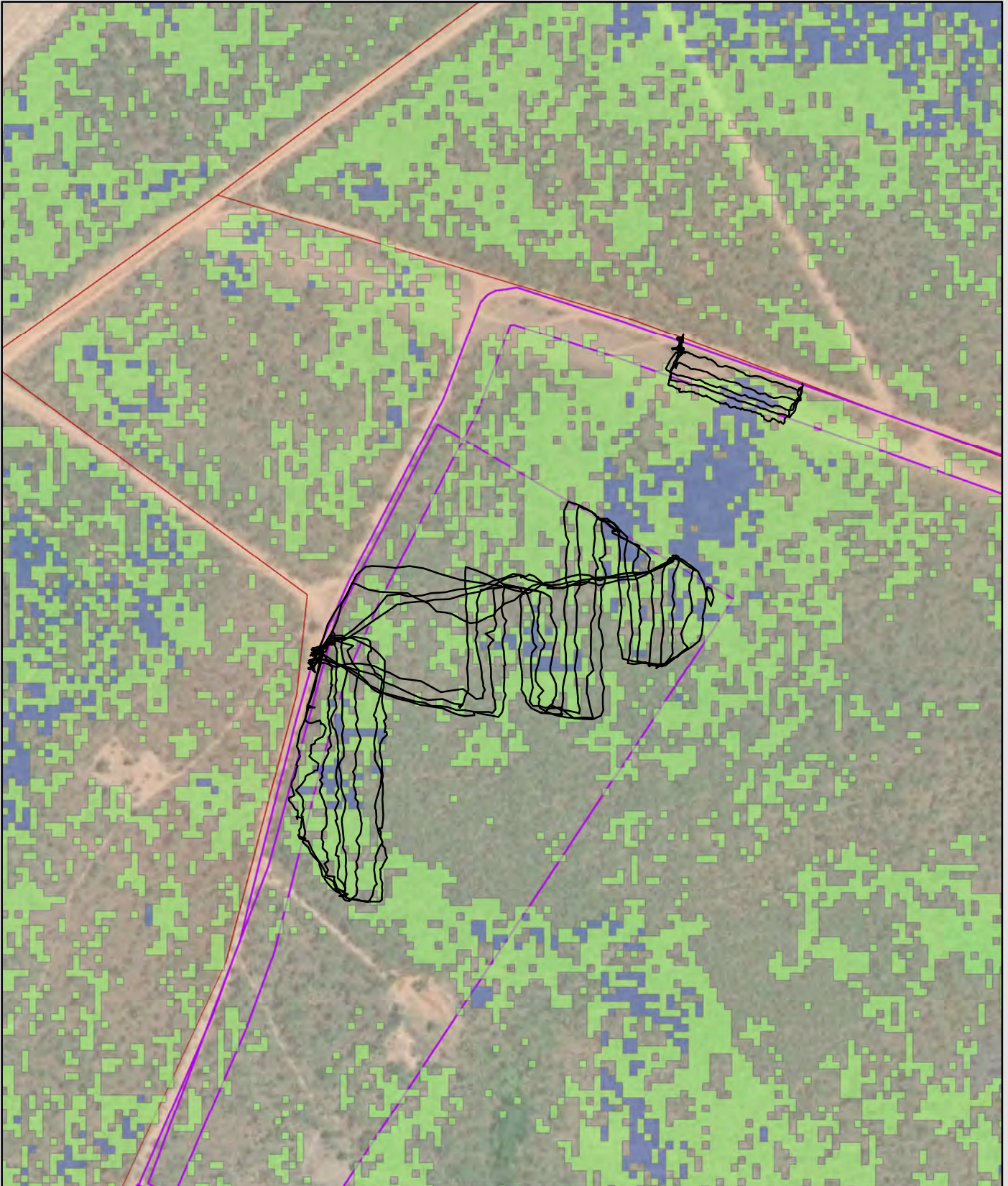


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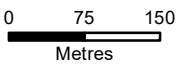


- Project area
- Survey areas
- Survey Tracks
- Typhonium plants


Modelled Likelihood

- High
- Moderate



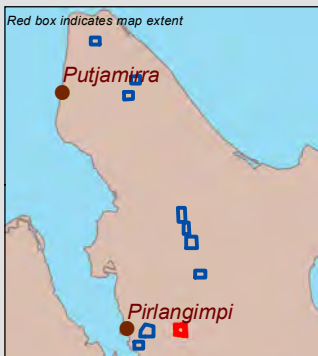
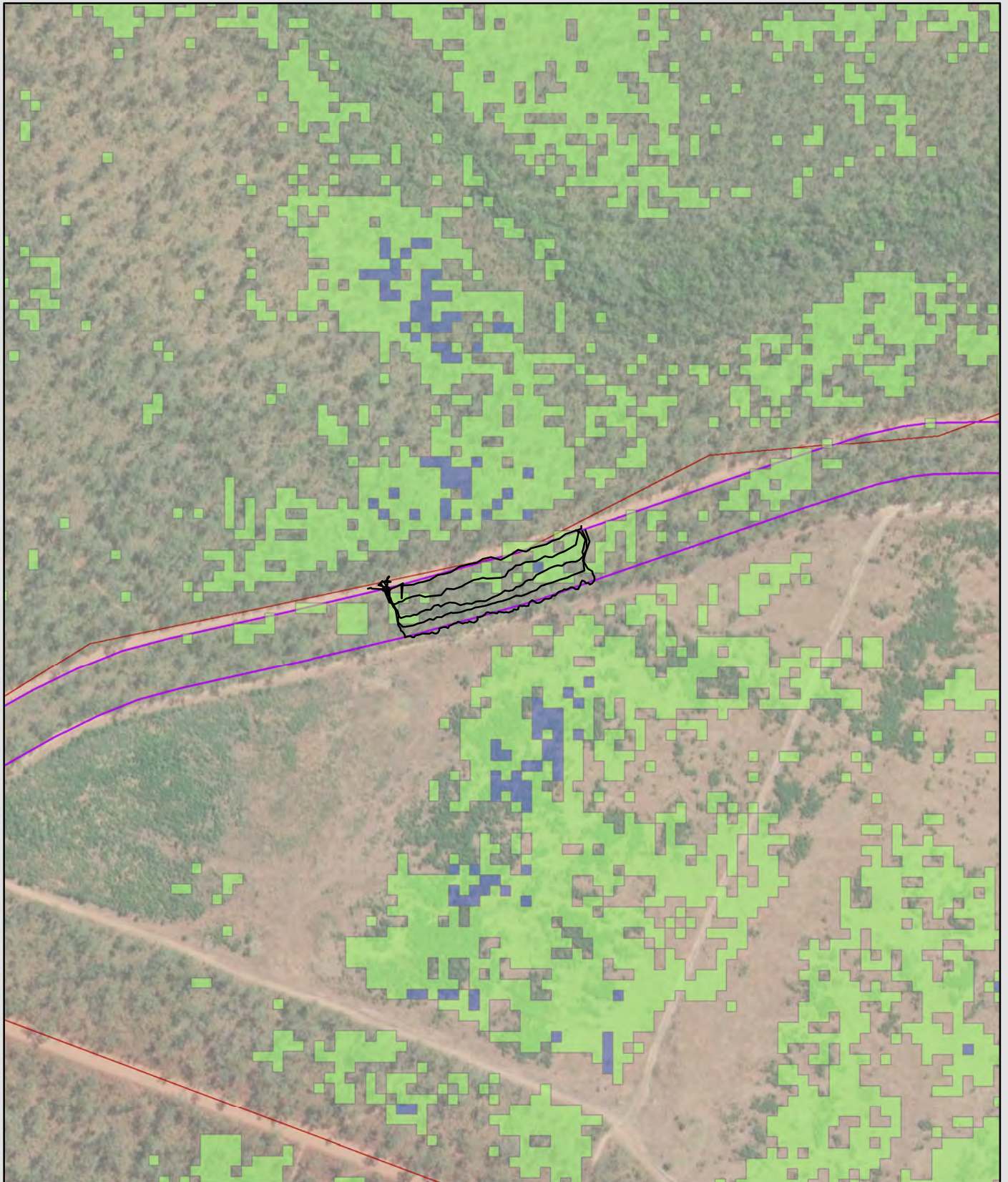


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DATA SOURCE
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 Project data: EZ21166, DEPWS
 Imagery: ESRI



- Project area
 - Survey areas
 - Survey Tracks
 - Typhonium plants
- Modelled Likelihood**
- High
 - Moderate

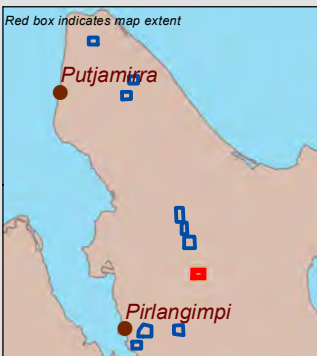
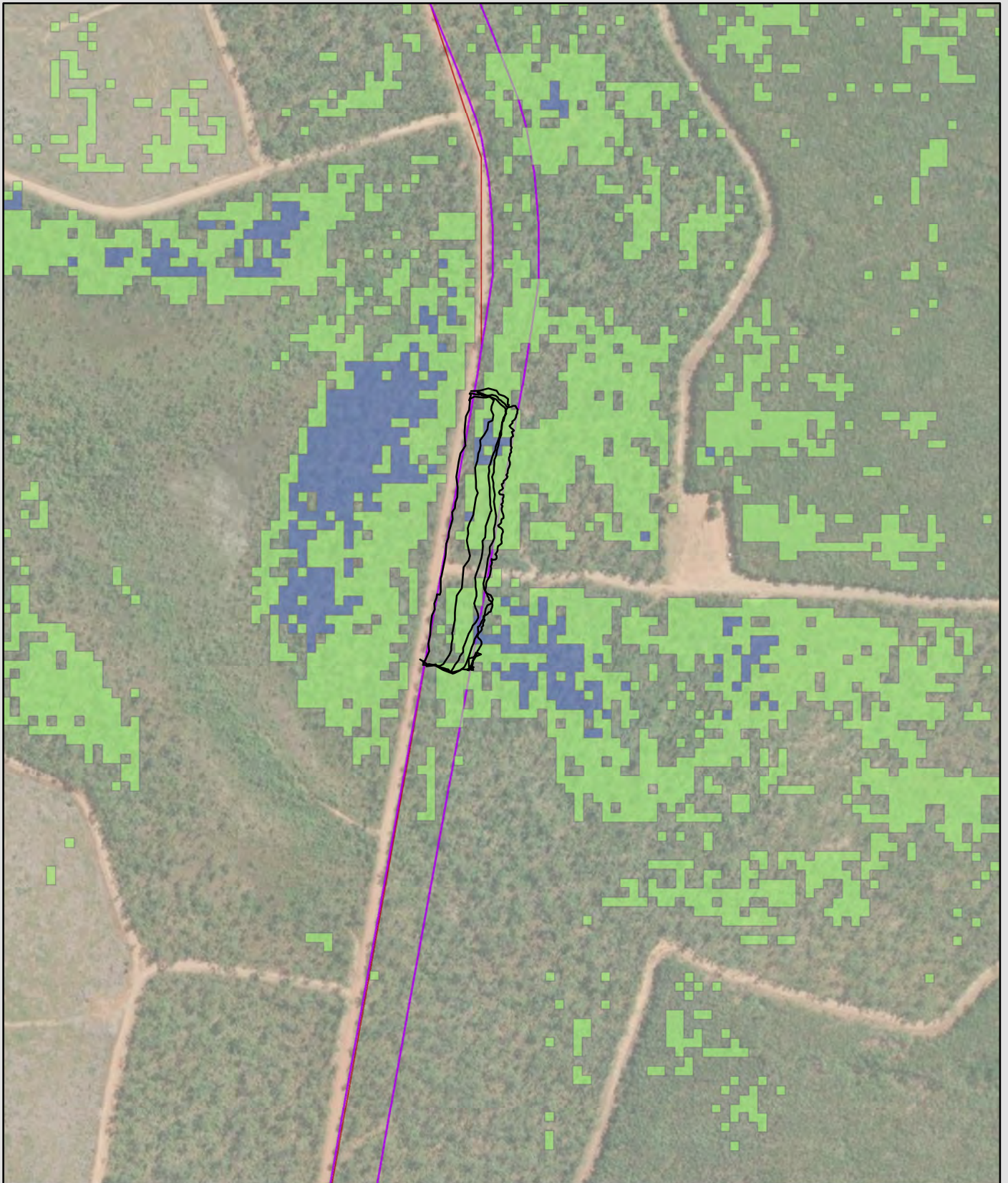


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DATA SOURCE
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 Project data: EZ21166, DEPWS
 Imagery: ESRI



- Project area
- Survey areas
- Survey Tracks
- Typhonium plants

Modelled Likelihood

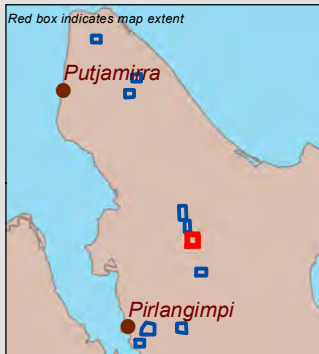
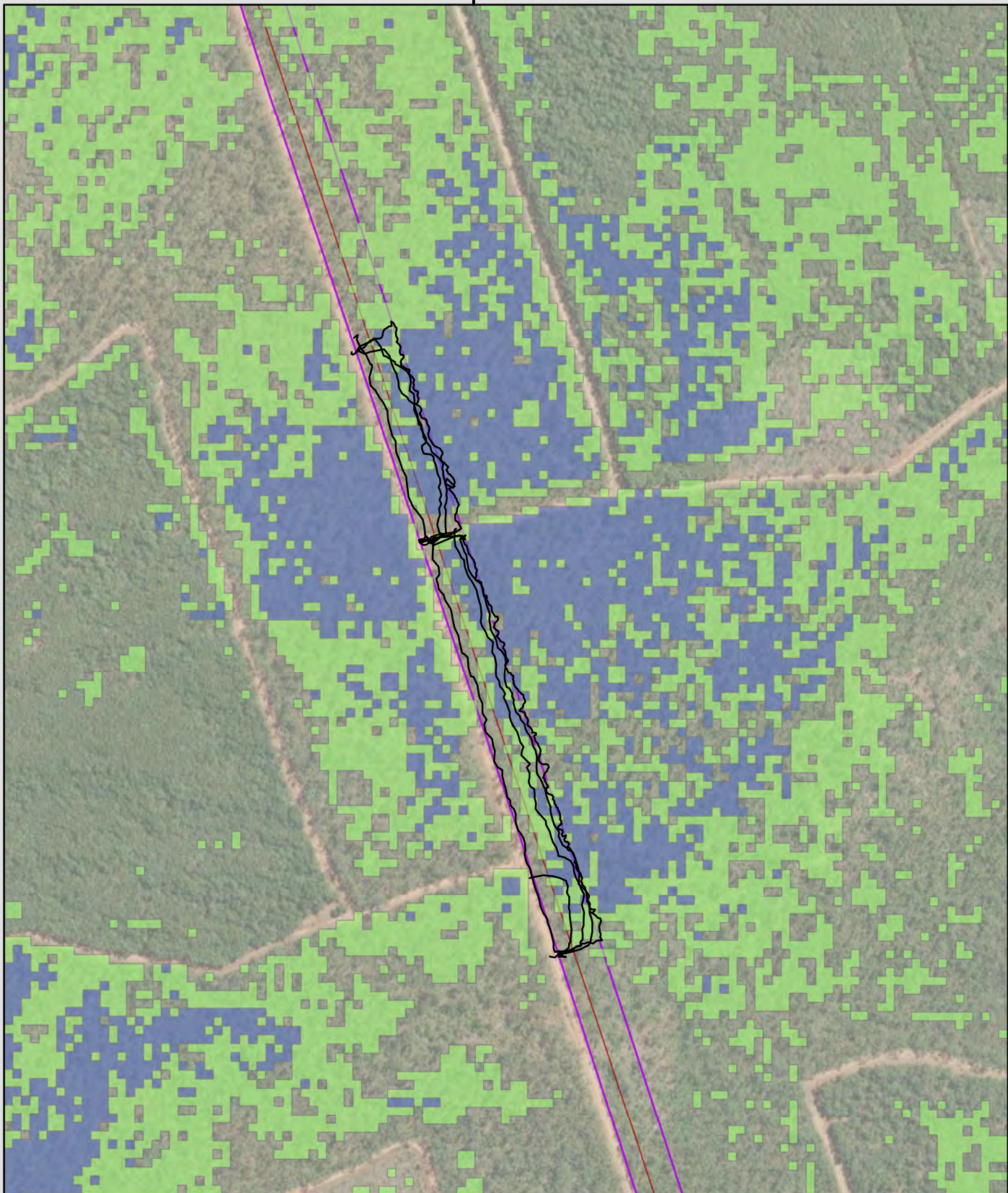
- High
- Moderate

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DATA SOURCE
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 Project data: EZ21166, DEPWS
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- Project area
- Survey areas
- Survey Tracks
- Typhonium plants


Modelled Likelihood

- High
- Moderate



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Metres



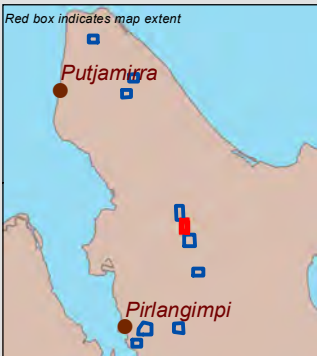
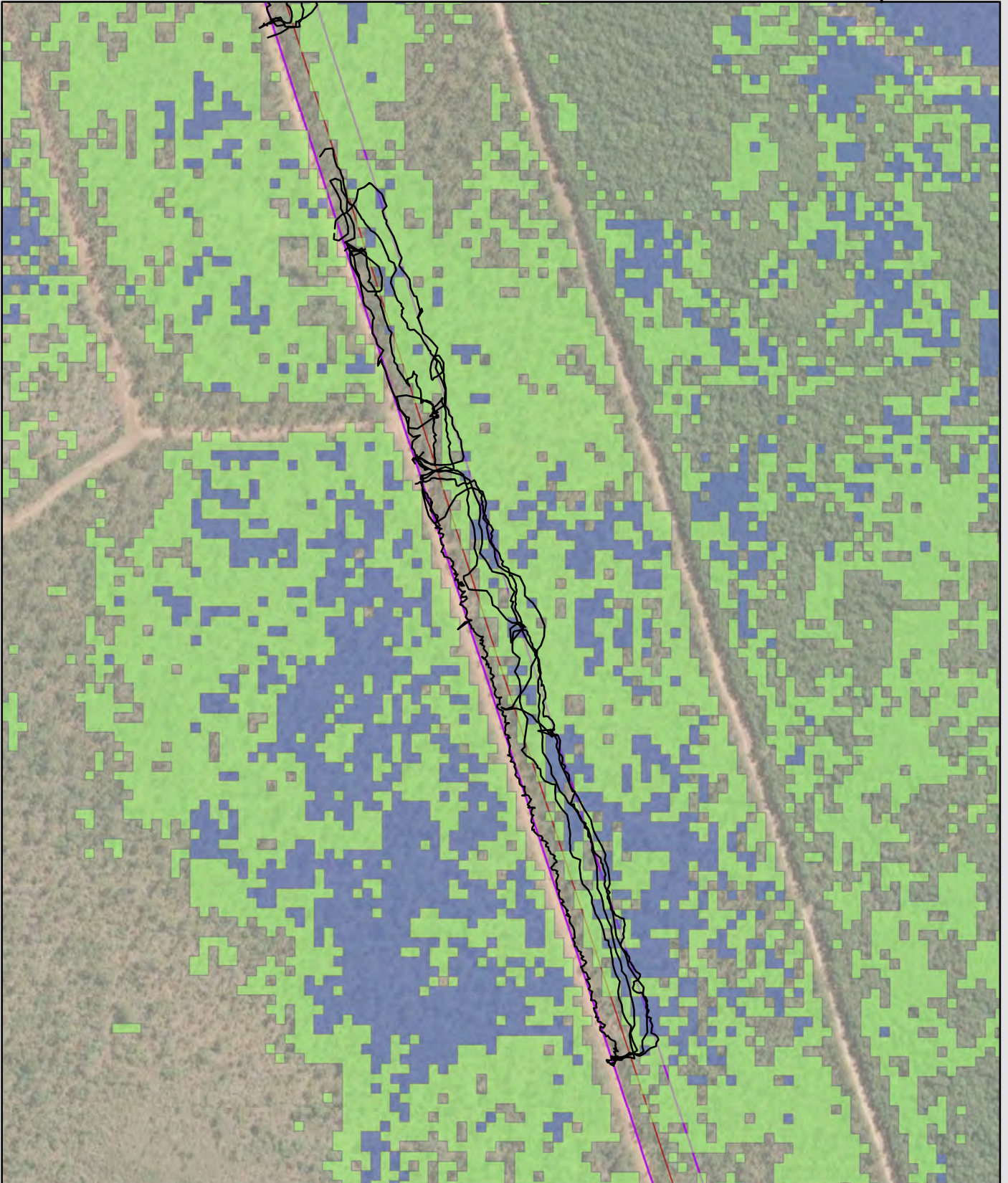
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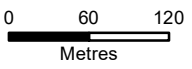
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Map of Typhonium survey effort: Northern Beaches 3



Project area
 Survey areas
 — Survey Tracks
● Typhonium plants
Modelled Likelihood
 High
 Moderate

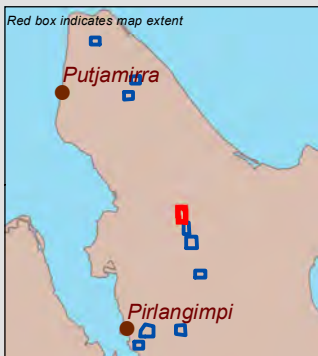
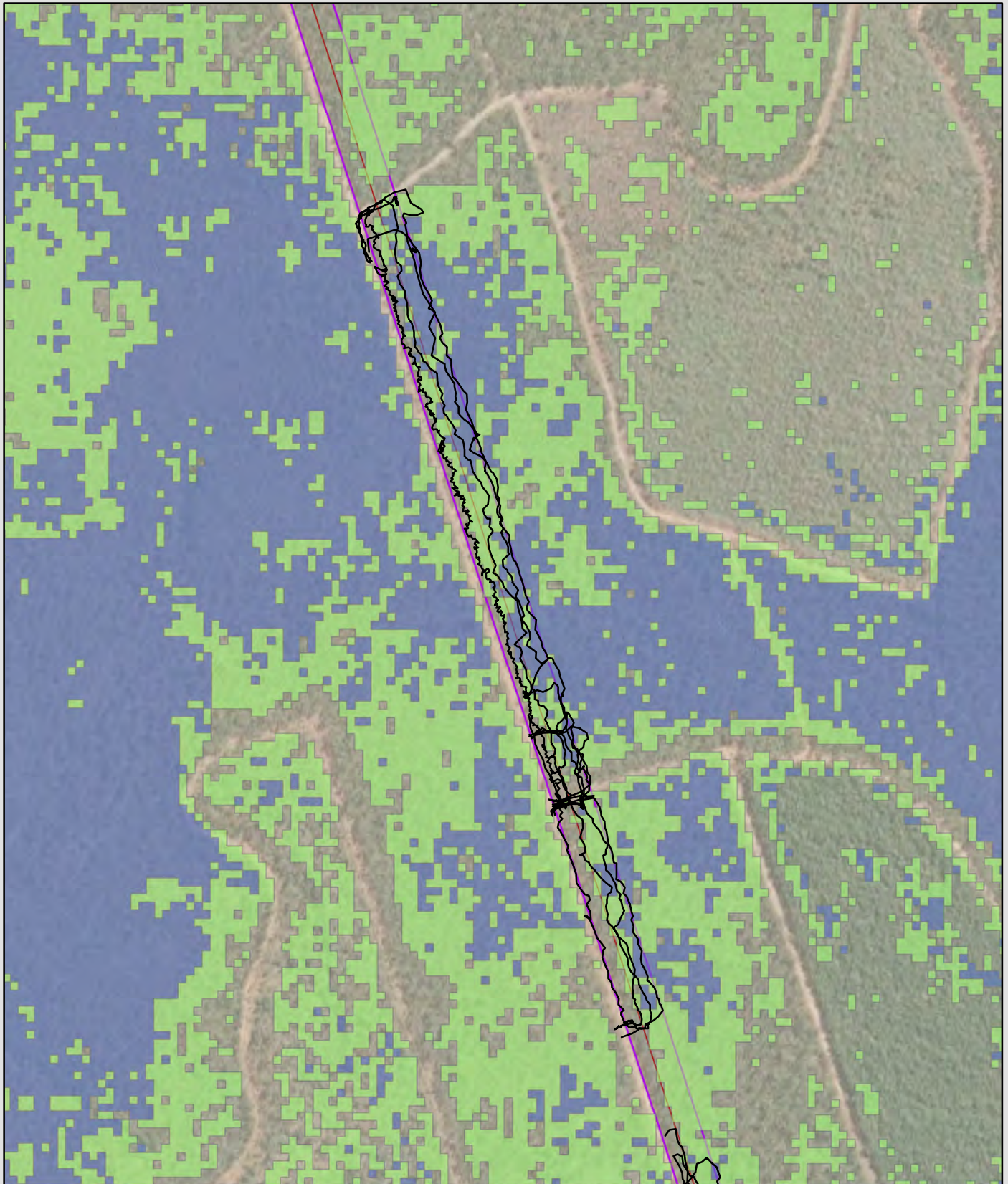






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Map of Typhonium survey effort: Northern Beaches 4



- Project area
- Survey areas
- Survey Tracks
- Typhonium plants

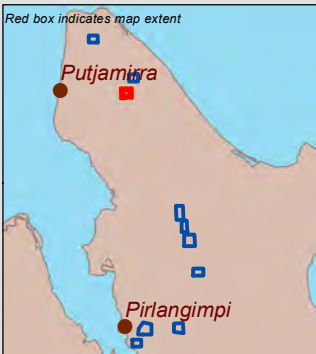
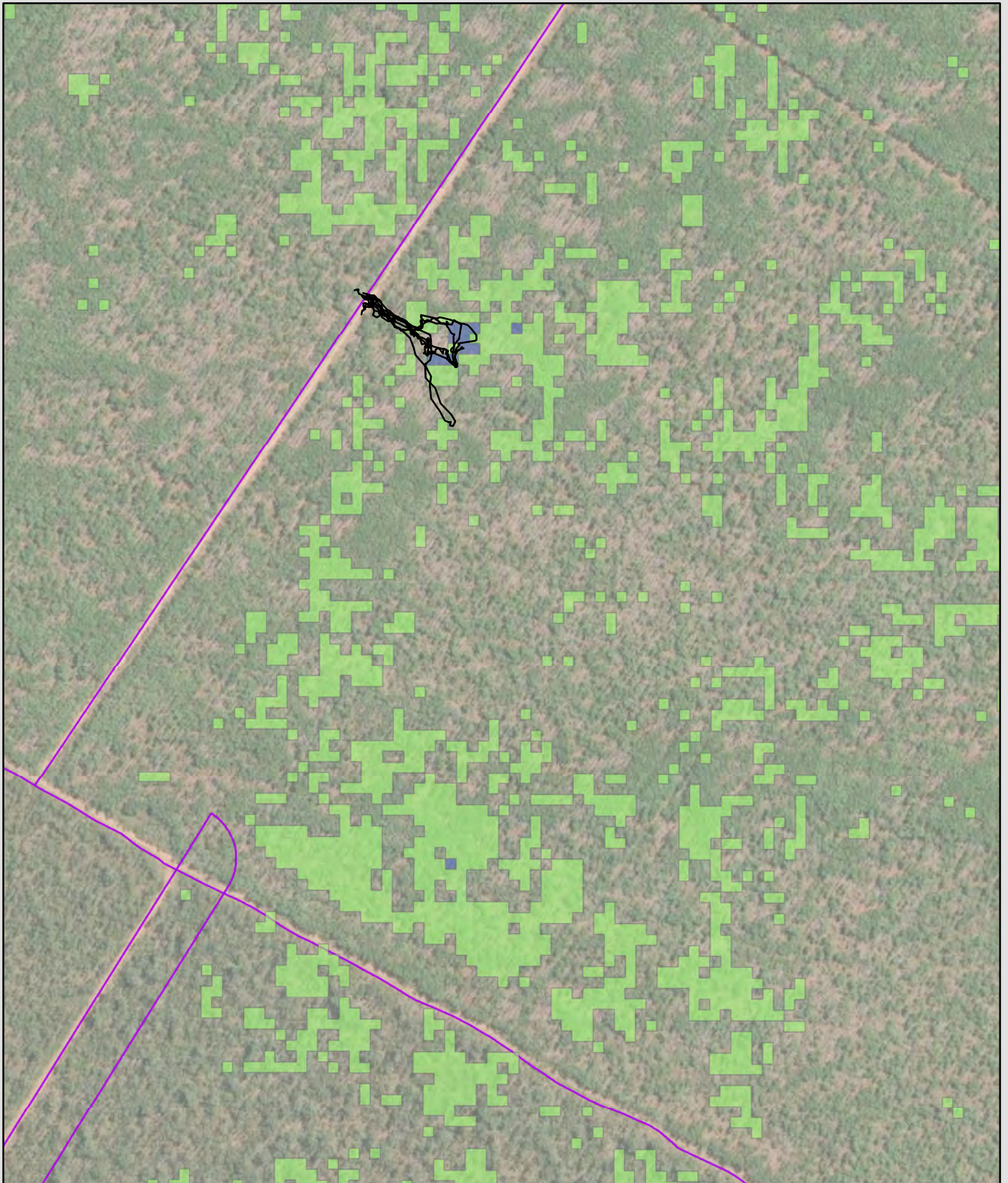
Modelled Likelihood

- High
- Moderate

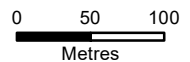
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DATA SOURCE
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 Project data: EZ21166, DEPWS
 Imagery: ESRI

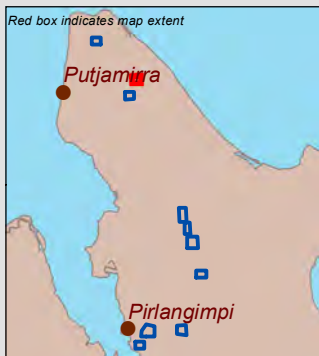
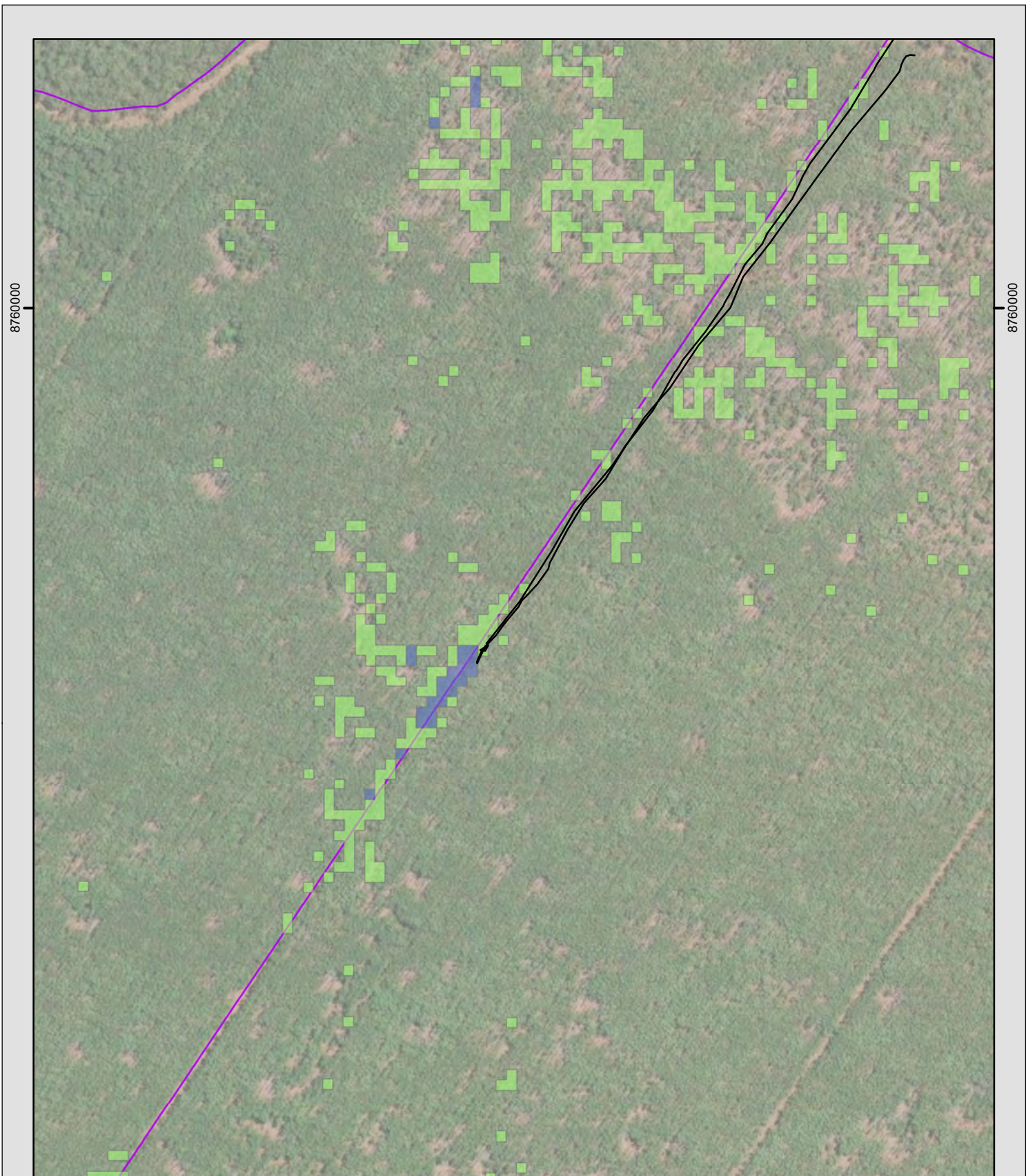


- Project area
 - Survey areas
 - Survey Tracks
 - Typhonium plants
- Modelled Likelihood**
- High
 - Moderate



MAP INFORMATION
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DATA SOURCE
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 Project data: EZ21166, DEPWS
 Imagery: ESRI



- Project area
- Survey areas
- Survey Tracks
- Typhonium plants

Modelled Likelihood

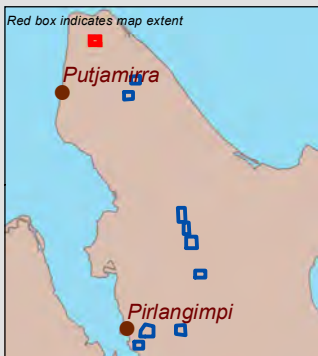
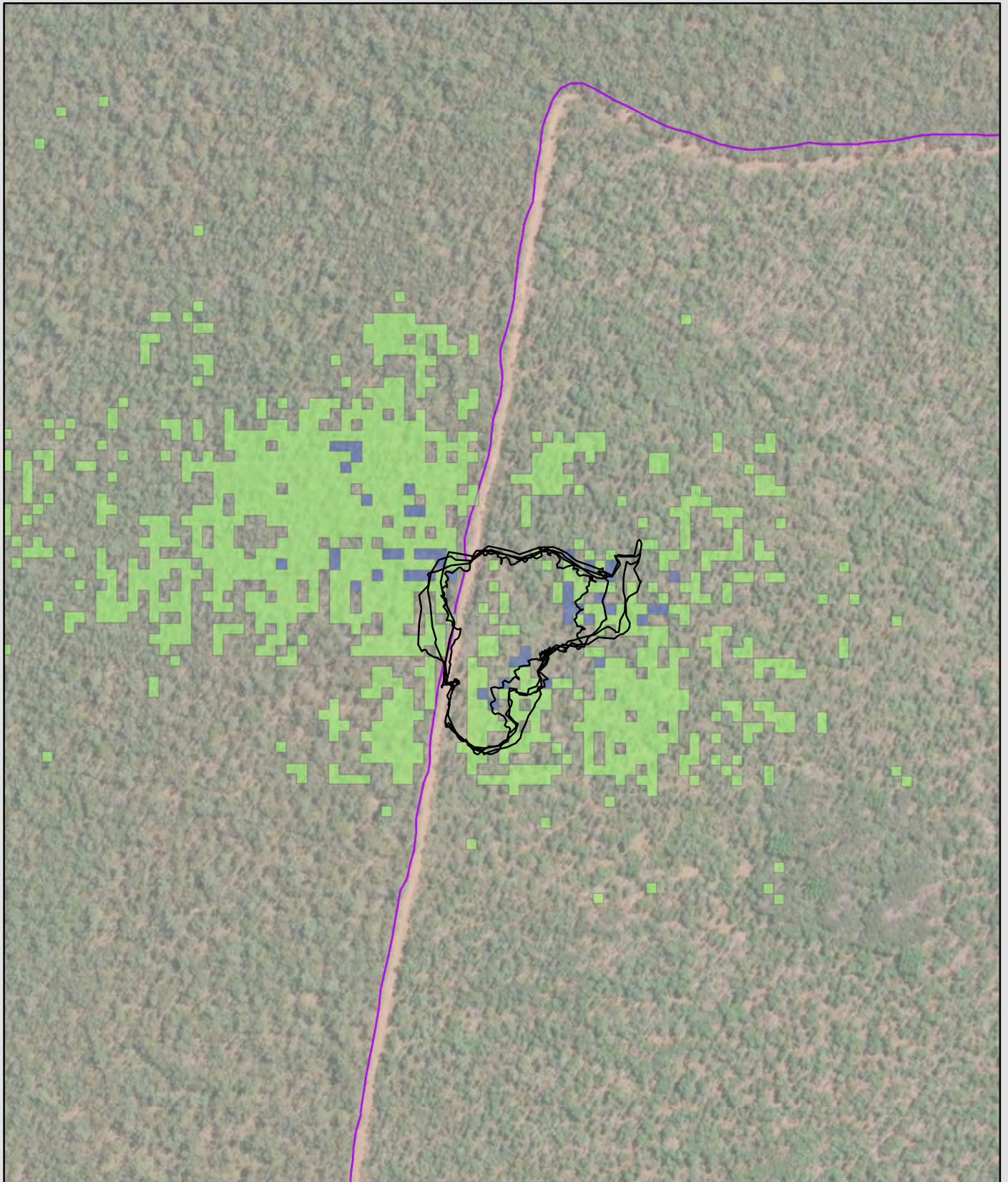
- High
- Moderate

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 Client: GEV
 Mapper: SR

DATA SOURCE
 Topographic data: Geoscience Aust.
 Project data: EZ21166, DEPWS
 Imagery: ESRI

Map of Typhonium survey effort: Imalu 2



- Project area
- Survey areas
- Survey Tracks
- Typhonium plants

Modelled Likelihood

- High
- Moderate

MAP INFORMATION
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 Projection: GDA 1994 MGA Zone 52
 Date Saved: 16/06/2022
 Client: GEV
 Mapper: SR

DATA SOURCE
 Topographic data: Geoscience Aust.
 Project data: EZ21166, DEPWS
 Imagery: ESRI



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