Sun Cable Pty Ltd

Australia – ASEAN Power Link Project
Environment Protection Act (NT) Referral

October 2020

754-MELEN232735

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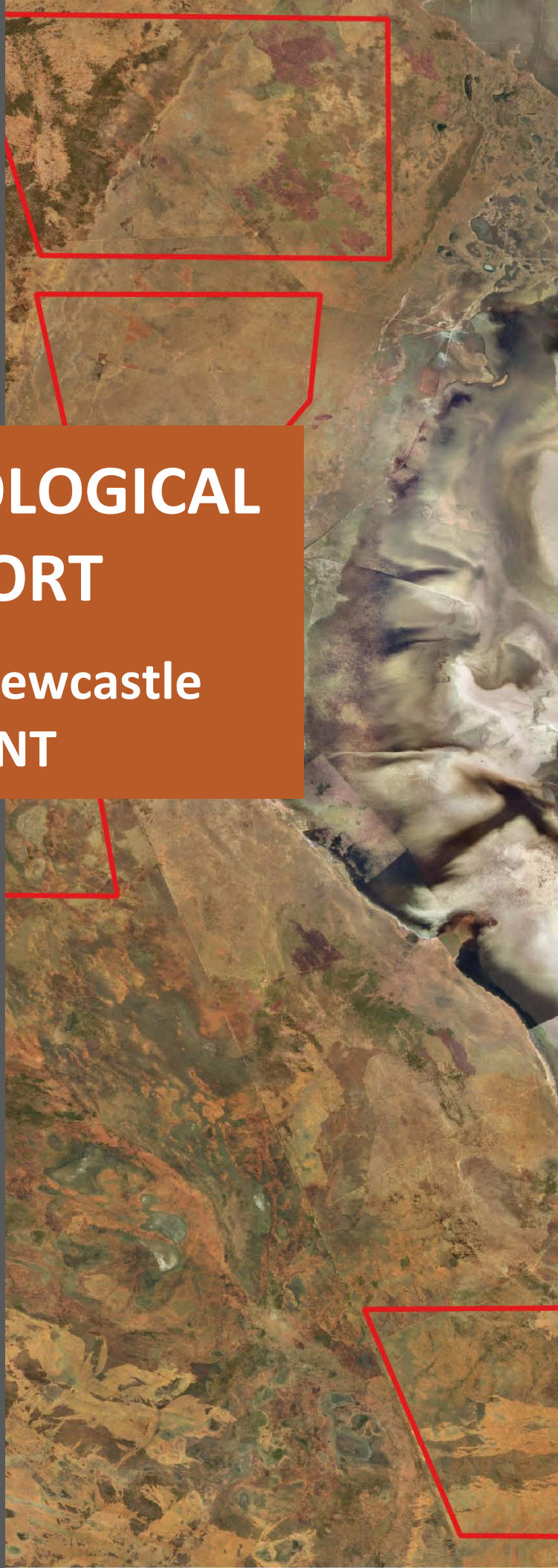
Appendix A – Solar farm precinct Preliminary Ecological Assessment Report



PRELIMINARY ECOLOGICAL ASSESSMENT REPORT

Proposed Solar Farm, Newcastle Waters Station, Elliott, NT

Prepared for:

Coffey Services Australia Pty Ltd
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28 May 2020

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Cover photo: Google Satellite image with the four AOI's overlaid.

Other photos in report: Except where specified, all other photos were taken by M. Proos.

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1 Introduction

Connect Environmental was engaged by Coffey Services Australia Pty Ltd (Coffey), on behalf of Sun Cable Pty Ltd (Sun Cable), in April 2020 to conduct a preliminary assessment of threatened and migratory species and ecological communities which may occur in four areas of interest (AOI's) on Newcastle Waters and Powell Creek Stations (part of the Consolidated Pastoral Company) (**Figure 1**), of which one may be the future site of Sun Cable's proposed solar farm. This work will assist in determining an appropriate regulatory assessment and approvals pathway. The AOI's are located approximately 20 km west of Elliott (**Figure 1**), as follows:

- AOI 1 = 22,884 ha (Newcastle Waters Station)
- AOI 2 = 13,927 ha (Powell Creek Station)
- AOI 3 = 19,255 ha (Powell Creek Station)
- AOI 4 = 12,846 ha (Powell Creek Station).

The solar farm will include up to 15,000 hectares of arrays of photovoltaic (PV) modules and will have a generation capacity of 10 GW. Associated infrastructure is likely to include:

- 30 GWh battery storage facility, including:
    - Electrolyte storage tanks and piping
    - Battery containers
    - Inverters
    - Switchgear and buildings
    - Transformers
    - Earthing mats
    - Above and below ground cabling
- Voltage Sourced Converter (VSC) station
- Intermittent substations
- Inverters
- Above and below ground transmission lines
- Rail siding (approximately 2,250 m long with hard stand area of approximately 10 ha)
- Operation and maintenance building (approximately 2,000 m2 hardstand area and 600 m2 office space)
- Airfield and associated infrastructure
- Groundwater supply, water treatment plant and storage tanks
- Wastewater treatment system
- Sealed access roads, car park, cleared firebreaks
- Weather stations

- Security system, fencing and lighting
- Microwave communications tower
- Underground fibre optic cable network
- Hardstand
- Personnel camp.

A permanent fence line and gates including surveillance will be constructed along the project boundary. Construction facilities will include hardstands, site offices, parking and laydown areas, a concrete batching plant and gravel borrow pits. Several of these will continue to be utilised during operation.

The assessment was completed by Mihkel Proos and Nick Volpe. Mihkel has 18 years' experience in the environmental field, including nearly ten in the NT. He has a background in terrestrial ecology and has worked for NT and Australian governments in science and regulatory positions. Nick has three years' experience in the environmental field, in terrestrial ecology, environmental education and science.

Jeni Young (Associate Environmental Consultant, Coffey) accompanied the Connect Environmental staff on the reconnaissance survey.

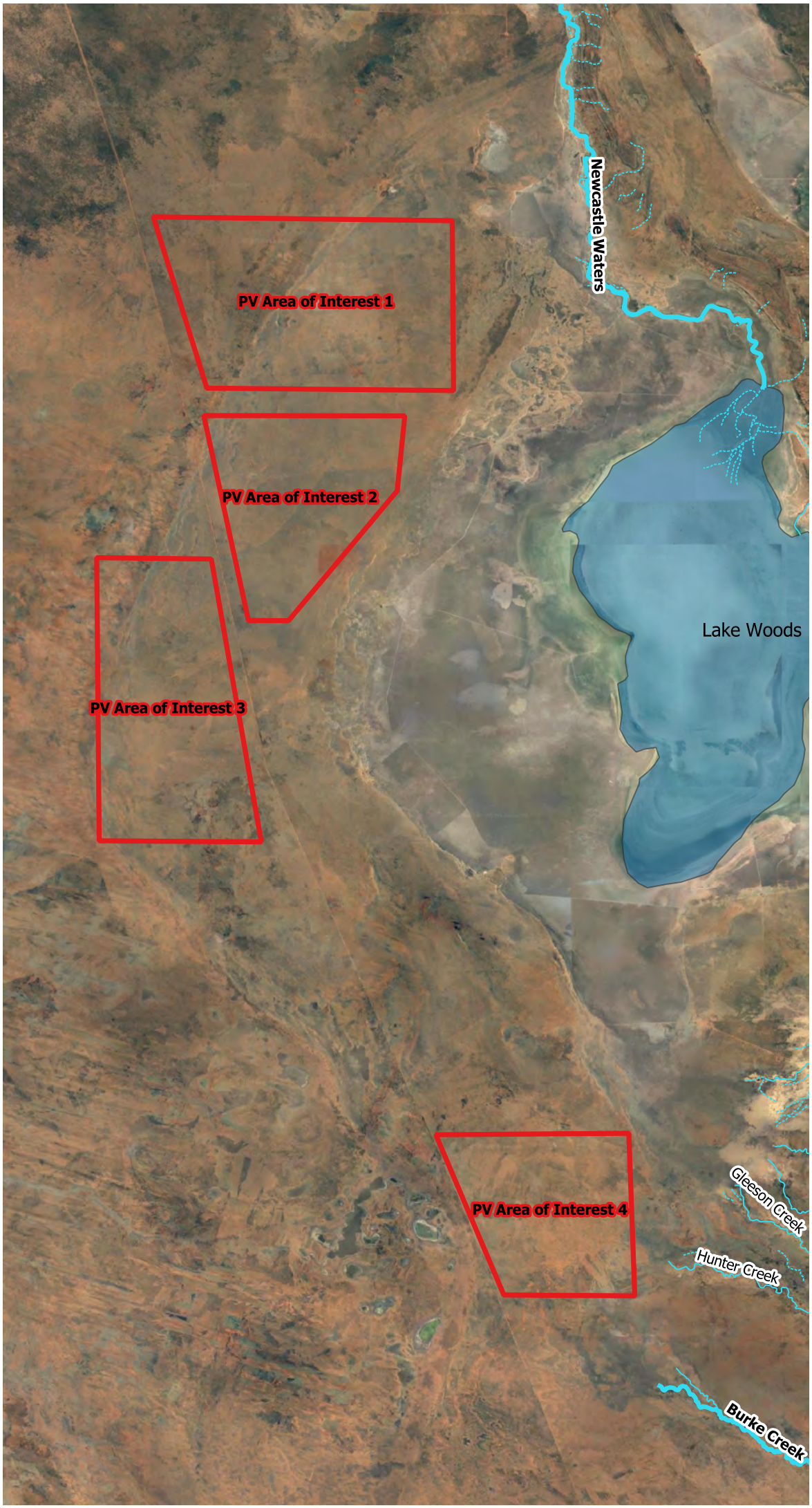

Figure 1 - Location and layout

Key

Areas of Interest

Google Satellite

N

0 4 8 12 km

1:300000

Client: Coffey Services Australia Pty Ltd

25 April 2020

CONNECT environmental

2 Methodology

The assessment consisted of a desktop review of existing literature and a reconnaissance survey of three of the AOI's (1, 2 and 4). AOI 3 was not visited during the reconnaissance survey due to access limitations from the Darwin to Adelaide railway corridor.

2.1 Desktop Assessment

The desktop assessment involved collating and reviewing existing relevant flora, fauna and vegetation community information to determine habitat types, likelihood of occurrence of threatened species and the level of potential impacts to biodiversity. This information aided to determine the potential for Territory and/or Commonwealth listed threatened species to occur. It was conducted by:

1. Collating, analysing and mapping information in relation to:
    a. Climate
    b. Fire patterns
    c. Land unit and/or land system patterns
    d. Aerial (satellite) imagery and terrain modelling
    e. Proximity of clearing to Sites of Conservation Significance
    f. Vegetation communities, including those which are sensitive or significant
    g. Significant landforms and soil types.
2. Interrogating relevant information databases to obtain a list of potentially occurring threatened species for all AOI's (including an appropriate geographic buffer), including:
    a. The NT Government's 'NR Maps'
    b. The Australian Government's EPBC Act 'Protected Matters Search Tool'
    c. NRM Infonet
    d. Other relevant government information sources such as Site of Conservation Significance (SOCS) fact sheets
    e. Any publicly available environmental assessment documentation for nearby projects.

2.2 Reconnaissance Survey

Following the desktop assessment, a reconnaissance survey was conducted to:

- View the general scale and nature of the areas
- Verify and/or identify vegetation communities, where possible
- Preliminarily assess land use and condition
- Note any obvious differences between the AOI's in terms of degradation and significant habitats and habitats for threatened species
- Determine the potential for threatened fauna species to occur in the AOI's

- Note threatening processes such as fire, weeds and feral pests
- Determine logistical constraints to conducting further ecological surveys (e.g. accessibility, staff and equipment transport options, potential focus areas etc.).

The reconnaissance survey focused on three AOI's (1, 2, and 4). Connect Environmental was instructed by Coffey not to enter AOI 3 due to access constraints. Each AOI was surveyed by vehicle via the tracks that passed through the areas (see **Figure 2**) by:

- Conducting a series of vegetation 'check sites' which involved documenting a vegetation community's main species composition (i.e. 1-3 species) and the structural formation of the dominant layer (through estimates of the canopy cover and height class). Observations in relation to geology, soils and landform were added. They assist in understanding the spatial characteristics and landform preferences of vegetation communities and are particularly useful to ground truth the linework of existing mapping. Check sites were completed where vegetation change was noted.
- Taking road notes (whilst driving), in between check sites, of vegetation cover and height estimates for 1-3 dominant species in the dominant layer when vegetation communities changed.
- Assessing the presence of suitable habitat for potentially occurring threatened species identified during the desktop assessment including general vegetation structure and health, value as habitat for significant species, and threatening processes such as fire, weeds and pests with a focus on:
    - Sandstone outcrops with *Ficus platypoda*, for *Semotrachia euzyga* (land snail)
    - Stands of mature *Acacia* or *Eucalyptus* dominated open forests for the Painted Honeyeater
    - *Triodia* dominated sandy dunes which contain *Acacia* shrubs for Princess Parrot
    - *Acacia* and *Melaleuca* shrubs on rocky outcrops, laterite rises, or low-lying drainage systems with *Triodia basedowii*, *T. pungens* and/or *T. schinzii* for the Greater Bilby
    - Sand dunes with mature hummock grasslands of spinifex, especially *Triodia basedowii* and *T. pungens* for the Brush-tailed Mulgara and potentially Night Parrot
    - Cracking clay soils on the edge of floodplains for the Plains Death Adder
- Taking notes on the impact of grazing on vegetation communities and land condition, with focus on the likelihood of the presence of targeted threatened fauna.
- Recording all fauna species incidentally observed.
- Recording any significant environmental weeds observed.

The reconnaissance survey was undertaken on 28 and 29 April 2020, with one day of travel either side to and from Darwin. The ecologists camped within the Newcastle Waters Station. During the survey it was revealed that some tracks mapped as possibly traversable prior to the survey were not (i.e. some were unmaintained fence line tracks).

2.3 Threatened Species Likelihood of Occurrence Assessment

An assessment of the likelihood of occurrence of threatened species was conducted by:

1. Analysing existing environmental information collated during the desktop assessment.
2. Describing each threatened species' conservation status, habitat preferences and number of local and/or regional records.
3. Analyse each species' habitat preferences and number and distribution of local / regional records (as an indicator of the species' historic presence) against the vegetation mapping, land unit mapping, satellite imagery or fire history to determine each species' likelihood of occurrence
4. In person habitat analysis from the reconnaissance survey
5. Categorise each species into the following likelihood of occurrence classes:
    a. **Unlikely**: species or ecological community is not expected to occur based on the lack of suitable habitat and/or local records
    b. **Possible**: species or ecological community may occur based on the occasional or potential presence of suitable habitat however it is not obvious
    c. **Likely**: species or ecological community is expected to occur based on the presence of suitable habitat and number of local records

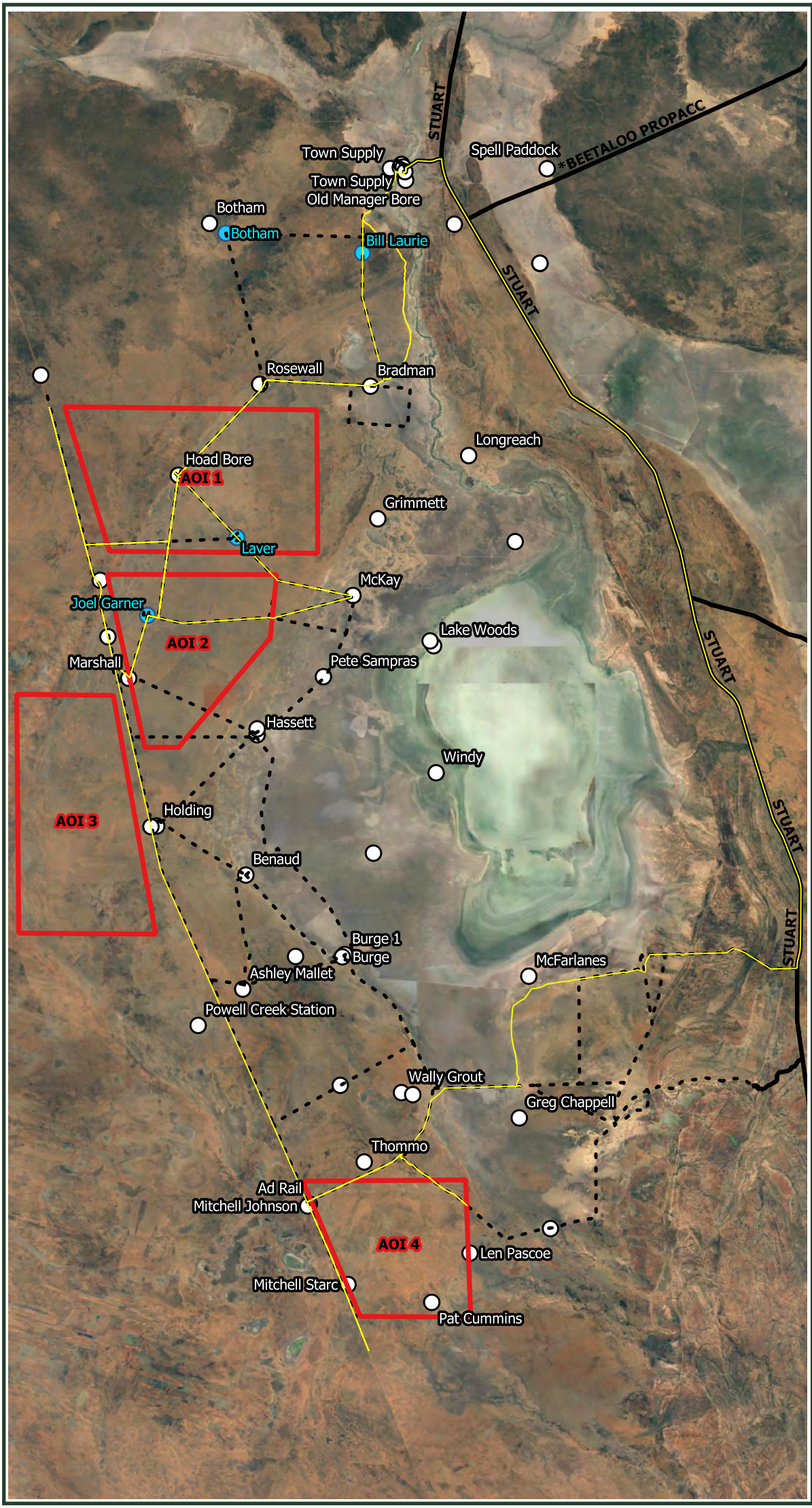

Figure 2 - Tracks traversed during reconnaissance survey

Key

- Areas of Interest
- Tracks driven
- Possible tracks (mapped prior to reconnaissance survey via aerial imagery)
- Bores
- Water tanks

Google Satellite

N

0 4 8 12 km

1:350000

Client: Coffey Services Australia Pty Ltd

13 May 2020

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3 Existing Information

3.1 Climate

The climate in the Elliott area is highly seasonal and dominated by a 'wet' season from December to April and a 'dry' season from May to November. During the wet season, soils are periodically saturated and groundwater recharge fills local aquifers. Vegetation growth is substantial and streams flow during high rainfall periods. During the dry season, irrigation of landscaped areas is required to ensure continued plant growth.

Climate statistics from the Bureau of Meteorology (BOM) site for Elliott (site number 015131) are shown in **Table 1** (BOM, 2020).

Table 1 Climate statistics for Elliott, NT

Aspect	Result
Mean maximum temperature (from 1980 to 2020)	34.5°C
Mean minimum temperature (from 1980 to 2020)	19.1°C
Average annual rainfall	586 mm
Mean number of days of rain ≥1 mm (from 1949 to 2020)	57 days

3.2 Land Units and Systems

Land units are areas that have similar bio-physical attributes including landform, soil and vegetation. They were originally mapped to describe the capability of each unit to support a range of land uses such as urban subdivision, farming, pasture improvement and resource extraction.

No land units are mapped for this region (as per the NT Government's Natural Resource (NR) Maps online tool), however broad scale (1:1,000,000) land system is available for southern NT. Land systems mapped similar features to land units. The AOI's encompass two land systems (**Table 2**, **Figure 2**).

Table 2 Land systems of the four AOI's

Land system	Class	Class description	Vegetation	Information source
Atlas_Ms14	Lateritic plains and rises	Plains and rises associated with deeply weathered profiles (laterite) including sand sheets and other depositional products; sandy and earth soils	Vegetation not described	Atlas of Australian Soils (Northcote *et al*, 1960-1968)

Land system	Class	Class description	Vegetation	Information source
Redsan	Desert sandplains	Level to undulating sandplains with red sands	Desert sparse low woodland (*E. polycarpa*, *E. argillacea*, *E. setosa*, *E. pruinosa*, *E microtheca*, *E. ferruginea*) with soft spinifex (*Triodia pungens*) or three-awn mid-height grass (*Aristida pruinosa*)	CSIRO, 1970

3.3 Land Use

Land use across all three AOI's is predominantly cattle grazing on native vegetation (Staben and Edmeades, 2017). AOI 1 is in Newcastle Waters Station and AOI's 2, 3 and 4 are in Powell Creek Station. Other land uses within each AOI are listed in **Table 3** and shown in **Figure 3**.

Table 3 Land use in 2016 (Staben and Edmeades, 2017)

Land unit Code	Land unit Description	Commodity	Primary Description	Secondary Description
210	Grazing native vegetation	Cattle	Production from Relatively Natural Environments	Grazing native vegetation
573	Railways	-	Intensive Uses	Transport and communication
612	Lake - production	-	Water	Lake
651	Marsh/wetland - conservation	-	Water	Marsh/wetland
652	Marsh/wetland - production	-	Water	Marsh/wetland

3.4 Vegetation Communities

Information on vegetation communities was found only from the National Vegetation Information System (NVIS) at a scale of 1:1,000,000. However, the polygons from the *Lancewood Survey of the Northern Territory* (Brocklehurst, 1993; mapped at a scale of 1:250,000) and the attributes from the associated publications have been translated into the NVIS framework. In this regard, the NVIS mapping does indicate areas of *Acacia shirleyi* (Lancewood) and *Macropteranthes kekwickii* (Bulwaddy)) that are 25 ha or greater. Vegetation within the four AOI's, as per the NVIS dataset, is described in **Table 4** and shown in **Figure 5** and **Figure 6**.

Table 4 Vegetation and associated environmental descriptions (NVIS, 1M)

Veg. ID	Vegetation description [1]	Environment description
393	*Macropteranthes kekwickii* (Bulwaddy) and *Acacia shirleyi* (Lancewood) low woodland over *Panicum mindanaense* and *Evolvulus alsinoides* low open tussock grassland and low open forbland	Lateritic sandstone outcrops, plateaux, breakaways to north/rises and plains to south; gravelly lithosols, some shallow red, yellow and black earths; well drained
394	*Macropteranthes kekwickii* (Bulwaddy) and *Acacia shirleyi* (Lancewood) low woodland over *Chrysopogon fallax*, *Paspalidium rarum* and *Mnesithea formosa* mid open tussock grassland	
395	*Acacia shirleyi* (Lancewood), *Macropteranthes kekwickii* (Bulwaddy) low woodland over *Eragrostis cumingii*, *Mnesithea formosa*, *Paspalidium rarum* low open tussock grassland	
1032	*Corymbia opaca*, *Eucalyptus gamophylla*, *Acacia ligulate* low open woodland over *Acacia coriacea*, *Hakea macrocarpa*, *Acacia adsurgens* mid sparse shrubland over *Triodia pungens*, *Triodia schinzii*, *Eragrostis eriopoda* low open hummock and tussock grassland	Gentle undulating plains, red earthy sand soils
1041	*Eucalyptus microtheca, Lophostemon grandifloras, Ventilago viminalis* low open woodland over *Acacia holosericea, Atalaya hemiglauca* and *Ventilago viminalis* mid sparse shrubland over *Eulalia aurea, Chrysopogon fallax, Astrebla* spp. low tussock grassland	Low lying flat plains, fringing water courses and swamps. Light to heavy grey and brown clays, some loamy soil
1042	*Bauhinia*[2] *cunninghamii*, *Corymbia opaca*, *Eucalyptus pruinosa* low open woodland over *Carissa lanceolata*, *Acacia lysiphloia*, *Atalaya hemiglauca* mid open shrubland over *Triodia pungens*, *Chrysopogon fallax*, *Enneapogon polyphyllus* low tussock and hummock grassland	Gentle undulating plains, deep sandy yellow earths, lateritic red earths, or deep sands

3.5 Weeds and Exotic Flora

Declared weeds are plants that have been identified for control, eradication or prevention of entry into the NT under the NT's *Weeds Management Act 2001* (WM Act). They are classed according to how difficult they are to control and how much harm they can cause. If a weed is declared under the WM Act, all land holders, land managers and land users must comply with the classification. There are three categories of declared weeds:

1. A - to be eradicated
2. B - growth and spread to be controlled
3. C - not to be introduced to the NT.

[1] *Descriptions from NVIS in line with the Australian Vegetation Attribute Manual Version 7.0 (DoEE, 2017)*

[2] *Listed in NVIS as Lysiphyllum, though has been changed here to reflect the NT listing (Flora NT).*

All Class A and Class B weeds are also Class C weeds.

Weeds of National Significance (WONS) are those listed by the Australian Government as plants that potentially cause detrimental impacts worth billions of dollars to the sustainability of Australia's productive capacity and natural ecosystems and as such a National Weeds Strategy exists for them.

A search of NR Maps (DENR, 2020) indicated that there are 15 declared weeds known to occur within 100 km of the AOI's. Five of these are WONS. These are listed in **Table 5**.

Table 5 Weeds and exotic flora recorded within 100 km of the areas of interest

Scientific name	Common name	Growth form	Declaration under WM Act	WONS [3]
Acanthospermum hispidum	Acanthospermum, Starburr, Star Burr, Goats Head	Forb	B	No
Aerva javanica	Aerva, Kapok Bush, Snow Bush	Forb, Shrub	No	No
Alternanthera pungens	Alternanthera, Khaki Weed	Forb	B	No
Alysicarpus ovalifolius	Alysicarpus, Buffalo Clover, Gilbert River Clover	Forb	No	No
Amaranthus viridis	Amaranthus, Green Amaranth	Forb	No	No
Azadirachta indica	Azadirachta, Neem Tree, Neem	Tree	B	No
Bidens pilosa	Bidens, Pitch-forks, Stick-tights, Burr Marigold	Forb	No	No
Bothriochloa pertusa	Bothriochloa, Indian Bluegrass	Tussock grass	No	No
Calotropis procera	Calotropis, Rubber Bush, Rubber Tree, Calotrope, Kings Crown, Cabbage Tree	Shrub	B/-	No
Cenchrus ciliaris	Cenchrus, Buffel Grass	Tussock grass	No	No
Cenchrus biflorus	Cenchrus, Gallons Curse	Tussock grass	No	No
Cenchrus echinatus	Cenchrus, Mossman River Grass, Burr-grass, Burr Grass, Galland's Curse	Tussock grass	B	No
Cenchrus pennisetiformis	Cenchrus	Tussock grass	No	No
Cenchrus pedicellatus subsp. pedicellatus	Pennisetum	Tussock grass	No	No
Cenchrus pedicellatus subsp. unispiculus	Pennisetum	Tussock grass	No	No
Cenchrus polystachios	Pennisetum	Tusock grass	B	No
Centrosema pascuorum	Centrosema, Centro	Vine	No	No

[3] *Weed of National Significance*

Scientific name	Common name	Growth form	Declaration under WM Act	WONS [3]
Chloris barbata	Chloris, Purple-top Chloris, Purple-top Rhodes Grass	Tussock grass	No	No
Citrullus colocynthis	Citrullus, Colocynth, Bitter Paddy Melon, Colocynth Melon	Vine,Forb	No	No
Citrullus lanatus	Citrullus, Paddy Melon, Pie Melon, Wild Melon, Camel Melon	Forb	No	No
Clitoria ternatea	Clitoria, Butterfly Pea, Blue Pea	Vine	No	No
Coronopus didymus	-	Forb		No
Cyanthillium cinereum var. cinereum	-	Forb		No
Cynodon dactylon var. dactylon	Cynodon, Couch, Couch Grass, Bermuda Grass	Tussock grass	No	No
Cyperus rotundus	Cyperus, Nutgrass	Sedge	No	No
Dactyloctenium aegyptium	Dactyloctenium, Coast Button Grass	Tussock grass	No	No
Delonix regia	Delonix, Poinciana, Orange Flame Tree	Tree	No	No
Dichanthium annulatum	Dichanthium, Sheda Grass	Tussock grass	No	No
Eragrostis amabilis var. amabilis	Eragrostis	Tussock grass	No	No
Eragrostis cylindriflora	Eragrostis, Lovegrass	Tussock grass	No	No
Eragrostis pilosa	Eragrostis, Lovegrass	Tussock grass	No	No
Eragrostis minor	Eragrostis, Smaller Stinkgrass, Lovegrass	Tussock grass	No	No
Euphorbia prostrata	Euphorbia	Forb	No	No
Euphorbia hirta	Euphorbia, Asthma Plant, Asthma Herb, Snake Weed	Forb	No	No
Gomphrena celosioides	Gomphrena, Gomphrena Weed	Forb	No	No
Grewia asiatica	Grewia	Shrub,Tree	No	No
Mesosphaerum suaveolens	Hyptis, Hyptis, Mint Weed	Forb	B	No
Jatropha gossypiifolia	Jatropha, Belly Ache Bush, Bellyache Bush	Shrub	A/B	Yes
Khaya senegalensis	Khaya, African Mahogany	Tree	No	No
Macroptilium atropurpureum	Macroptilium, Siratro	Vine	No	No

Scientific name	Common name	Growth form	Declaration under WM Act	WONS [3]
Malvastrum coromandelianum	Malvastrum	Forb	No	No
Malvastrum americanum	Malvastrum, Malvastrum, Spiked Malvastrum	Forb,Shrub	No	No
Merremia dissecta	Merremia, White Convolvulus Creeper	Vine	No	No
Oxalis corniculata	Oxalis, Creeping Oxalis, Creeping Wood-sorrel	Forb	No	No
Parkinsonia aculeata	Parkinsonia, Parkinsonia, Jerusalem Thorn	Shrub,Tree	B	Yes
Passiflora foetida	Passiflora, Wild Passionfruit, Stinking Passion Flower, Stinking Passionfruit	Vine	No	No
Portulaca pilosa	Portulaca, Pigweed	Forb	No	No
Portulaca pilosa subsp. pilosa	Portulaca, Pigweed	Forb	No	No
Portulaca oleracea var. weedy	Portulaca, Pigweed, Common Purslane	Forb	No	No
Prosopis pallida	Prosopis, Mesquite, Algaroba	Shrub	A	Yes
Senna obtusifolia	Senna, Cassia	Shrub	B	No
Sida cordifolia	Sida, Flannel Weed	Shrub	B	No
Sonchus oleraceus	Sonchus, Milk Thistle, Common Sow-thistle	Forb	No	No
Sorghum bicolor	Sorghum, Forage Sorghum, Grain Sorghum, Cultivated Sorghum	Tussock grass	No	No
Sporobolus coromandelianus	Sporobolus	Tussock grass	No	No
Sporobolus pyramidalis	Sporobolus, Giant Rat's Tail	Tussock grass	No	No
Stylosanthes scabra	Stylosanthes, Shrubby Stylo, Stylo	Forb	No	No
Stylosanthes viscosa	Stylosanthes, Stylo	Forb	No	No
Stylosanthes hamata	Stylosanthes, Verano Stylo, Verano, Carribbean Stylo, Stylo	Forb	No	No
Tamarix aphylla	Tamarix, Athel Tree, Athel Pine	Shrub	A/B	Yes
Trianthema portulacastrum	Trianthema, Giant Pigweed, Black Pigweed	Forb	No	No
Tridax procumbens	Tridax, Tridax Daisy	Forb	No	No
Urochloa mutica	Urochloa, Para Grass	Tussock grass	No	No

Scientific name	Common name	Growth form	Declaration under WM Act	WONS [3]
Vachellia nilotica	Vachellia, Wattle	Shrub	A	No
Xanthium strumarium	Xanthium, Noogoora Burr	Forb	B	Yes

3.6 Site of Conservation Significance

Sites of high conservation significance in the NT include those that support important wetland values, large aggregations of wildlife, concentrations of threatened species or endemic species, or are botanical hot-spots. Such areas have been classed as Sites of Conservation Significance (SOCS).

The only Site of Conservation Significance (SOCS) within 100 km of the AOI's is the Lake Woods SOCS (**Figure 7**). Lake Woods is a large ephemeral wetland and, when inundated, supports grass and sedge communities including one of the largest areas of lignum swamp in the NT (NRETAS, date unknown). It is internationally significant, with over 100,000 water birds known to utilise the wetlands, when in flood (NRETAS, date unknown).

3.7 Fire History

According to the North Australia and Rangelands Fire Information service (NAFI, 2020), the AOI's have been burnt typically between four and eight times in the last 19 years (**Figure 8** and **Figure 9**).

Changed fire regimes in northern Australia have been implicated in several species' declines over the last 50 to 100 years (Woinarski *et al*. 2009). High frequency and intensity fires have been shown to reduce vegetation diversity and complexity in all strata. For many obligate seeders, one fire can kill an adult plant and the survival of that species in an area is dependent on regeneration from seed (Woinarski *et al*. 2009).

3.8 Drainage and Hydrology

The nearest mapped drainage line is about 9 km to the east of AOI 1. Hydrological conditions in the area consist of numerous ephemeral drains and creeks discharging into Lake Woods (**Figure 10**). Regional hydrology is shown in **Figure 11**. No streams, or minor or major drainage lines are mapped within the AOI's (**Figure 10**).

3.9 Threatened Flora and Fauna Records

Threatened fauna records from within 100 km are tallied in **Appendix A** and shown in **Figure 12**, as obtained from the NT Fauna Atlas (most recently downloaded on 26 February 2020). No threatened flora has been recorded within 100 km according to the NT Flora Atlas.

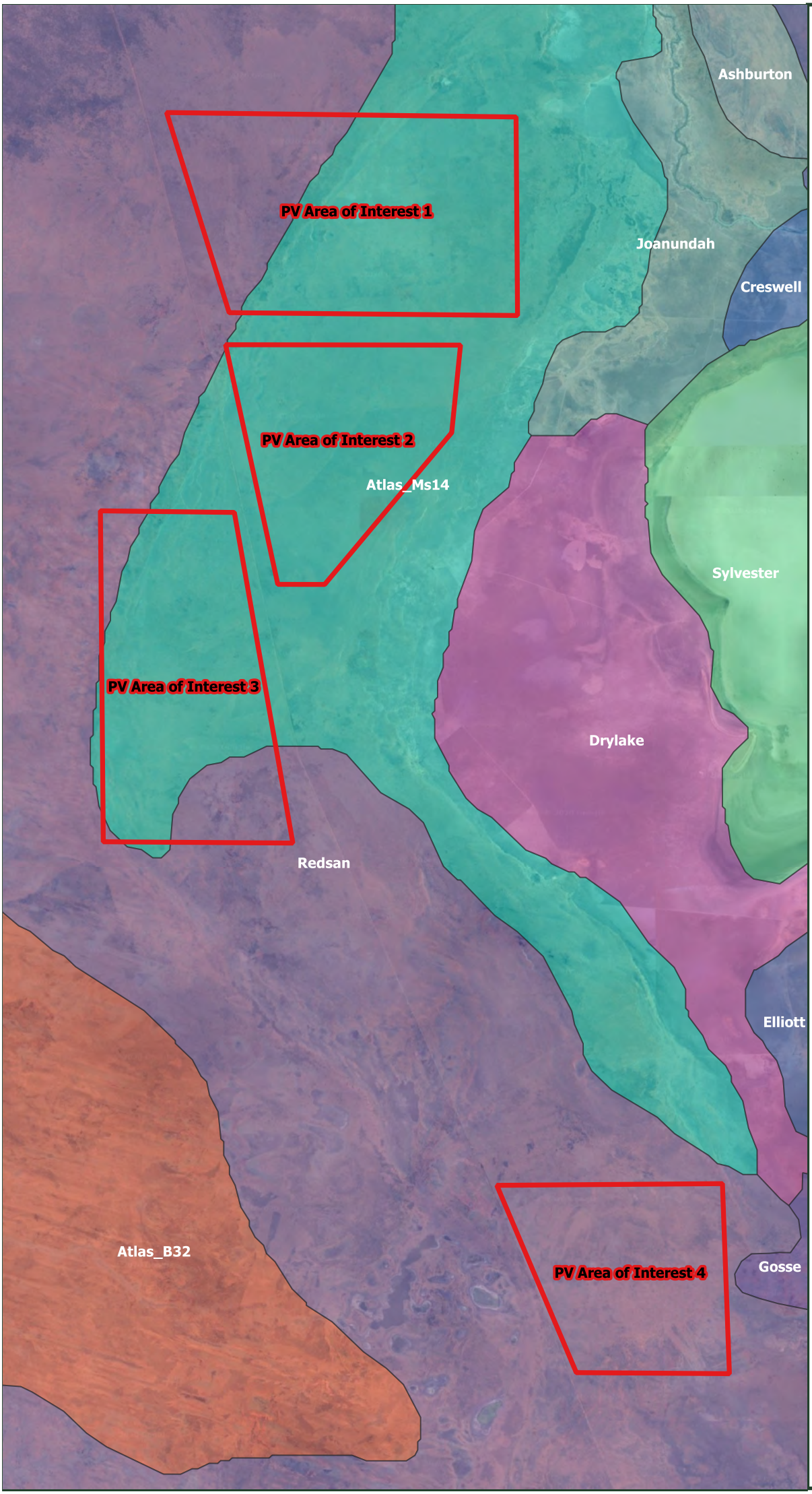

Figure 3 - Land systems

Key

Areas of Interest

Land systems (CSIRO, 1970; Northcote et al, 1960-1968)

- Ashburton
- Atlas_B32
- Atlas_Ms14
- Creswell
- Drylake
- Elliott
- Gosse
- Joanundah
- Redsan
- Sylvester

Google Satellite

N

0 5 10 km

1:250000

Client: Coffey Services Australia Pty Ltd

25 April 2020

CONNECT environmental

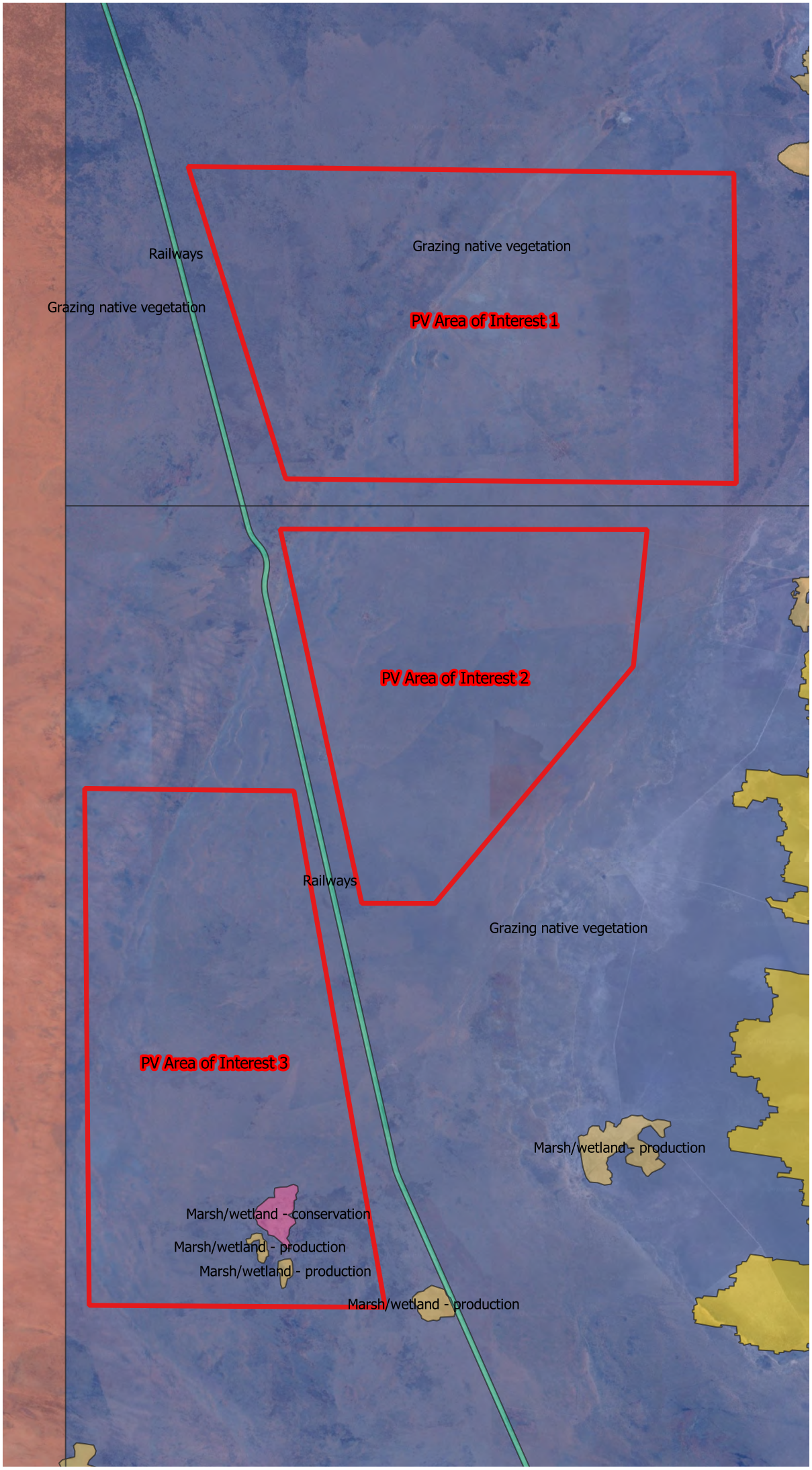

Figure 4 - Land use in 2016 (Staben and Edmeades, 2017)

Key

Areas of Interest

Land use (2016)

- Grazing native vegetation
- Marsh/wetland - conservation
- Marsh/wetland - production
- Railways

Google Satellite

N

0 2 4 6 km

1:160000

Client: Coffey Services Australia Pty Ltd

7 April 2020

CONNECT environmental

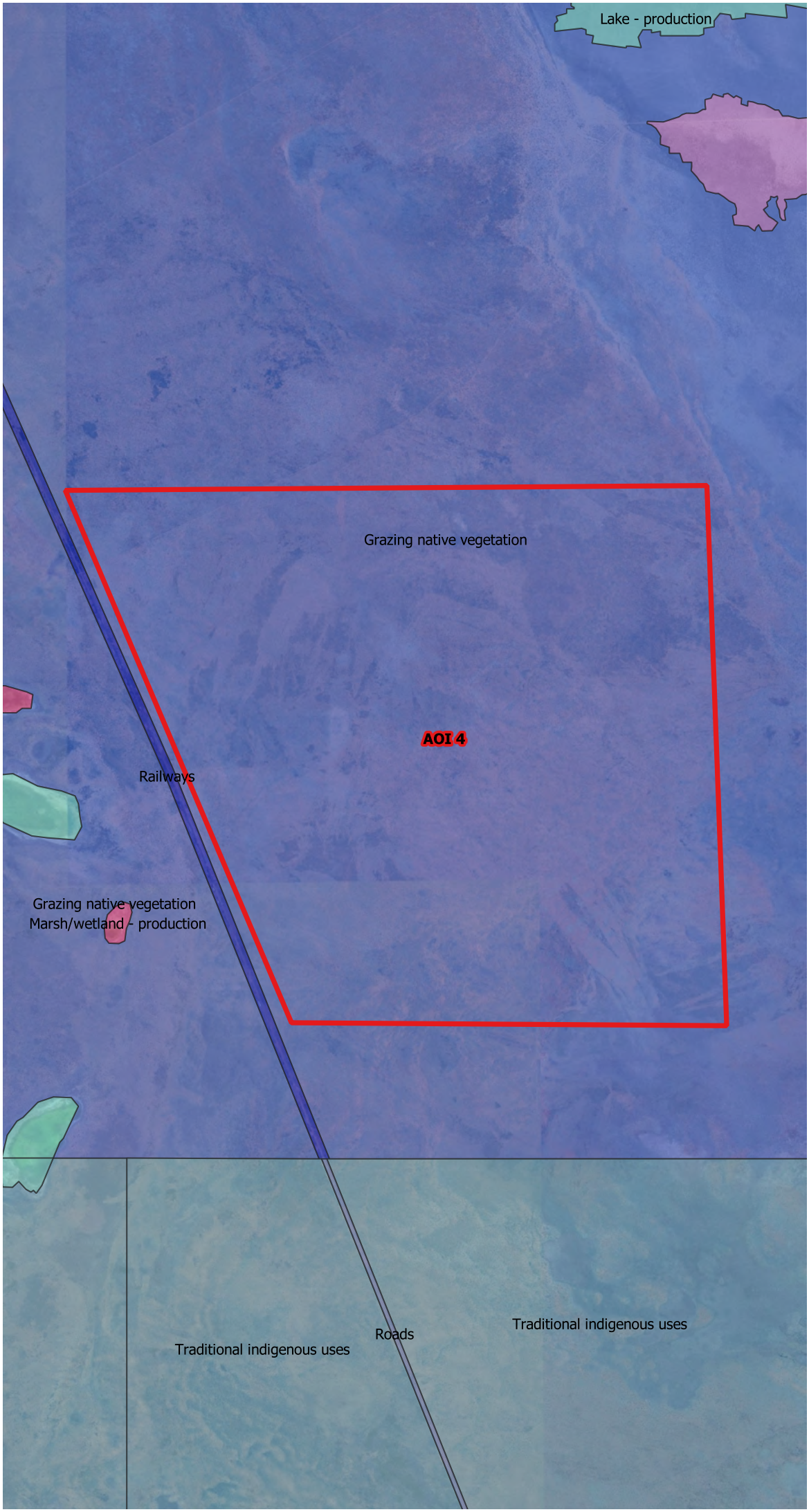

Figure 5 - Land use in 2016 (Staben and Edmeades, 2017)

Key

Areas of Interest

Land use (2016)

- Grazing native vegetation
- Lake - production
- Marsh/wetland - conservation
- Marsh/wetland - production
- Roads
- Traditional indigenous uses

Google Satellite

N

0 1 2 3 km

1:90000

Client: Coffey Services Australia Pty Ltd

27 May 2020

CONNECT environmental

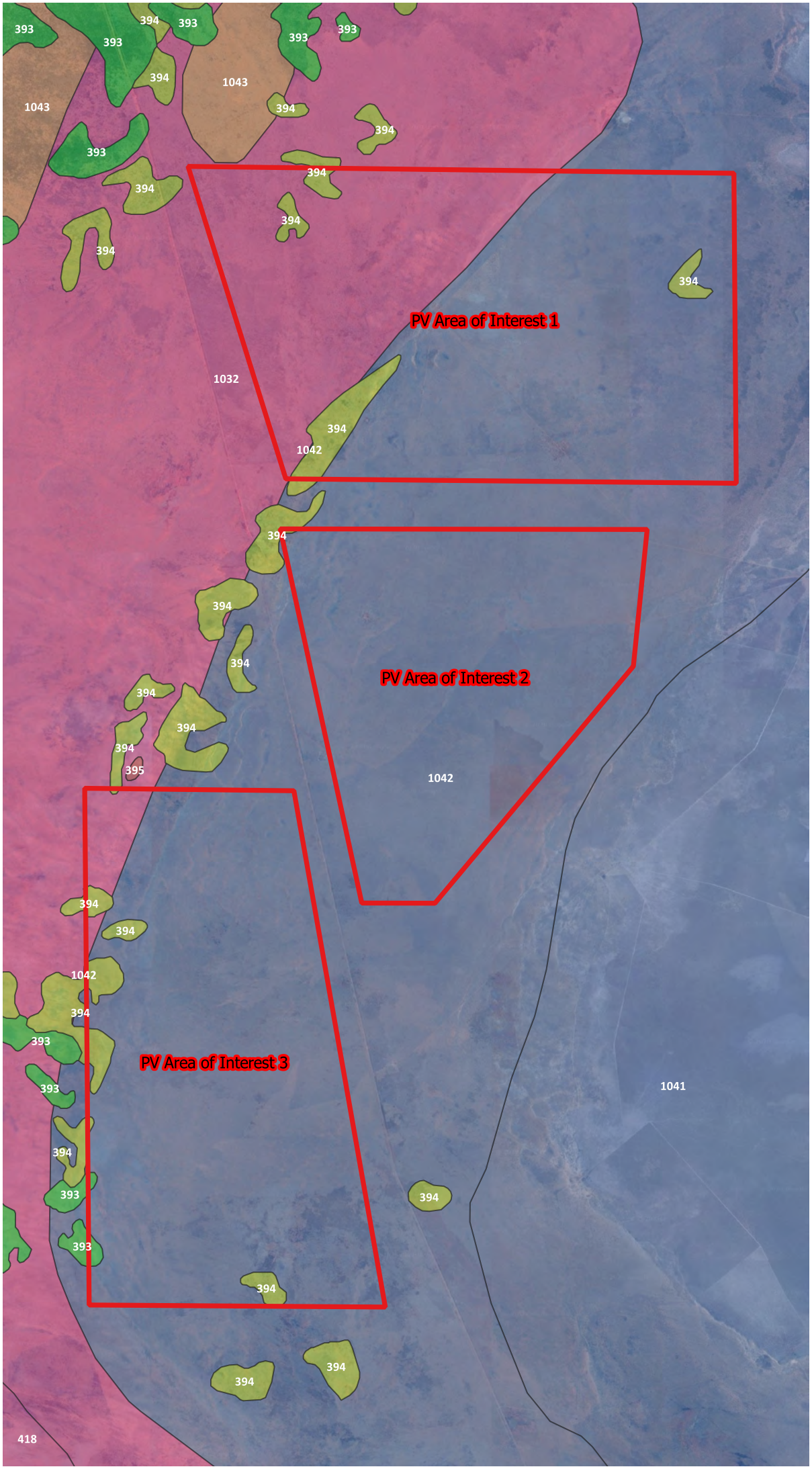

Figure 6 - Vegetation communities (NVIS_1M)

Key

Areas of Interest

Vegetation communities (NVIS_1M)

- 393 - Macropteranthes low woodland
- 394 - Macropteranthes (mixed) low woodland
- 395 - Acacia low woodland
- 1032 - Triodia low open hummock grassland
- 1042 - Eucalyptus low open woodland

Google Satellite

N

0 2 4 6 km

1:160000

Client: Coffey Services Australia Pty Ltd

7 April 2020

CONNECT environmental

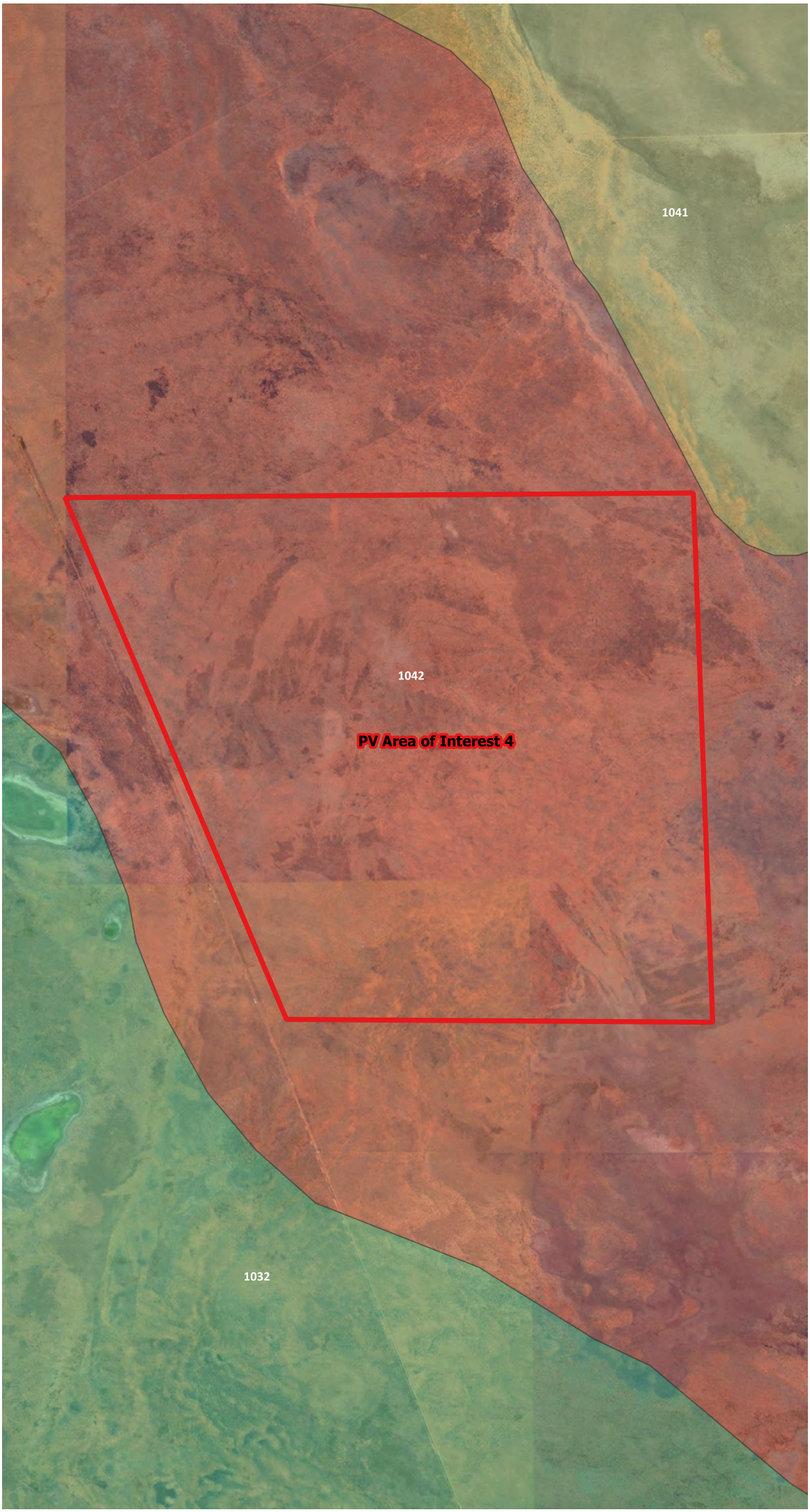

Figure 7 - Vegetation communities (NVIS_1M) – Area of Interest 4

Key

Areas of Interest

Vegetation communities (NVIS_1M)

- 1032 - Corymbia opaca, Eucalyptus gamophylla, Acacia ligulate low open woodland
- 1041 - Eucalyptus microtheca, Lophostemon grandifloras, Ventilago viminalis low open woodland
- 1042 - Lysiphyllum cunninghamii, Corymbia opaca, Eucalyptus pruinosa low open woodland

Google Satellite

N

0 1 2 3 km

1:92000

Client: Coffey Services Australia Pty Ltd

25 April 2020

CONNECT environmental

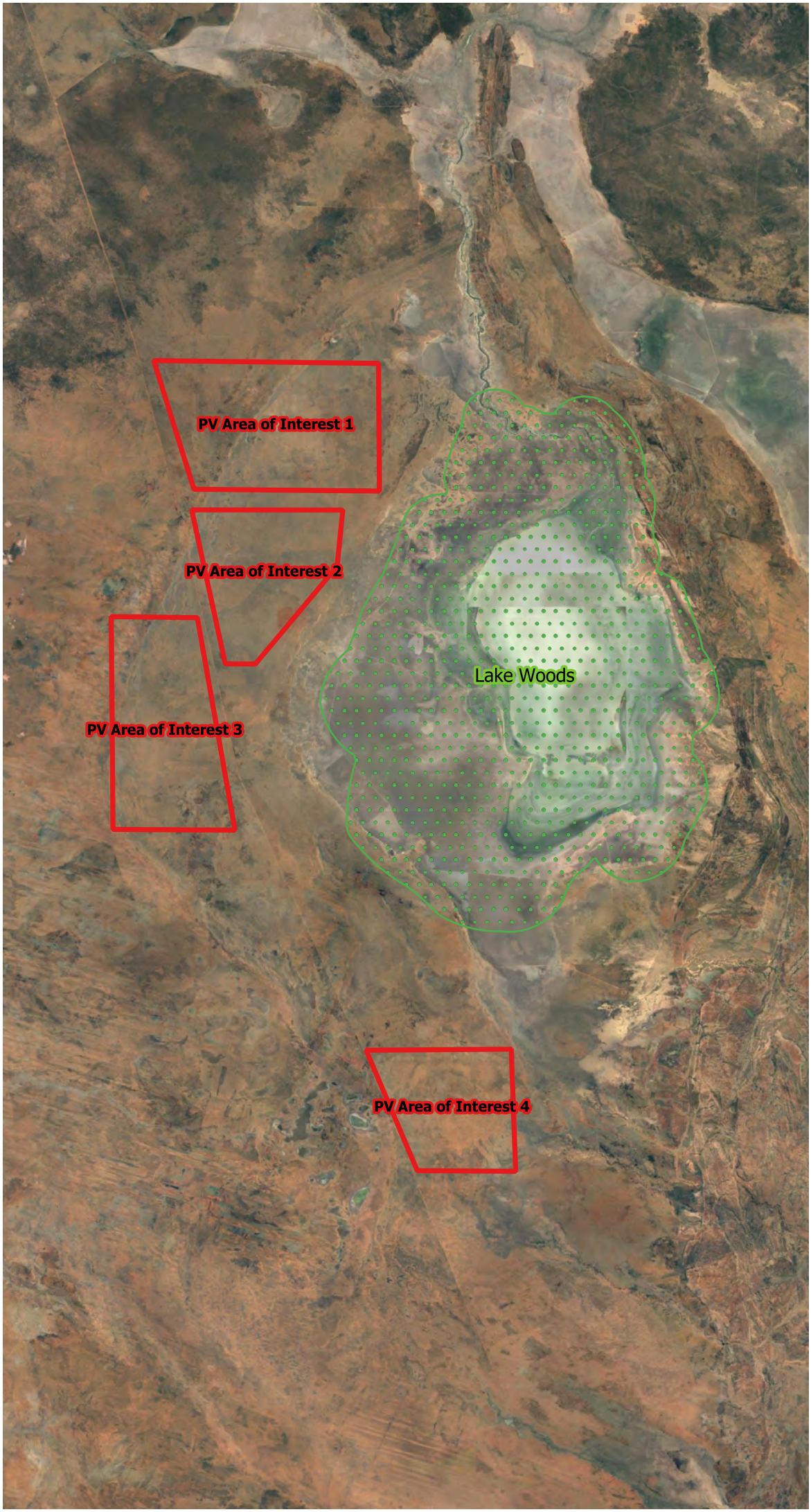

Figure 8 - Site of Conservation Significance

Key

- Areas of Interest
- Sites of Conservation Significance

Google Satellite

N

0 5 10 15 km

1:400000

Client: Coffey Services Australia Pty Ltd

25 April 2020

CONNECT environmental

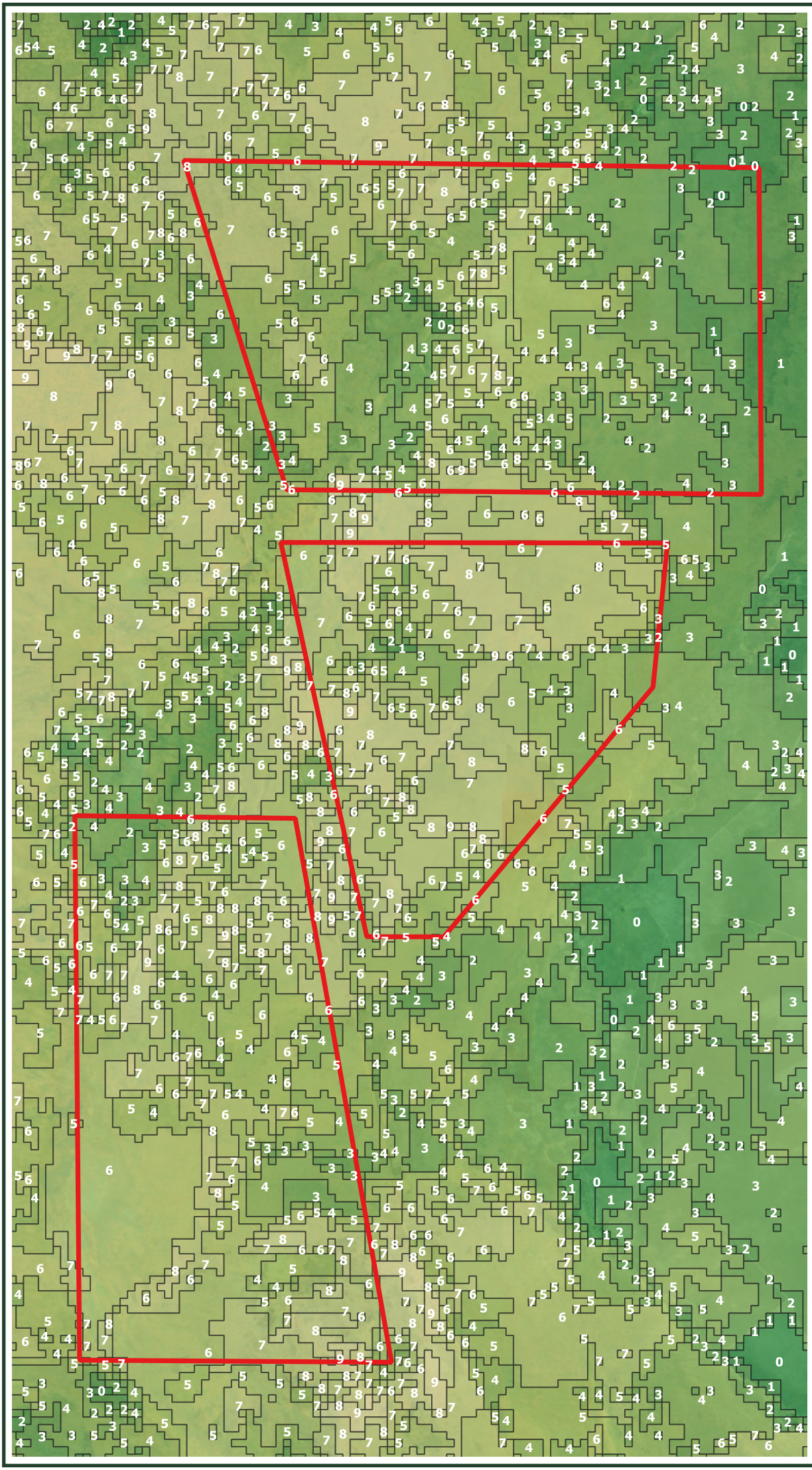

Figure 9 - Fire frequency from 2000 to 2018 (AOI's 1-3)

Key

Areas of Interest

Fire frequency (no. of fires; source: NAFI))

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19

Google Satellite

N

0 1.5 3 4.5 km

1:150000

Client: Coffey Services Australia Pty Ltd

7 April 2020

CONNECT environmental

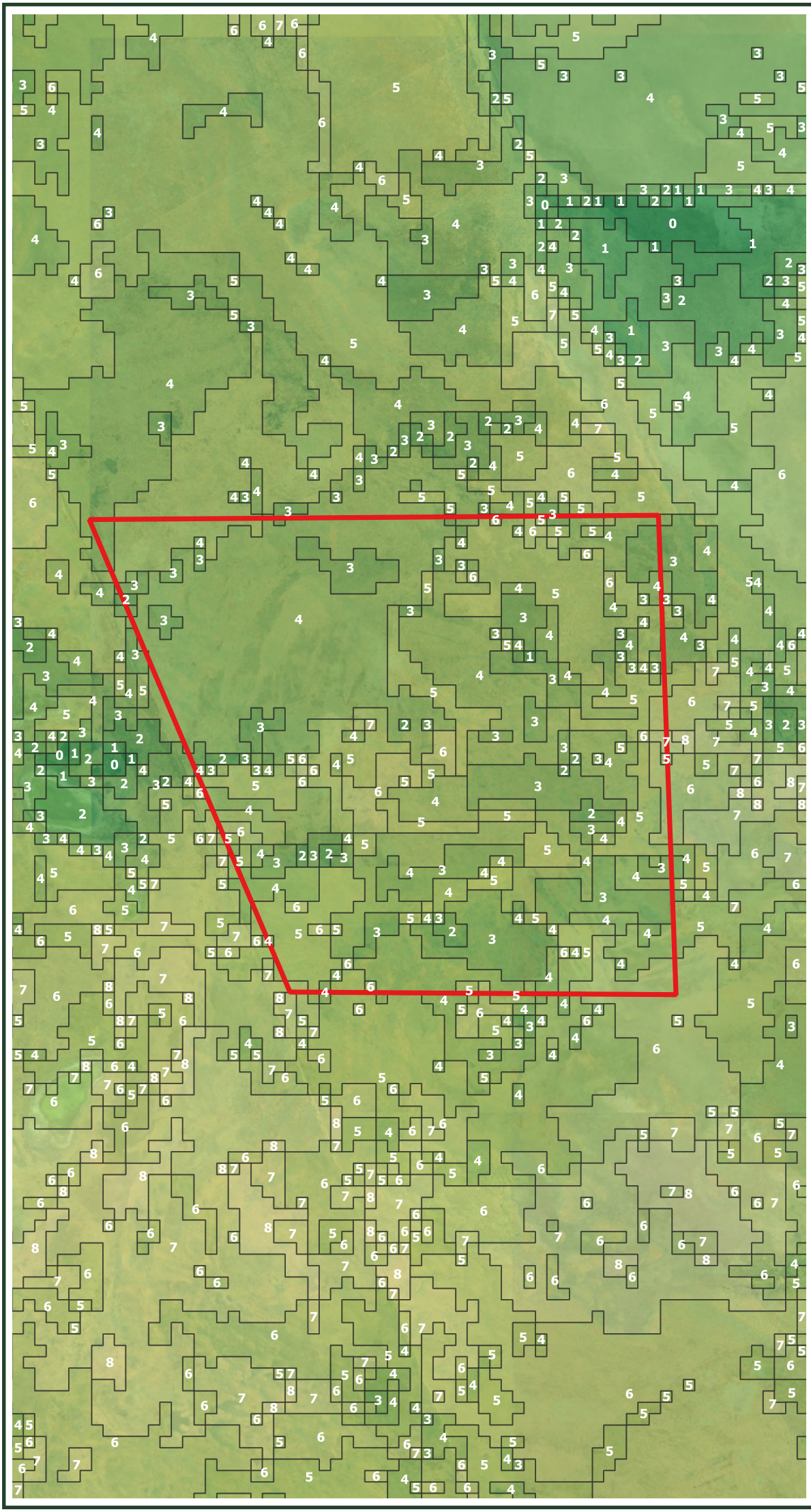

Figure 10 - Fire frequency from 2000 to 2018 (AOI 4)

Key

Area of Interest 4

Fire frequency (no. of fires; source: NAFI))

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19

Google Satellite

N

0 1 2 3 km

1:100000

Client: Coffey Services Australia Pty Ltd

25 April 2020

CONNECT environmental

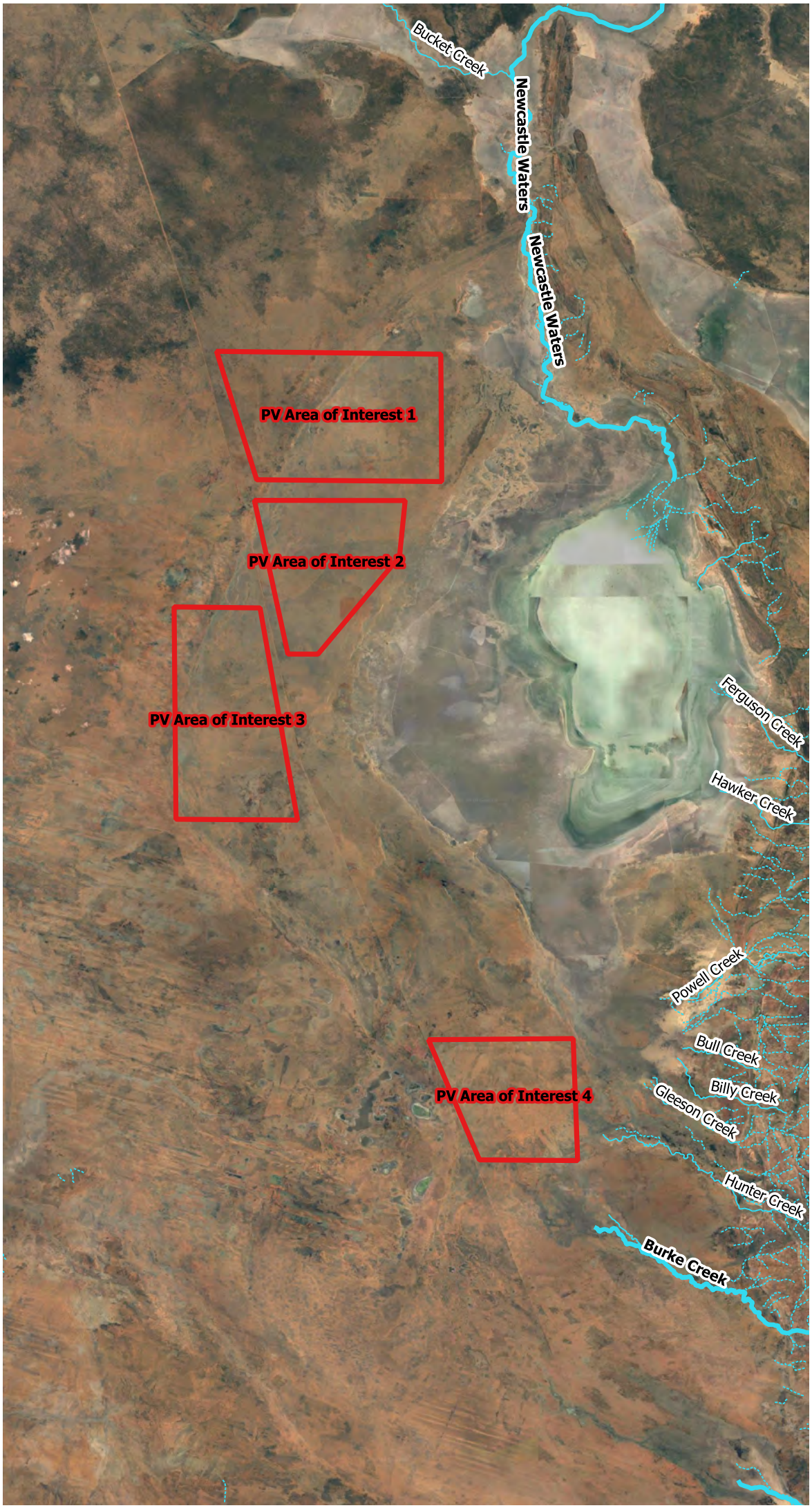

Figure 11 - Local surface hydrology

Key

- Areas of Interest
- Streams
- Minor_Drainage
- Major_Drainage

Google Satellite

N

0 5 10 15 km

1:400000

Client: Coffey Services Australia Pty Ltd

25 April 2020

CONNECT environmental

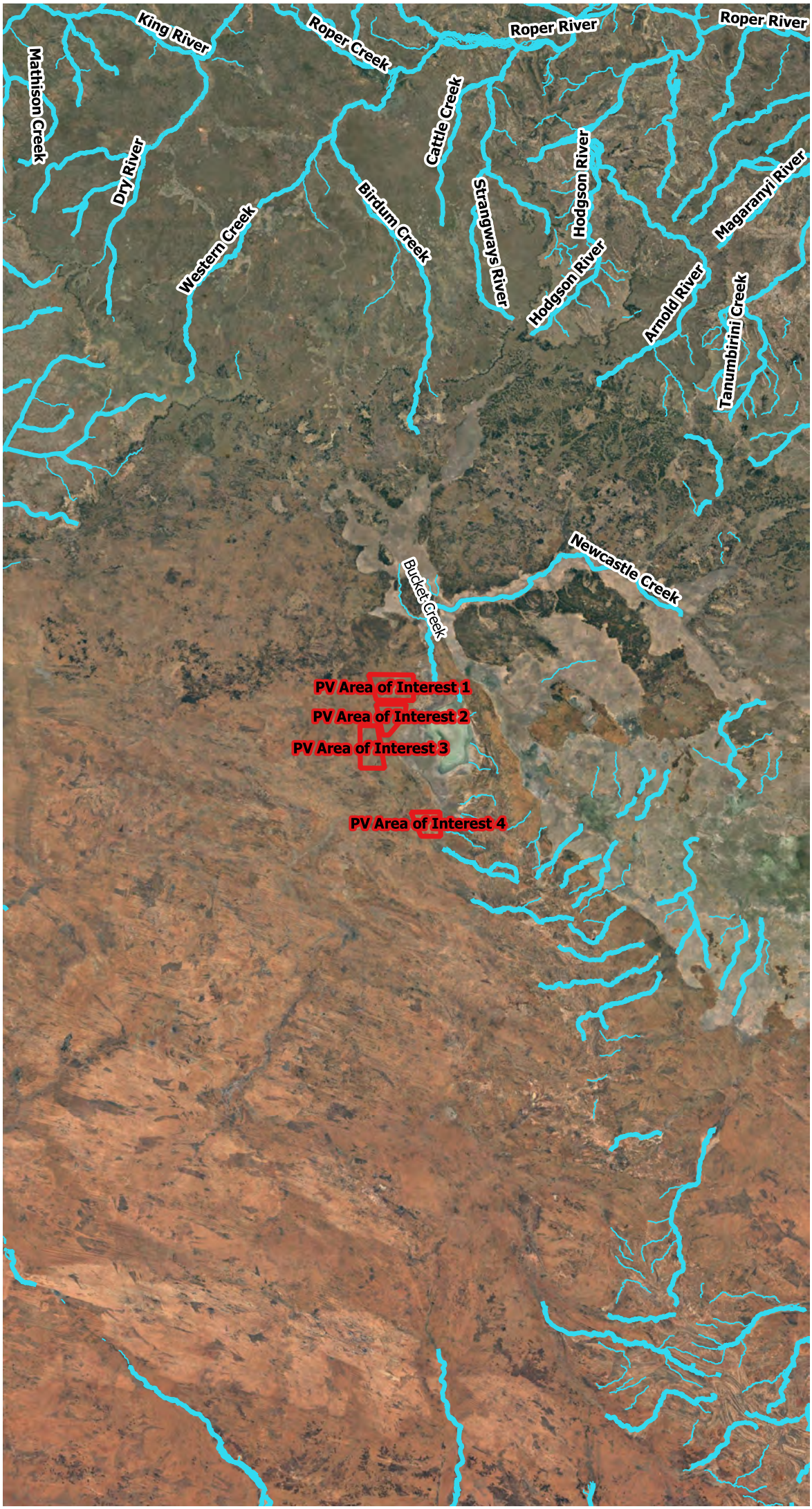

Figure 12 - Regional surface hydrology

Key

- Areas of Interest
- Minor_Drainage
- Major_Drainage

Google Satellite

N

0 25 50 75 km

1:2000000

Client: Coffey Services Australia Pty Ltd

25 April 2020

CONNECT environmental

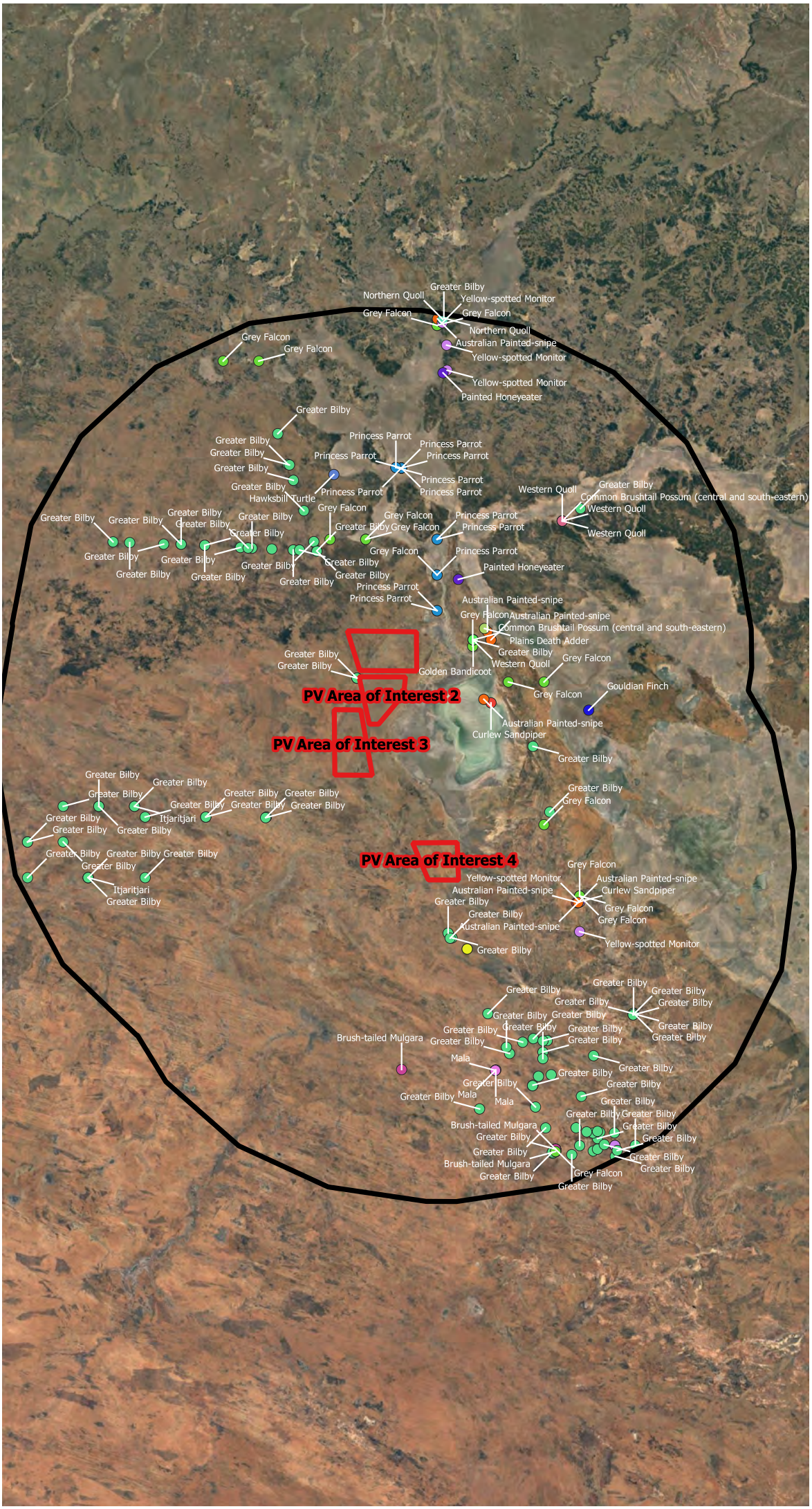

Figure 13 - Threatened fauna records within 100 km (NT Fauna Atlas)

Key

Areas of Interest

Threatened fauna

- Australian Painted Snipe
- Brush-tailed Mulgara
- Comm. Brushtail Possum
- Curlew Sandpiper
- Golden Bandicoot
- Gouldian Finch
- Greater Bilby
- Grey Falcon
- Hawksbill Turtle
- Itjaritjari
- Mala
- Northern Quoll
- Painted Honeyeater
- Plains Death Adder
- Princess Parrot
- Western Quoll
- Yellow-spotted Monitor

Google Satellite

N

0 16 32 48 km

1:1300000

Client: Coffey Services Australia Pty Ltd

25 April 2020

CONNECT environmental

4 Reconnaissance Survey

4.1 Summary

A summary of the findings of the reconnaissance survey is shown in **Table 6** with additional details provided in the following sections.

Resulting from the desktop assessment, 'focus' habitats were highlighted as being indicators for several potentially occurring threatened species during the reconnaissance survey. This was based on a preliminary threatened species likelihood of occurrence (which has since been revised based on the results of the reconnaissance survey – see **Section 5**). These are listed and assessed against in **Table 6**.

Table 6 Summary of findings from the reconnaissance survey

Aspect	AOI 1	AOI 2	AOI 4
Accessibility			
Accessible tracks inside area (see **Figure 2**)	37 km	20 km	6.9 km
Accessible tracks within 2 km and parallel to a boundary (see **Figure 2**)	13 km	16 km	12 km
Vegetation			
Summary	Dominant flora species were generally consistent with the NVIS mapping described and mapped in **Section 3.4**, except that no *Triodia* was observed in any areas of AOI 1 or AOI 2. In addition, Bulwaddy (*Macropteranthes kekwickii*) was not observed in the transition zones between the NVIS mapped 1042 and 1032 communities (as mapped in NVIS), though a patch was observed adjacent to the railway corridor near the north-west corner of AOI 1.		Mostly consistent with the NVIS mapping (community ID 1042), including the presence of *Triodia*. *Hakea lorea* also dominated several areas of AOI 4.
Land use and condition			
Summary	Land around bores in both AO1 and A02 were severely degraded with a high abundance of weeds. Noticeable degradation around lower drainage points, otherwise native vegetation still dominant.		Spinifex hummocks were degraded to singular clumps which may have resulted from intensive grazing and/or frequent fires
Focus habitats for potentially occurring threatened species			
Semotrachia euzyga (land snail) – Sandstone outcrops with *Ficus platypoda*	No signs of sandstone outcrops were observed, nor were any rises not dominated by sand noticed in the distance. Unlikely to be sandstone outcrops in areas not surveyed (though cannot confirm until a more detailed assessment is conducted).		

Aspect	AOI 1	AOI 2	AOI 4
Painted Honeyeater – stands of mature *Acacia* or *Eucalyptus* dominated open forests	Stands of mature *Acacia* and *Eucalyptus* dominated open forests were observed in AOI's 1 and 2, usually with very sparely distributed mature trees.		Not observed in AOI 4 but possible in non-surveyed areas.
Princess Parrot - *Triodia* dominated sandy dunes which contain *Acacia* shrubs	No signs of mature *Triodia* dominated sandy dunes with *Acacia spp*. were observed in any AOI, although still possible in unsurveyed areas of all AOI's.		
Greater Bilby - *Acacia* and *Melaleuca* shrubs on rocky outcrops, laterite rises, or low-lying drainage systems with *Triodia basedowii*, *T. pungens* and/or *T. schinzii*	No signs of rocky outcrops or laterite rises. Low-lying drainage systems with *Triodia* spp. possible in unsurveyed areas of all AOI's.		
Brush-tailed Mulgara and Night Parrot - sand dunes with mature hummock grasslands of spinifex, especially *Triodia basedowii* and *T. pungens*	No signs of mature *Triodia* dominated sandy dunes were AOI's 1 and 2, although is possible in unsurveyed areas.		No sand dunes with mature spinifex observed, though they are possible in unsurveyed areas of AOI 4.
Plains Death Adder - cracking clay soils on the edge of floodplains	No cracking clay habitat was in any of the AOI's, the black-soil plains are further east.		
Logistical constraints and limitations			
Summary	Access to the whole area of all AOI's was restricted to the limited number of tracks traversing through.		

4.2 AOI 1

4.2.1 Accessibility

AOI 1 was accessed via a track from the north-east that led to Hoad Bore. From Hoad Bore, two tracks traversed south-south-west and south-east to the boundary of the AOI and intersected by an east to west fence line track. There was also a track adjacent to the railway line about 1.5 km from the western boundary of the AOI. A total of 37 km was travelled within AOI 1, with a further 13 km along the vehicle track adjacent to the railway.

4.2.2 Vegetation

The vegetation communities appeared broadly uniform in the lower basin, consisting of dense grass cover *(Chrysopogon fallax and Enneapogon polyphyllus)* and sparse large Desert Bloodwoods (*Corymbia opaca*) and Silver Box Mallees (*Eucalyptus pruinosa*). The vegetation on the sandy rise on the western side gradually changed with altitude, with Turpentine (*Acacia lysiphloia*[4]) being more dominant over the patchy *C. opaca* (**Figure 14**). Ground cover on the elevated sandy hill landform is described and mapped NVIS as '*Triodia pungens*, *Triodia schinzii*, *Eragrostis eriopoda* low open hummock and tussock grassland', however no *Triodia* was observed in AOI 1. The NVIS mapping is broad and generalises vegetation communities leading to inaccuracies at the finer scale, as demonstrated here. Although it is possible that *Triodia* historically existed and has been replaced by other grasses through constant grazing and frequent fires.

A patch of Bullwaddy (*Macropteranthes kekwickii*) woodland was located on the edge of the railway line adjacent the north-western corner (**Figure 15**). The Bullwaddy woodland mapped by NVIS in the south-west was not observed when driving uphill along the east to west fence line track. Instead, Turpentine (*Acacia lysiphloia*) groves were observed, which may be a result of a commission error when the Lancewood / Bullwaddy communities were mapped using aerial imagery from the early 1990's (N. Cuff, pers. comm. 27/5/2020).

Bullwaddy is endemic to the NT. It is not listed as a threatened species under either the NT *Territory Parks and Wildlife Conservation Act* or the Australian Government's *Environment Protection and Biodiversity Conservation Act*. However, the species has links to monsoon rainforest communities further to the north, which probably reflects a previous rainforest distribution during different climates (Russell-Smith, 1991, cited in NTG 2005; N. Cuff, pers. comm. 28/5/2020). Given the apparent absence of floral diversity within Bullwaddy stands, and its links to earlier periods of aridification within Australia, it is considered unique.

[4] *However, Acacia lysiphloia was also noted in dense patches in other AOI's, particularly on the western boundaries along the railway corridor.*

Figure 14 On-top of the sandhill rise in AOI 1 showing abundance of shrubby Acacia spp.

Figure 15 Patch of Bullwaddy (Macropteranthes kekwickii) woodland on the north-western outskirt of AOI 1

4.2.3 Land Use and Condition

The areas directly surrounding Hoad Bore were severely degraded, with a complete loss of grass cover, defoliated trees and compacted soils (this was common around all bores observed in each of the AOI's). Weeds such as Rubberbush (*Calotropis procera)* were common around the bore. The tracks traversing through the lower basin showed signs of degradation correlating to the distance to bores, with defoliation and over-grazing more noticeable within a couple of kilometres around bores. Lower drainage areas were also heavily degraded from cattle. The sandhill rise along the east-west fence-line seemingly contained the most intact native vegetation communities amongst tracks in AOI 1.

4.2.4 Fauna Habitats and Potential for Threatened Species

The slight sandy rises along the tracks saw numerous active sand goanna (*Varanus gouldii*) burrows (**Figure 16**) and multiple signs of invertebrate diggings (dor beetles, scorpions and mygalomorph spiders) and native mammal tracks scattered around cow dung and tracks, showing a co-existence of terrestrial fauna and cattle. It is unlikely that any threatened species would occur in the lower reaches of AOI 1 from the degradation and disturbances of constant cattle grazing. The western third of the area up the rise could have potential habitat for the Greater Bilby (*Macrotis lagotis*) if there are areas with little disturbances. This area could also contain potential feeding sites for Princess Parrots (*Polytelis alexandrae*).

Figure 16 One of numerous active Sand Goanna (Varanus gouldii) burrows in AOI 1

4.2.5 Logistical Constraints and Limitations

Large areas of the north-west and eastern side of the AOI 1 were not accessible for assessment. The marked fence track running north-south along the western boundary was not maintained and inaccessible. Alternative methods of accessing unsurveyed areas should be considered for further surveys (see **Section 6** for recommendations).

4.3 AOI 2

4.3.1 Accessibility

AOI 2 was accessed via the track leading south-east down from Hoad Bore leading towards a track traversing east-west between the Joel Garner water tank and Mckay Bore. A third track travelling south-west from Joel Garner Bore to Marshall Bore lead us to the western edge of the AOI. A total of 20 km was travelled within AOI 2, with a further 16 km along the vehicle track adjacent to the railway 1.5 km away from the western area boundary.

4.3.2 Vegetation

Vegetation across the observed areas of AOI 2 were broadly uniform with *Eucalyptus* woodland dominated by Desert Bloodwood (*Corymbia opaca*) and Silver Box Mallee (*Eucalyptus pruinosa*) with a dense grass understory (**Figure 17**). Both species of these trees had large mature specimens flowering along the east-west track towards Mckay Bore. In this area, the trees were also sparser than in the northern section of the AOI.

Figure 17 Vegetation typically observed in AOI 2

4.3.3 Land Use and Condition

The land surrounding the three bores were severely degraded and over-run with weeds, like AOI 1. The eastern side had sparse tree cover, but there appeared to be a higher proportion of the trees that were mature than the western side.

4.3.4 Fauna Habitats and Potential for Threatened Species

The track leading south from Hoads Bore yielded a diversity of reptiles, especially in areas with deep sand (**Figure 18**). Three terrestrial gecko species and one pygopod were recorded in a short night walk covering only

900 m along the track, demonstrating that small cryptic fauna can co-exist with the longer-term cattle disturbance[5]. The track running east-west heading to Mckay Bore showed a diversity of bird species including flocks of Budgerigars, Cockatiels and Zebra Finches utilising the large mature trees. There is potential for Princess Parrots (*Polytelis alexandrae*) or Painted Honeyeaters (*Grantiella picta*) to occasionally visit the trees in this area. Yellow-spotted Monitors (*Varanus panoptes*) are likely to persist in the sparse woodlands in this area closer to the floodplains to the east, although this is habitat is unlikely to be of significant value to the species. The Greater Bilby (*Macrotis lagotis*) may occur in western half of this AOI. There is a record of the species just outside the north-western corner from 1997, possibly on the track adjacent the railway line.

Figure 18 Two species of gecko found in AOI 2, Western Beaked Gecko (Rhynchoedura ornata) and Fat-tailed Gecko (Diplodactylus conspicillatus) (photos: N. Volpe)

4.3.5 Logistical Constraints and Limitations

Everywhere south of the tracks were not surveyed in AOI 2. The northern third above the east-west tracks was also inaccessible. Alternative methods of accessing non-surveyed areas should be considered for further surveys.

4.4 AOI 4

4.4.1 Accessibility

A track veering north-east off the adjacent railway track heading towards Thommo Bore was driven with 3.7 km being inside the AOI 4 in the north-western corner. From Thommo Bore, a track was taken south-east heading towards Len Pascoe Bore. The track passed through 3.2 km of the north-eastern corner of AOI 4. The track adjacent the railway line was driven 12 km south to be 1.5km away from the western boundary of the area.

4.4.2 Vegetation

This was the only of the three areas to contain any spinifex (*Triodia spp.)* by the side of the accessible tracks. The *Triodia* was the dominant grass, with Bootlace Oak (*Hakea lorea*) and *Acacia* spp. and *Bauhinia cunninghamii* present. There were also patches with a dense *Eucalyptus pruinosa* overstorey.

[5] *Though, at as the date of this report, the stock grazing / rotation rates are unclear.*

Figure 19 Typical landscape seen in the north-western corner in AOI 4

4.4.3 Land Use and Conditions

The spinifex hummock grasslands seen were degraded with no old-growth spinifex occurring, only singular clumps. This could have resulted from intensive grazing and/or frequent fires. The lack of hummocks forming in this spinifex grassland exposes native terrestrial fauna to predation by feral cats. There were areas with large amounts of dead *Eucalyptus pruinosa* and *Acacia* trees, possibly similarly from a recent or too frequent fire.

4.4.4 Potential for Threatened Species

Triodia hummock grasslands, particularly containing old-growth hummocks, are important for many cryptic arid fauna species. The lack of any bore in the interior still maintains the possibility that there is healthy old-growth spinifex on loose soils which, if not as degraded by cattle, could potentially be habitat for the Greater Bilby (*Macrotis lagotis*) and Brush-tailed Mulgara (*Dasycercus blythi)*. The Greater Bilby is the most likely threatened species to occur in AOI 4 with three records only 17 km south of the site in 2001. A Brush-tailed Mulgara was recorded in 2012 approximately 63 km south of AOI 4 and represents the northern edge of the known distribution of the species. Although, if continuous habitat exists it is still a possibility the Brush-tailed Mulgara could occur in this AOI.

4.4.5 Logistical Constraints and Limitations

AOI 4 had the least amount of accessibility, with the only tracks crossing the north-western and north-eastern corners. This left most of the site completely unobserved. Alternative methods of accessing these areas should be considered for further surveys.

4.5 Incidental Fauna

Fauna species observed during the reconnaissance survey are listed in **Table 7**. None are listed as a threatened species under NT or national legislation.

Table 7 Fauna incidentally observed during the reconnaissance survey (across Newcastle Waters or Powell Creek Stations)

Common Name	Species Name
Mammals	
Cat	*Felis catus*
Northern Nailtail Wallaby	*Onychogalea unguifera*
Red Kangaroo	*Macropus rufus*
Birds	
Apostlebird	*Struthidea cinerea*
Australian Bustard	*Ardeotis australis*
Australian Magpie	*Cracticus tibicen*
Australian White Ibis	*Threskiornis molucca*
Black Kite	*Milvus migrans*
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*
Black-faced Woodswallow	*Artamus cinereus*
Black-fronted Dotterel	*Elseyornis melanops*
Black-winged Stilt	*Himantopus himantopus*
Brown Falcon	*Falco berigora*
Brown Honeyeater	*Lichmera indistincta*
Budgerigar	*Melopsittacus undulatus*
Bush Stone-curlew	*Burhinus grallarius*
Cockatiel	*Nymphicus hollandicus*
Common Bronzewing	*Phaps chalcoptera*
Crested Bellbird	*Oreoica gutturalis*
Crested Pigeon	*Ocyphaps lophotes*
Diamond Dove	*Geopelia cuneata*
Galah	*Eolophus roseicapillus*
Little Button Quail	*Turnix velox*
Little Corella	*Cacatua sanguinea*
Little Raven	*Corvus mellori*
Magpie-lark	*Grallina cyanoleuca*

Common Name	Species Name
Masked Lapwing	*Vanellus miles*
Masked Woodswallow	*Artamus personatus*
Peaceful Dove	*Geopelia striata*
Pied Butcherbird	*Cracticus nigrogularis*
Pied Heron	*Egretta picata*
Pink-eared Duck	*Malacorhynchus membranaceus*
Plumed Whistling-Duck	*Dendrocygna eytoni*
Rainbow Bee-eater	*Merops ornatus*
Red-backed Fairy-wren	*Malurus melanocephalus*
Spotted Nightjar	*Eurostopodus argus*
Straw-necked Ibis	*Threskiornis spinicollis*
Whistling Kite	*Haliastur sphenurus*
White-breasted Woodswallow	*Artamus leucorynchus*
White-winged Triller	*Lalage sueurii*
Willie Wagtail	*Rhipidura leucophrys*
Zebra Finch	*Taeniopygia guttata*
Reptiles	
Central Military Dragon	*Ctenophorus isolepis*
Central Netted Dragon	*Ctenophorus nuchalis*
Centralian Blue-tongued Skink	*Tiliqua multifasciata*
Common Blue-tongued Skink	*Tiliqua scincoides*
Fat-tailed Gecko	*Diplodactylus conspicillatus*
Lally's Two-line Dragon	*Diporiphora lalliae*
Rock Ctenotus	*Ctenotus saxatilis*
Sand Goanna	*Varanus gouldii*
Sand-plain Gecko	*Lucasium stenodactylum*
Western Beaked Gecko	*Rhynchoedura ornata*
Western Hooded Scaly-foot	*Pygopus nigriceps*
Frogs	
Northern Laughing Tree Frog	*Litoria rothi*

5 Preliminary Likelihood of Occurrence Assessment of Threatened Species

5.1 Attributes Assessed

All threatened flora and fauna species recorded within 100 km of the AOI's and contained within the EPBC Act Protected Matters Search Tool (**Appendix B**) were included in this likelihood of occurrence assessment. The combined list contained no species of threatened flora, one invertebrate and 20 vertebrate threatened fauna. This included threatened migratory shorebird species.

A buffer of 100 km was considered appropriate for this project because it was expected to satisfactorily characterise local and regional abundance and distributions of threatened species and adequately capture the potential for these species to exist in the AOI sites. Where relevant, flora and fauna records further afield were analysed to aid in the significance of any detected species or potential impacts.

Threatened ecological communities were included in the search.

5.2 Results

The results of the likelihood of occurrence assessment are provided in full in **Appendix A** with a summary shown in **Table 8**. With limitations during the reconnaissance survey on accessing large portions of the projected AOI's and information gaps in vegetation communities and health, all the AOI's have been categorised together for the purposes of this assessment.

Table 8 Results of likelihood of occurrence assessment

Species	Common name	Likelihood of occurring			
		AOI 1	AOI 2	AOI 3	AOI 4
Threatened Invertebrates					
Semotrachia euzyga	Land Snail	Unlikely	Unlikely	Unknown	Unlikely
Threatened Birds					
Calidris ferruginea	Curlew Sandpiper	Unlikely	Unlikely	Unlikely	Unlikely
Erythrotriorchis radiatus	Red Goshawk	Unlikely	Unlikely	Unlikely	Unlikely
Erythrura gouldiae	Gouldian Finch	Unlikely	Unlikely	Unlikely	Unlikely
Falcunculus frontatus whitei	Northern Shrike-tit	Unlikely	Unlikely	Unlikely	Unlikely
Rostralata australis	Australian Painted Snipe	Unlikely	Unlikely	Unlikely	Unlikely
Tyto novaehollandiae kimberli	Masked Owl	Unlikely	Unlikely	Unlikely	Unlikely

Species	Common name	Likelihood of occurring			
		AOI 1	AOI 2	AOI 3	AOI 4
Malurus coronatus coronatus	Purple-crowned Fairy-wren	Unlikely	Unlikely	Unlikely	Unlikely
Falco hypoleucos	Grey Falcon	Possible	Possible	Possible	Possible
Grantiella picta	Painted Honeyeater	Possible	Possible	Possible	Possible
Polytelis alexandrae	Princess Parrot	Possible	Possible	Possible	Possible
Pezoporus occidentalis	Night Parrot	Possible	Possible	Possible	Possible
Threatened Mammals					
Macroderma gigas	Ghost Bat	Unlikely	Unlikely	Unlikely	Unlikely
Isoodon auratus	Golden Bandicoot	Unlikely	Unlikely	Unlikely	Unlikely
Lagorchestes hirsutus	Mala	Unlikely	Unlikely	Unlikely	Unlikely
Trichosurus vulpecula vulpecula	Common Brushtail Possum (central and south-eastern)	Unlikely	Unlikely	Unlikely	Unlikely
Notoryctes typhlops	Itjaritjari (Southern Marsupial Mole)	Unlikely	Unlikely	Possible	Unlikely
Macrotis lagotis	Greater Bilby	Possible	Possible	Possible	Possible
Dasycercus blythi	Brush-tailed Mulgara	Unlikely	Unlikely	Possible	Possible
Threatened Reptiles					
Acanthopsis hawkei	Plains Death Adder	Unlikely	Unlikely	Unlikely	Unlikely
Varanus panoptes	Yellow-spotted Monitor	Unlikely	Possible	Possible	Unlikely
TOTAL (possible)		**5**	**6**	**8**[6]	**6**

[6] *Reflects the uncertainty of the vegetation and habitats on site given that it was not accessed during the reconnaissance survey.*

6 Conclusions and Recommendations

The reconnaissance survey allowed the start of a progression of steps to be undertaken to assess the likelihood, presence and significant impacts of threatened fauna in the three AOI's. In terms of a general site assessment, the accessible tracks through the AOI's showed noticeable degradation from cattle and potentially fire, but enough native vegetation cover was present to still be maintaining some biodiversity, at least. Given the limited access to most of each AOI and the existing broad scale mapping, further floristic surveys are required to adequately map vegetation communities across each AOI and help fill information gaps.

A total of eight threatened species have been identified to potentially occur in the AOI's including four bird, three mammal and one reptile species. For the Greater Bilby and Brush-tailed Mulgara, all habitat in this region is considered significant if they were to occur in any AOI. Species with a widespread distribution and that traverse varying habitats (such as the Yellow-spotted Monitor), an assessment of conservation significance in the region is based on interpretation of multiple factors, including local abundance, isolated populations or important breeding habitat.

For nomadic threatened species such as the Princess Parrot (*Polytelis alexandrae*), Painted Honeyeater (*Grantiella picta*) and Grey Falcon (*Falco hypoleucos*) that could potentially visit the site but are unlikely to breed, targeted surveys are recommended due to the large-scale clearing of the project, as any marginal or foraging grounds may still be significant. The Night Parrot (*Pezoporus occidentalis*) has not been confirmed in the NT since the 1920's, but numerous potential sightings suggest the species may persist in low numbers (Pavey, 2006). Therefore, the possibility of them occurring should remain until further surveys for extensive mature *Triodia* hummock grasslands are conducted in any AOI.

At this stage, the only perceived substantial difference between the AOI's is the lack of spinifex in the AOI's 1 and 2 (it was present in AOI 4, and AOI 3 was not accessed). This is likely to constitute more suitable habitat for threatened species such as the Brush-tailed Mulgara, Night Parrot and Princess Parrot, though caution is applied given the minimal extent of observation across all AOI's.

Without knowledge of any other project preferences in relation to heritage or infrastructure considerations, an approach to subsequent threatened species assessments is provided in **Table 9**.

Table 9 Recommended approach to subsequent threatened species assessments in one or all the AOI's

Step	Milestone	Recommendation	Justification / result
1	Vegetation mapping and habitat suitability assessment	• Further reconnaissance surveys be conducted aerially to systematically verify vegetation communities and habitat suitability for threatened fauna across the target area/s. • A suitable approach may involve assessing relevant attributes in quadrats at increasing distances from bores to evaluate cattle abundance and vegetation degradation in relation to bore sites or in a grid-like fashion across the target area. • Consultation with DENR is recommended to ensure the most effective method is utilised (particularly given that extensive vegetation survey work in currently being conducted in the Beetaloo Basin).	• Provide detailed information in relation to vegetation communities, habitats for threatened species and the potential for those species to occur. • Unmanned aerial vehicles (UAV's) could be used to determine vegetation types and condition (to some extent), and fauna habitats, across the target areas. • Helicopters could be then used to conduct full floristics surveys and identify evidence of threatened fauna.
2	Threatened fauna survey	Fauna surveys appropriate to targeted threatened species, at suitable times of year for activity of the species. The methods most suitable for each species, according to EPBC survey guidelines, include: • Pitfall traps (Brush-tailed Mulgara) • Elliott traps (Brush-tailed Mulgara) • Camera traps (Greater Bilby and Yellow-spotted Monitor) • Bird surveys (Princess Parrot, Painted Honeyeater, Grey Falcon, Night Parrot) • Active searches (all target species). Survey intensity would be decided following the vegetation mapping and habitat suitability assessment (step 1).	Limited data of fauna species recorded in actual AOI's, plus to identify presence of any cryptic threatened fauna.
3	Impact assessment	• An Impact assessment will be required should a threatened species be detected within the target area or significant habitat for any potentially occurring species. • The significance and consequences of impacts from the proposed development for each species will need to be evaluated and determined at a local and regional level.	• Understand the significance of populations of any threatened species occurring in any AOI. • Understand the consequences that the proposed development will have on any occurring threatened species.

7 Limitations

The objectives of the assessment were to gain a preliminary understanding of the ecological values of the AOI's, including which threatened species could occur in any of the AOI's. However, there are several inherent limitations to all assessments of this nature, including:

- The desktop assessment was based on a review of available literature only. Such assessments are considered an important first step in understanding the biodiversity values on a site, though in some instances may require further investigation including a site visit / reconnaissance survey to help to clarify site values.
- When conducting database searches for threatened species, buffers of between 2 and 100 km are generally used depending on the likely amount of survey effort conducted in that area. A buffer of 100 km was used for this project as it was determined that this distance would satisfactorily characterise local and regional abundance and distributions of threatened species and adequately capture the potential for these species to exist on the site.
- Flora and fauna records obtained through NR Maps are not necessarily an accurate representation of the abundance and distribution of a species in any given area. Survey effort in that area must also be recognised as a factor.
- Assessments and conclusions made by Connect Environmental were based on available information at the time of preparation of this report. Only broad scale (i.e. 1:1M) vegetation and land system mapping was available, substantially limiting the ability to define habitat features at a scale appropriate to target field investigations.
- Other matters protected under the EPBC Act, such as Matters of National Environmental Significance (except for threatened and migratory species), and the *NT Environment Assessment Act*, were not assessed as part of this assessment report.

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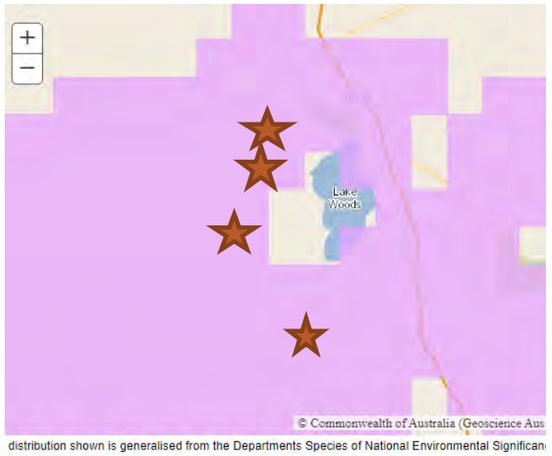
Appendix A: Preliminary Threatened and Migratory Species Likelihood of Occurrence Assessment

Species excluded from this assessment include those that have not been recorded within 100 km of the AOI's since 1980 or clearly false records. This includes the Western Quoll (*Dasyurus geoffroii*) which is now considered extinct in the NT, and the Hawksbill Turtle record which must be erroneous given the lack of suitable habitat within 100 km (i.e. it is a marine species).

Scientific Name	Common Name	Conservation Status [7]	Description	Preferred Habitat	Records within 100 km (most recent year)	Likelihood of occurrence
Threatened Invertebrates						
Semotrachia euzyga	Land Snail	NT: Endangered Nat.: Endangered	A small yellow-brown camaenid land snail, about 8.0 mm in diameter (Ward *et al*., 2006)	Restricted to areas around fig trees (*Ficus platypoda* (Large-leaf Rock Fig)) in rocky litter (Solem, 1993; cited in Ward *et al*., 2006)	2 (2019)	**Unlikely in any AOI** No suitable habitat of sandstone or limestone ridges appears to exist.
Threatened Birds						
Calidris ferruginea	Curlew Sandpiper	NT: Vulnerable Nat.: Critically Endangered	Shorebird with long legs and a long black tapering down-curved bill. Upperparts are grey-brown with little mottling with light grey across the belly. Has a white eye-brow and a white rump and broad wing bar are apparent in flight.	Non-breeding birds forage around coastal brackish lagoons, intertidal mud and sand flats, estuaries, saltmarshes and occasionally on inland freshwater systems such as ephemeral or permanent lakes, dams or waterholes edged with bare mud or sand (Higgins & Davies 1996, Garnett et al 2011)	2 (1995)	**Unlikely in any AOI** No suitable habitat (ephemeral or permanent lakes or dams) appears to exist.
Erythrotriorchis radiatus	Red Goshawk	NT: Vulnerable; Nat.: Vulnerable	Large reddish-brown hawk with dark streaks on its belly and barred on the underwing and tail.	Coastal and subcoastal tall, open forest and woodlands, tropical savannas traversed by rivers lined with timber, and along the edges of rainforest (including paperbark forest and gallery forests) (Woinarski, 2006; Marchant & Higgins 1993 cited in DEWHA, 2010). The species generally only nests in trees taller than 20 m and within 1 km of a watercourse or wetland, but not in areas with fragmented vegetation (Aumann & Baker-Gabb, 1991; Czechura, 2001 cited in TSSC, 2015b).	0	**Unlikely in any AOI** Nearest records are over 250 km away in either direction. No suitable habitat on any of the AOI sites.
Erythrura gouldiae	Gouldian Finch	NT: Vulnerable; Nat.: Endangered	Distinctive small colourful bird with a purple chest, yellow breast and green back, with an intensely vivid pale blue upper collar. Females are duller than males, and juveniles are completely dull green.	From April to July, breeds in habitat on wooded rocky hills with *Eucalyptus tintinnans* and *Eucalyptus brevifolia* and, from August to March (non-breeding season), occurs in lowland drainages (TSSC, 2016a).	1 (2006)	**Unlikely in any AOI** Neither *Eucalyptus brevifolia* nor *E. tintinnans* (known breeding trees) have been recorded in the region. Except for the single record within 100 km, all others are at least 150 km north. It is unlikely to be an important area for the species.
Falco hypoleucos	Grey Falcon	NT: Vulnerable Nat.: Not listed	Medium sized falcon with light-blue grey upper parts and white belly with dark streaks. Has grey freckling on the wings with dark tips.	Areas of lightly timbered lowland plains, typically on inland drainage systems, where the average annual rainfall is less than 500 mm (Ward, 2012). Nest in tallest trees along water courses, especially *Eucalyptus camaldulensis* and *E. coolabah* (Schoenjahn 2013, 2018; Falkenburg 2010).	17 (1997)	**Possible in any AOI** No mapped drainage lines within any of the AOI's (the closest flows into Lake Woods from the north and east of Lake Woods and Hunter Creek to the south-east of AOI 4), however these creek lines, and nearby marshes, are within an individual's range of travel (Schoenjahn, 2018). There are also likely to be broad drainage depressions throughout the areas. The abundance of the species is likely to be sparse and given the lack of mapped (i.e. distinct) drainage courses within the AOI's, they are probably not important or vital (therefore is unlikely to be significantly impacted).
Falcunculus frontatus whitei	Northern Shrike-tit	NT: Near threatened Nat: Vulnerable	Medium sized bird with dull green back, yellow belly and black and white marked head with a small black crest.	The subspecies occurs across a range of Eucalypt, melaleuca and semi-arid woodlands, mainly dominated by *Eucalyptus miniata, E. tetrodonta* or *E. bleeseri* (Robinson and Woinarski 1992; Ward pers. obs.)	0	**Unlikely in any AOI** Nearest record is 160 km to north. No suitable habitat on any of the AOI's.

[7] *Under both the NT Territory Parks and Wildlife Conservation Act or the national Environment Protection and Biodiversity Conservation Act.*

Scientific Name	Common Name	Conservation Status [7]	Description	Preferred Habitat	Records within 100 km (most recent year)	Likelihood of occurrence
Grantiella picta	Painted Honeyeater	NT: Vulnerable Nat.: Vulnerable	A small to medium-sized honeyeater in which the black head and upperparts contrast strongly with the white underparts (Ward, 2012).	They inhabit *Acacia*- or *Eucalyptus*-dominated woodlands and open forest and prefer habitats with more mature trees since these host more mistletoes (Ward, 2012)	2 (dates not recorded)	**Possible in any AOI** There was a lack of mistletoes in any AOI, the main food source for the Painted Honeyeater, plus a lack of mature Eucalyptus or Acacia forest. This species breeds in south-eastern Australia and non-breeding birds move into semi-arid and northern NT (Ward, 2012), so no vital breeding habitat will be impacted in any AOI.
Malurus coronatus coronatus	Purple-crowned Fairy-wren	NT: Vulnerable; Nat.: Endangered	Distinctive fairy-wren with males having a vivid purple crown in breeding plumage. Deep blue tail with sandy coloured backs and wing with a lighter belly.	Prefer areas of thick riparian vegetation, typically of canegrass and/or pandanus, but also dense patchy shrubs up to 3 m.	0	**Unlikely in any AOI** No suitable habitat, closest record is over 200 km away.
Pezoporus occidentalis	Night Parrot	NT: Critically Endangered Nat.: Endangered	A medium-sized (22-25 cm head-body length) bird with a dumpy build and a short tail.	Most habitat records are of *Triodia* (Spinifex) grasslands and/or chenopod shrublands (Garnett et. al., 2011; cited in TSSC, 2016c) in the arid and semi-arid zones, and Higgins (1999; cited in TSSC, 2016c) listed *Astrebla* spp. (Mitchell grass), shrubby samphire and chenopod associations, scattered trees and shrubs, *Acacia aneura* (Mulga) woodland, treeless areas and bare gibber as associated with sightings of the species. Roosting and nesting are reported as being primarily in old and large spinifex clumps (Higgins 1999, Murphy 2015; cited in TSSC, 2016c). The EPBC Act Species Profile and Threats Database (SPRAT) shows that the leases are within the modelled distribution, though the Threatened Species Scientific Committee (TSSC; who provides independent scientific advice to the Minister for the Environment) does explain that the distribution is unknown (TSSC, 2016c).  *Figure 20 SPRAT modelled distribution of the Night Parrot (pink is potential distribution of species; ochre stars are approximate location of AOI's) (DoE, 2020)*	0	**Possible in any AOI** Given there are significant knowledge gaps in the distribution of the species in the NT, and without more detailed vegetation or habitat mapping in inaccessible areas in the AOI's to make sure there is no extensive mature *Triodia* hummock grasslands, it is prudent to consider that the species could possibly occur there.

Scientific Name	Common Name	Conservation Status [7]	Description	Preferred Habitat	Records within 100 km (most recent year)	Likelihood of occurrence
Polytelis alexandrae	Princess Parrot	NT: Vulnerable Nat.: Vulnerable	Distinctive slim medium-sized parrot with a long tapering tail. The basic colour is dull olive-green; paler on the underparts. It has a red bill, blue-grey crown, pink chin, throat and foreneck, prominent yellow-green shoulder patches, bluish rump and back, and blue-green uppertail.	Nomadic but usually occupies swales between *Triodia* dominated sand dunes and is occasionally seen on slopes and crests of dunes. This habitat consists mostly of shrubs such as Eremophila, Grevillea, and Hakea and scattered trees. Some records are from riverine forest, woodland and shrubland. Breeds in hollows in large Eucalyptus and Desert Oaks (Pavey, 2006).	13 (1976 [8])	**Possible in all AOI's** A nomadic bird that is most commonly found on extensive *Triodia* dominated dunes which is still unlikely to occur anywhere but possibly AOI 4. However, could possibly visit any of the AOI's, as they feed in open shrublands which contain *Acacia* species in which it feeds on the seeds (Higgins 1999; Pavey et al. 2014).
Rostratula australis	Australian Painted Snipe	NT: Vulnerable Nat.: Endangered	Small wader with head, neck and upper breast a chestnut-bronze. The back and wings are dark olive-green, finely barred black with bright chestnut spots and black bars. A broad white band separates the neck and wings and has a white horizontal band through the eye. Male birds lack the rufous on the hindneck.	Shallow, vegetated, freshwater swamps, claypans or inundated grasslands or saltmarshes (including temporary wetlands) (Marchant & Higgins 1993 cited in DEWHA, 2010; Taylor et al., 2013). Likely to occur on any shallow ephemeral wetlands in central or southern NT.	8 (2018 [9])	**Unlikely in any AOI** No inland wetland systems in either AOI. Possibly occurs in extremely wet years (in AOI 3) but unlikely to be an important or regular site of occupation.
Tyto novaehollandiae kimberli	Masked Owl (northern)	NT: Vulnerable Nat.: Vulnerable	The Masked Owl is a large dark owl with substantial feathering on the legs. It has a loud call of shrieks and whistles.	Mainly in eucalypt tall open forests (esp. those dominated by *Eucalyptus miniata, E. tetrodonta* and *Corymbia nesophila*). Also, commonly roosts in monsoon rainforests and forages in more open vegetation types, including grasslands and "treeless plains" (Woinarski & Ward, 2012a).	0	**Unlikely in any AOI** No suitable habitat in any AOI, closest record is over 250 km away, with most records north of Katherine.
Threatened Mammals						
Dasyurus hallucatus	Northern Quoll	NT: Endangered; Nat.: Critically Endangered	A distinctive carnivorous marsupial the size of a small cat with white spots on a generally dark body (Woinarski & Hill, 2012).	Wide range of habitats, but the most suitable habitats appear to be rocky areas and it was once common in many eucalypt open forests (Woinarski & Hill, 2012). DoE (2020a) describes suitable habitat in the top end of the NT as rocky areas and tall open coastal eucalypt forests, with prime habitat being sandstone escarpment. DoE (2020a) also states that habitat in Kakadu includes open forest and woodlands on plains dominated by *Eucalyptus tetrodonta*, *E. miniata* and *E. tectifica*, and riparian areas with flowing water dominated by *Melaleuca viridiflora* and *Pandanus spiralis* (Oakwood 2000; cited in DoE (2020a). Critical habitat (relevant to the survey area), as defined by DoE (2016), includes "structurally diverse woodland or forest areas containing large diameter trees, termite mounds or hollow logs".	2 (date unknown)	**Unlikely in any AOI** No suitable habitat.
Dasycercus blythi	Brush-tailed Mulgara	NT: Vulnerable Nat.: Least Concern	Small carnivorous marsupial with sandy brown fur and a white belly. Broad tail which is usually red near the body tapering to black.	Occur in a range of vegetation types; however, principal habitat is sand dunes with mature hummock grasslands of spinifex, especially *Triodia basedowii* and *T. pungens* (Masters et al. 2003, Woolley 2008).	4 (2012)	**Possible in AOI of 4** Whilst the nearest record over 100 km south, there still may be extensive sandy *Triodia* grasslands and slight dunes within any of the AOI's 4 that could not be accessed.

[8] *11 of the 13 records do not have dates recorded.*

[9] *Near Renner Springs*

Scientific Name	Common Name	Conservation Status [7]	Description	Preferred Habitat	Records within 100 km (most recent year)	Likelihood of occurrence
Isoodon auratus	Golden Bandicoot	NT: Vulnerable Nat.: Least Concern	Small bandicoot to 600 g (Palmer *et al*., 2012)	Mainly in heathland and shrubland on sandstone or sandsheets and avoids vegetation with greater tree cover (Palmer *et al*., 2012).	1 (1968)	**Unlikely in any AOI** In the NT, it is currently known only from Marchinbar, Raragala and Guluwuru Islands (Palmer *et al*., 2012).
Macroderma gigas	Ghost Bat	NT: Near Threatened; Nat.: Vulnerable	The Ghost Bat is pale grey or brown on the back, lighter on the belly, and pale cream to brown on the wings. It has large ears and nose-leaf.	Often roost in a deep crack or cave during the day and perch in vegetation nearby during the night (Ward & Milne, 2016).	0	**Unlikely in any AOI** Closest relatively recent record over 300 km north. Extinct in arid areas with the last specimen from arid areas collected in 1961 (Butler, 1962).
Macrotis lagotis	Greater Bilby	NT: Vulnerable Nat.: Vulnerable	Large distinctive bandicoot whose fur is ash grey over most of the body, whereas on the belly it is pure white to cream. The snout is long and delicate, and the ears are large and rabbit-like	Found in sandy soils dominated by hummock grasslands covered predominantly by three species of spinifex, *Triodia basedowii*, *T. pungens* and *T. schinzii*. Low shrub overstory of *Acacia* and *Melaleuca* species and rocky outcrops, laterite rises, and low-lying drainage systems are usually present. Greater Bilbies in NT are considered nomadic with no sites holding permanent colonies (Southgate 1990b).	93 (2016 [10])	**Possible in any AOI's** The numerous recent records in the region in apparent similar habitat to that in any of the AOI's, suggest that the species possibly still occurs there. Extensive sandy soils with low shrub overstory are present, with the possibility of areas with little disturbance by cattle.
Notoryctes typhlops	Itjaritjari (Southern Marsupial Mole)	NT: Vulnerable Nat.: Not listed	Distinctive small mammal which lacks external ears and has vestigial eyes. Smooth fur coat which ranging from white to rich golden red. Short limbs and stumpy tail.	Found in the sandy deserts where they occupy dunes, sandy plains, and river flats. Underground sign is most common on well-vegetated dunes (Benshemesh, 2006).	2 (1982)	**Unlikely in any AOI** No suitable habitat of extensive soft sand dunes dominated by *Triodia spp*. appears to exist in any AOI.
Lagorchestes hirsutus	Mala	NT: Extinct Nat.: Endangered	Small wallaby with long shaggy rufous/brown hair on its back and sides. The fur on its belly and chest is pale fawn grading to white.	Dependent upon dense spinifex habitat and small concentrated feeding areas on saline flats adjacent to watercourses and drainage depressions (Lundie-Jenkins 1993; Lundie- Jenkins et al. 1993)	3	**Unlikely in any AOI** Has been extinct in the NT since 1992, due to change in vegetation complexity and introduced feral predators.
Trichosurus vulpecula vulpecula	Common Brushtail Possum (central and south-eastern)	NT: Endangered Nat.: Not listed	A medium-sized mammal (body mass of 1.3-3 kg) about the size of a domestic cat (Pavey & Ward, 2012)	Riverine habitat that is close to rocky outcrops and moist gullies within the ranges or rocky slopes (Kerle et al. 1992; cited in Pavey & Ward, 2012).	2 (1968)	**Unlikely in any AOI** It is currently known only from isolated populations in the southern NT (with the stronghold being West MacDonnell National Park) (Pavey & Ward, 2012). It previously occurred in the Tanami and Great Sandy Deserts across to the Western Australian border at Lake Mackay and Kintore (Pavey & Ward, 2012).
Threatened Reptiles						
Acanthopsis hawkei	Plains Death Adder	NT: Vulnerable Nat.: Vulnerable	The body is short (grow to 600 mm in total length), stout and banded, the head triangular and distinct from the neck, and the tail is slender and tipped with a spine (used to lure prey within striking distance) (Ward & Phillips, 2012).	It is known to occur on the cracking soils on floodplains of the Adelaide, Mary and Alligator Rivers, the cracking black soils of the Barkly Tableland on the NT/QLD border, the Mitchell Grass Downs of western QLD and likely on floodplains and cracking soil plains across mainland northern Australia (Ward & Phillips, 2012).	1 (date not recorded)	**Unlikely in any AOI** This species occurs on the cracking soils around Lake Woods Conservation Reserve, but there is not cracking soil in any AOI's. No death adder species are recorded in sandy habitat in the central northern deserts, but it is unlikely that *A. hawkei* would push into this habitat.
Varanus panoptes	Yellow-spotted Monitor	NT: Vulnerable Nat.: Not listed	Large dark brown monitor with large black and small yellow spots with a pale belly. Last quarter of the tail is pale with narrow dark bands.	Occupies a variety of habitats, including coastal beaches, floodplains, grasslands and woodlands (Ward *et al*, 2012).	8 (2017)	**Possible in AOI 2** Possibly occurs throughout the sparse woodlands on the eastern side of AOI 2. Although, this would be unlikely to constitute important habitat from a regional or Territory-wide perspective.

[10] *Record is from 30 km north of Renner Springs, submitted by a truck driver. Before this, there are numerous records from 2011.*

Appendix B: EPBC Act Protected Matters Search Tool Report

Australian Government
Department of the Environment and Energy

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.

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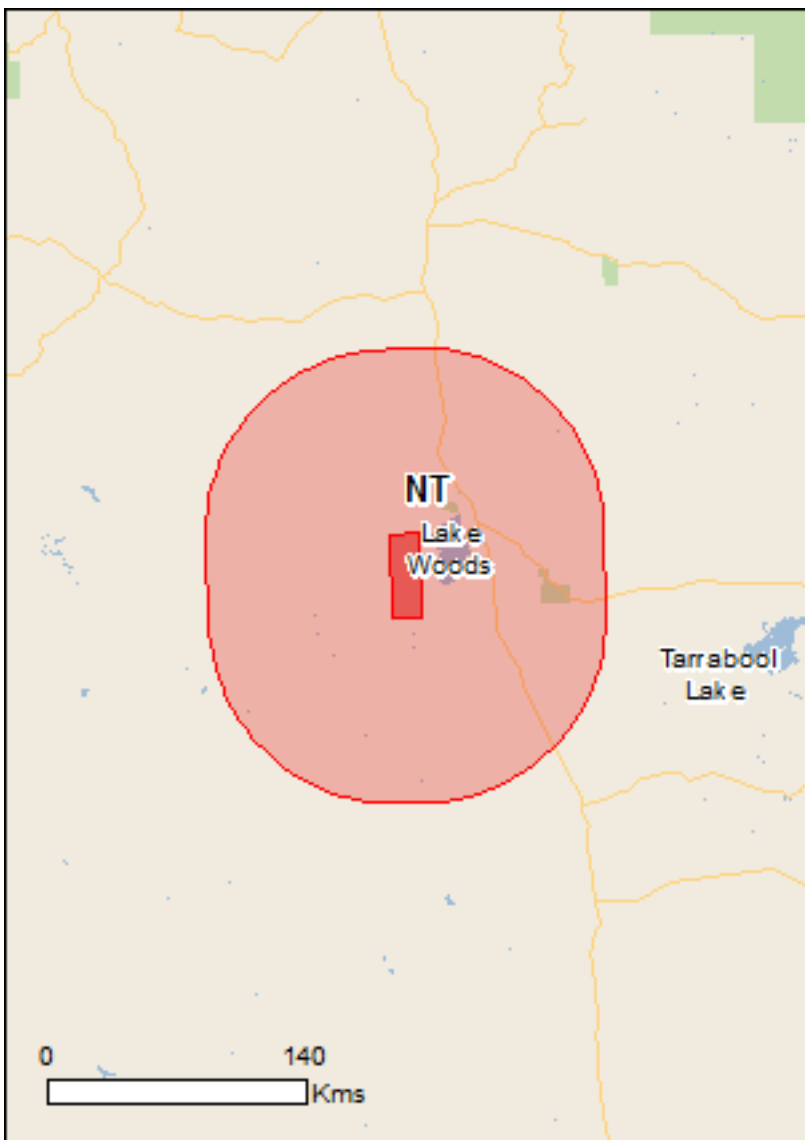

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Coordinates

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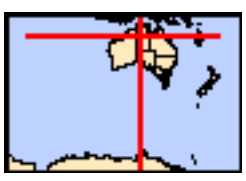

Summary

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:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	11
Listed Migratory Species:	14

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:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	20
Whales and Other Cetaceans:	None
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:	3
Regional Forest Agreements:	None
Invasive Species:	17
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Erythrura gouldiae Gouldian Finch [413]	Endangered	Species or species habitat known to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Polytelis alexandrae Princess Parrot, Alexandra's Parrot [758]	Vulnerable	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Tyto novaehollandiae kimberli Masked Owl (northern) [26048]	Vulnerable	Species or species habitat may occur within area
Mammals		
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat may occur within area
Macrotis lagotis Greater Bilby [282]	Vulnerable	Species or species habitat known to occur within area
Reptiles		
Acanthophis hawkei Plains Death Adder [83821]	Vulnerable	Species or species habitat known to 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

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely 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
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may 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
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -

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		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known 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 likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat known 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 known 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

Name	Threatened	Type of Presence
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Frew Ponds	NT
Lake Woods	NT
Longreach Waterhole Protected Area	NT

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 Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat may occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Camelus dromedarius Dromedary, Camel [7]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Plants		
Acacia nilotica subsp. indica Prickly Acacia [6196]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area
Jatropha gossypifolia Cotton-leaved Physic-Nut, Bellyache Bush, Cotton-leaf Physic Nut, Cotton-leaf Jatropha, Black Physic Nut [7507]		Species or species habitat likely to occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
Prosopis spp. Mesquite, Algaroba [68407]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area
Vachellia nilotica Prickly Acacia, Blackthorn, Prickly Mimosa, Black Piquant, Babul [84351]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area

Nationally Important Wetlands	[Resource Information]
Name	State
Lake Woods	NT

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

-17.749901 133.199743,-17.735513 133.346685,-18.141844 133.356298,-18.140538 133.217595,-17.749901 133.199743

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 – OHTL Easement Threatened Species Report

THREATENED SPECIES ASSESSMENT REPORT

Part of Sections 1905, 1816, 1820, 1821, 1658 and 1605, Wickham, NT

Prepared for:

Coffey Services Australia Pty Ltd
L2/80 Mitchell St
Darwin City NT 0800

20 March 2020

Document Information and Control

Version	Author, Position, Business / Company	Date	Review / Approver, Position, Company	Date
0.1 (Draft)	M. Proos, Principal Environmental Consultant, Connect Environmental	1/3/20	J. Young, Associate Environmental Consultant, Coffey Mark Branson, Sun Cable	16/3/20
1.0 (Final)		20/3/20	-	-

Cover photos: Mixed species mid open woodland with *Melaleuca leucadendra* (Weeping Paperbark) (photo taken from the survey area for this project); *Typhonium praetermissum* (to be confirmed) detected in the survey area.

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Appendix C: Potentially Suitable Habitat for Other Threatened Species

1 Introduction

1.1 Purpose and Objectives

Connect Environmental was commissioned by Coffey Services Australia Pty Ltd (Coffey) to conduct an initial assessment of threatened species for a linear parcel of land in which an overhead power transmission line is proposed, known as the 'survey area'. It measures approximately 7 km long and up to 400 m wide. Its northern most point is immediately north of Channel Island Road, Wickham and it traverses slightly inland from the margins of the Darwin Harbour mangrove communities to about 1.5 km north of Middle Arm Road (see **Figure 1**). The total area measures about 134 ha. Coffey is currently preparing a Notice of Intent (NOI) on behalf of the proponent (Sun Cable) for the development. The results of this investigation will be included in the NOI.

An initial desktop assessment of aerial imagery, land unit and vegetation mapping, local threatened species records from the NT Flora and Fauna Atlases, the Australian Government's Protected Matters Search Tool and species distribution modelling revealed the potential presence of two threatened flora species (*Typhonium praetermissum* and *Cycas armstongii*) within the survey area. Given that the most suitable timing to survey for *T. praetermissum* is January to March, it was decided that surveys for these two species would be conducted immediately in conjunction with habitat assessments for other potentially occurring threatened species. Both occur in similar habitats.

The objectives of the assessment were to:

- Determine the presence or absence of *Typhonium praetermissum* and *Cycas armstrongii* within the survey area
- If present, determine their abundance and distribution
- Identify other threatened species that may require further consideration, and those that are unlikely to occur within the survey area
- Delineate suitable habitat for those threatened species that require further assessment
- Outline a survey approach for these species (noting that this will be further subject to the scale and extent of the proposed development, once known).

1.2 Assumption of Species Identity

This report has been prepared on the assumption that the *Typhonium* species detected within the survey area is *Typhonium praetermissum*, which is listed as Vulnerable under the NT's *Territory Parks and Wildlife Conservation Act*. It is not listed under the Australian Government's *Environment Protection and Biodiversity Conservation Act*.

Samples of individuals located were taken and sent for molecular analysis to confirm their species identity. As of the date of this report, the results of these analyses have not been received by Connect Environmental. Results are expected in late March 2020. In lieu of this, based on the habitat characteristics at the location of the individuals observed, it is assumed that they are *Typhonium praetermissum*. However, DENR has indicated that there may be a similar species which occurs in habitats typically associated with *T. praetermissum* though slightly wetter. As such, this report has been prepared on that basis however may be subject to change upon confirmation of the species identity.

1.3 Approach

The assessment was conducted by:

1. Assessing the likelihood of occurrence of threatened species, which included analysing vegetation and land unit mapping, aerial imagery, species records from the NT Flora and Fauna Atlases and results of a search of the Australian Government's Protected Matters Search Tool
2. Survey for *Typhonium praetermissum* and *Cycas armstrongii*
3. Simultaneous to the field survey for the threatened flora, assess habitats within the survey area for other potentially occurring threatened species
4. Report on the results.

Full details of the methods used are provided in the relevant sections of this report.

The surveys were completed by Mihkel Proos and Nick Volpe. Mihkel has 18 years' experience in the environmental field, including nearly ten in the NT. He has a background in terrestrial ecology and has worked for NT and federal governments in science and regulatory positions. Nick is a graduate ecologist with experience in Victoria and the NT.

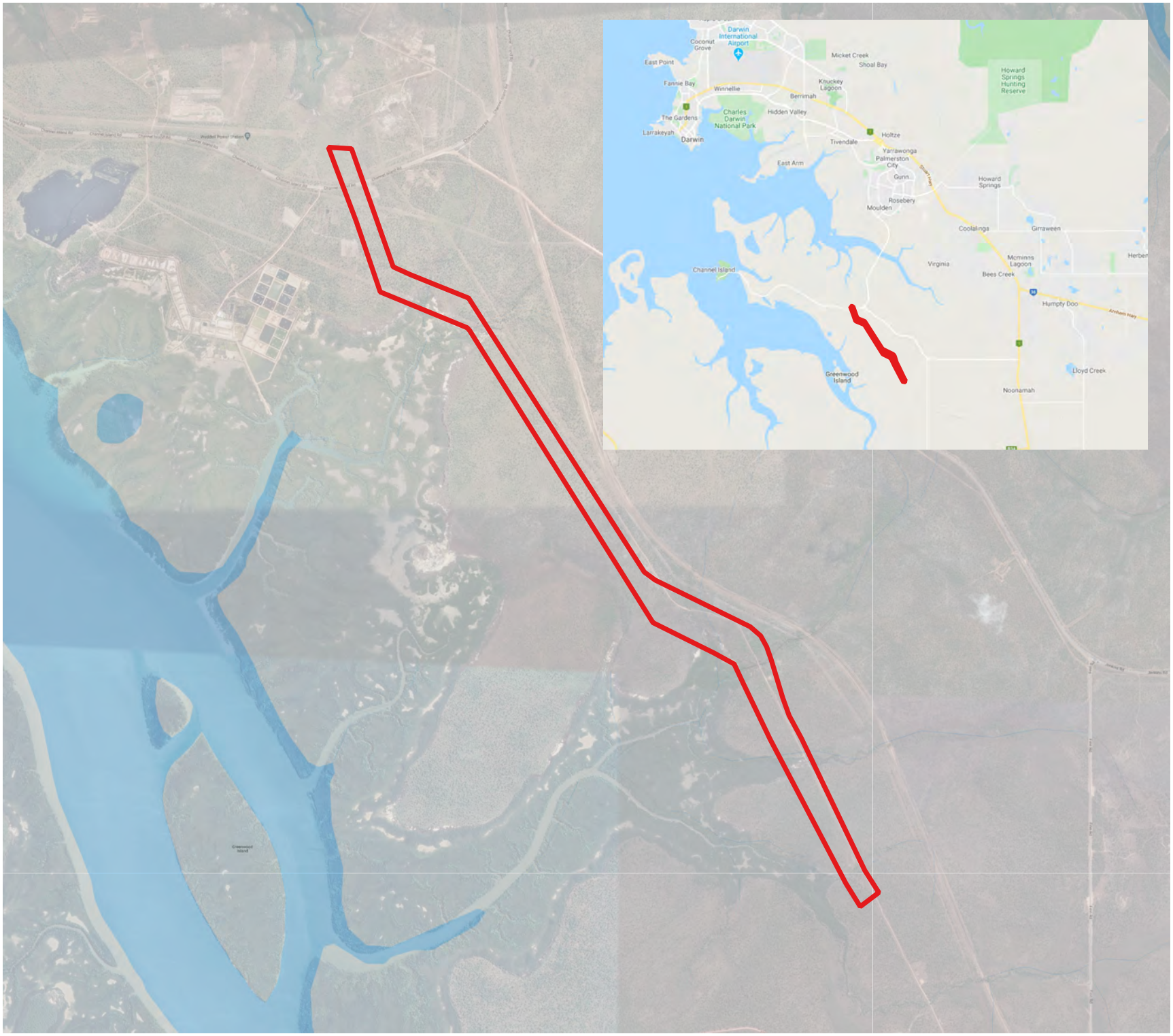

FIGURE 1
-
Location of the utilities corridor

Client: Coffey
Date: 24 February 2020

Key

Utilities corridor

Background - Google Satellite (image dated 1/2006)

N

0 0.75 1.5 km

1:40000

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2 Environmental Description

2.1 Climate

The climate in the Wickham area is highly seasonal and dominated by an extreme 'wet' season from December to April and a 'dry' season from May to November. During the wet season, soils are saturated and groundwater recharge fills local aquifers. Vegetation growth is substantial and streams flow. During the dry season, local streams cease to flow, and irrigation of landscaped areas is required. The average annual rainfall at a nearby Bureau of Meteorology (BOM) site (Channel Island) is approximately 1,620 mm per year (BOM, 2020).

2.2 Vegetation

Vegetation communities along the survey area have been previously mapped on at least three occasions:

1. Land unit mapping by Fogarty *et al*. in 1984 at a scale of 1:25,000
2. Brock in 1995 at a scale of 1:100,000
3. Cuff and Brocklehurst in 2011 at a scale of 1:10,000.

Land units across the survey area are mapped and described in the next section. Land units provide a good starting point for mapping and assessing vegetation communities in an area, which are then used to conduct impact assessments.

The vegetation mapping produced by Cuff and Brocklehurst (2011) provides fine scale (1:10,000) distribution and definition of communities throughout most of the survey area. Whilst not reproduced here, it has been utilised extensively in determining and/or verifying the vegetation communities within the survey area.

By utilising the results of this desktop literature review and the subsequent biodiversity surveys, updated vegetation mapping has been produced at a scale of 1:10,000, as shown and described in **Section 5.1**.

2.3 Land Units

Land units are areas that have similar bio-physical attributes including landform, soil and vegetation. They were originally mapped to describe the capability of each unit to support a range of land uses such as urban subdivision, farming, pasture improvement and resource extraction.

The land units mapped in the survey area by Fogarty *et al*. (1984) are summarised in **Table 2** and shown in **Figure 2** (north section), **Figure 3** (central section) and **Figure 4** (south section). The land unit mapping is used to determine the land characteristics and habitats in the survey area, and in turn aiding in determining the potential for threatened species to exist.

2.4 Fire History

The number of fires that have occurred within the survey area between 2000 and 2018 are shown in **Figure** 5 (north section), **Figure 6** (central section) and **Figure 7** (south section) (NAFI, 2019). The information was obtained from the North Australian Fire Information (NAFI) website. It helps to inform the level of disturbance across the study area and subsequent assessment of the likelihood of occurrence of threatened species. Changed fire regimes in the top end have been implicated in several species' declines over the last 50 to 100 years. High frequency and intensity fires have been shown to reduce vegetation diversity and complexity in all strata.

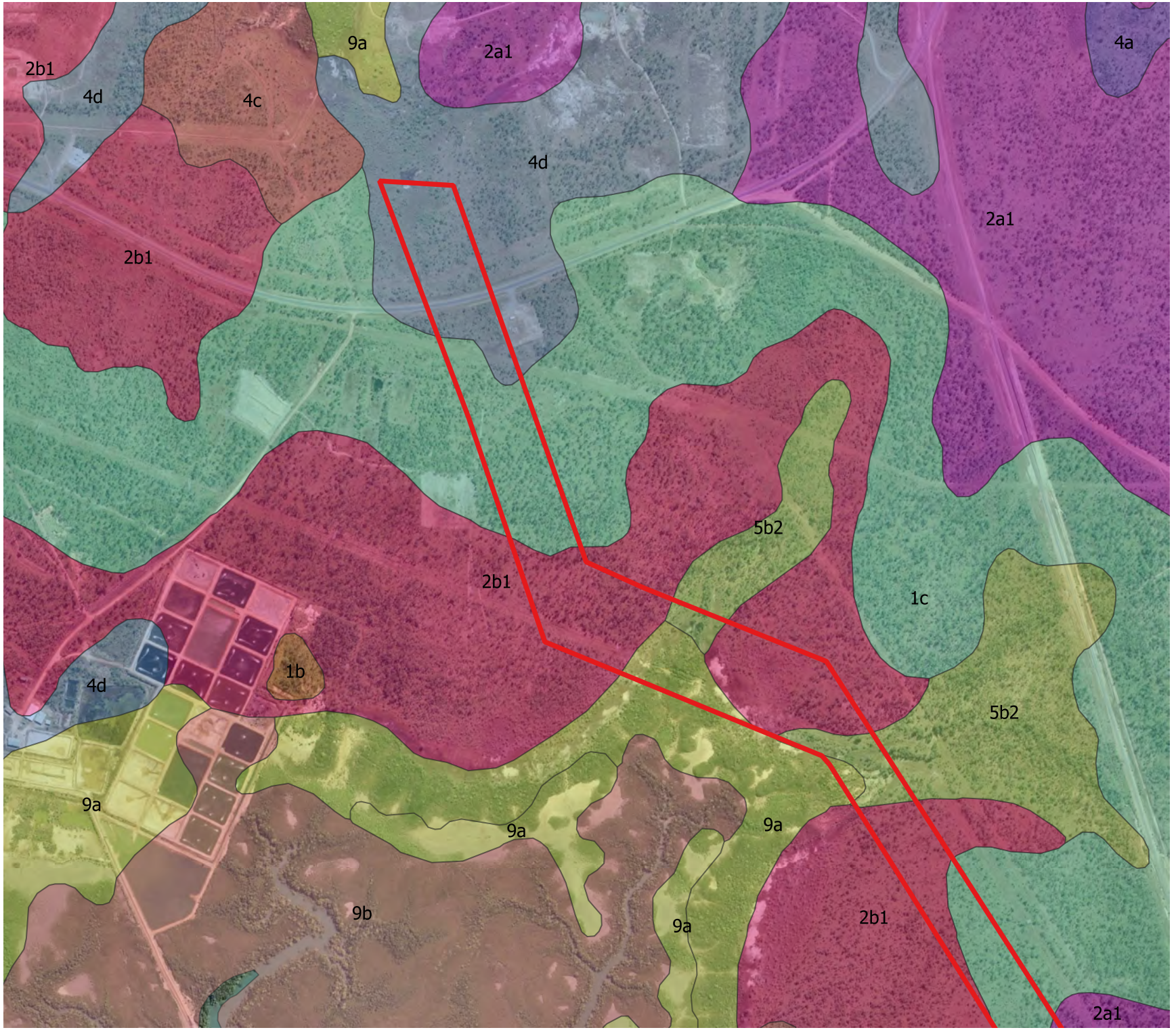


FIGURE 2
-
Land units (Fogarty et al., 1984) - north section

Client: Coffey
Date: 24 February 2020

Key

Survey area

Land units (numbered)

Background - Google Satellite (image dated 1/2006)

N

0 150 300 450 m

1:12500

CRS: GDA94; Page size: A4

CONNECT environmental

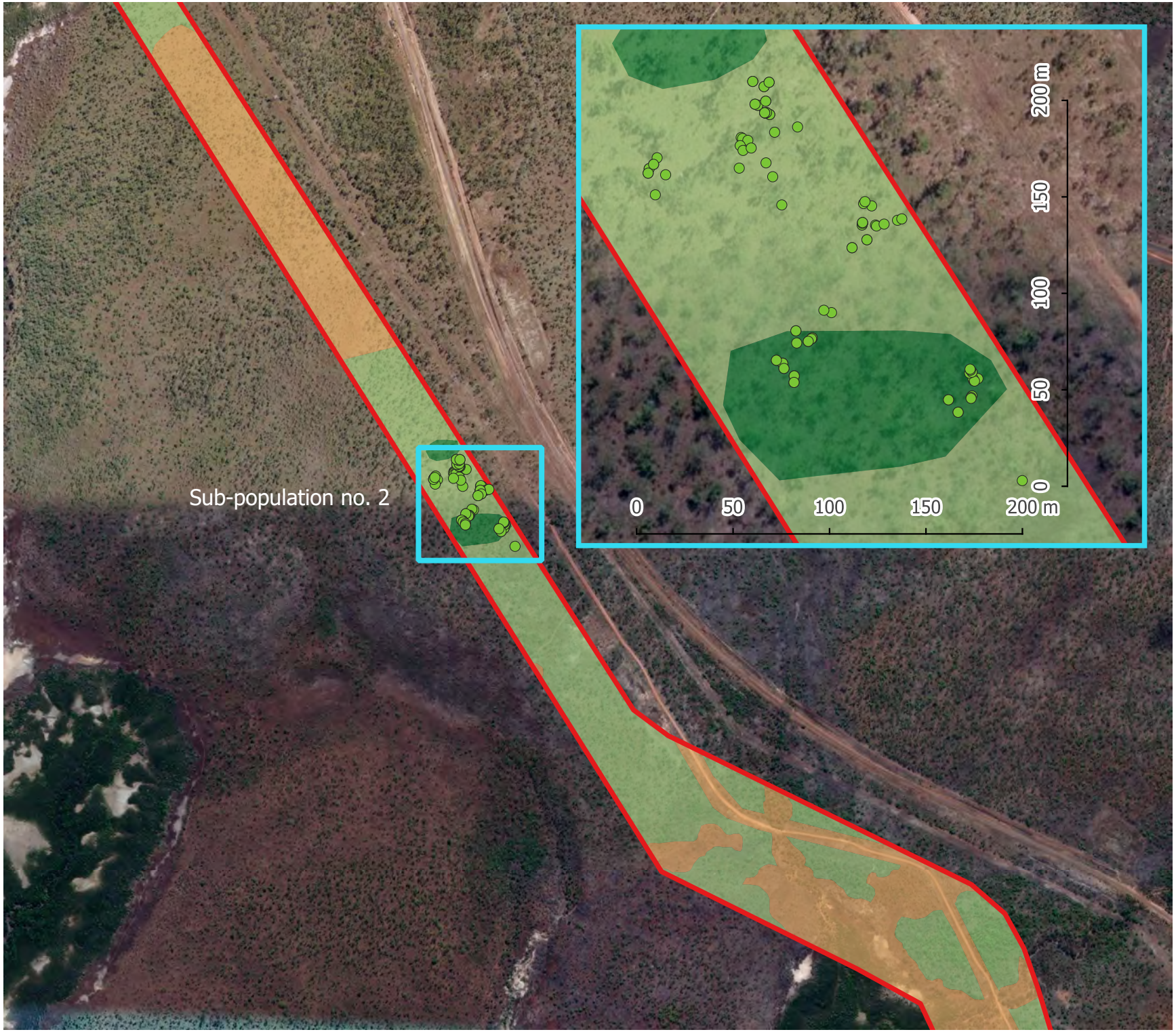


FIGURE 3
-
Cycas armstrongii density and Typhonium praetermissum detections- central section

Client: Coffey
Date: 24 February 2020

Key

- Survey area
- No cycads
- Low density cycads (1-129 adult stems / ha)
- Moderate density cycads (130-399 adult stems / ha)
- Typhonium praetermissum individuals (sub-poppulation no. 2)

Background - Google Satellite (image dated 1/2006)

N

0 150 300 450 m

1:12500

CRS: GDA94; Page size: A4

CONNECT environmental

FIGURE 4
-
Armstrong's Cycad density - south section

Client: Coffey
Date: 24 February 2020

Key

- Survey area
- No cycads
- Low density cycads (1-129 adult stems / ha)
- Moderate density cycads (130-399 adult stems / ha)

Background - Google Satellite (image dated 1/2006)

0 150 300 450 m

1:12500

CRS: GDA94; Page size: A4

CONNECT environmental

Table 1 Summary of the land units of the Elizabeth, Darwin and Blackmore Rivers (source: Fogarty et al., 1984)

	Landform	Soils	Drainage[1]	Slope	Surface Features	Vegetation[2]	Equivalent[3] Previous Designation
1a	Flat hillcrests	Stony lithosols, shallow	VR	<3%	Stone, o/c[4] extensive	W-OW *E. miniata, E. bleeseri, E. tectifica, E. dicromophloia, E. tetrodonta*	-
1b	Steeply sloping ridge terrain	Stony lithosols, shallow	VR	10-40%	Stone, o/c extensive		-
1c	Low scarps and short steep slopes	Gravelly lithosols, shallow	VR	8-20%	o/c extensive		4a
2a1	Low rounded hills	Gravelly lithosols, shallow	R	<4%	Extensive gravel	W-OW *E. miniata, E. tectifica, E. bleeseri, E. foelscheana*	3c
2a2	Low rounded hills	Gravelly lithosols, shallow	R	2-5%	Extensive gravel	Tall dense shrubland or low open forest	3c
2b1	Gentle sideslopes	Gravelly yellow earths, shallow	R	2-5%	Extensive gravel	W-OW as for 2a1	3b, 3c
2b2	Gentle sideslopes	Lithosols	R	2-5%	Lateritic o/c common	W-OW as for 2a1	3c
3a	Flat to gently undulating upland surface	Deep red massive earths, less than 10% gravel	M	<2%	Minor/no gravel	OF *E. tetrodonta, E. miniata*	1a
3b	" " " " " "	Gravelly massive earths, mod. deep	M	<2.5%	Common ferruginous gravel	W *E. miniata, E. tetrodonta*	1b1
3c	" " " " " "	Very gravelly massive earths, shallow-mod. deep	M	1-3%	Extensive ironstone gravel	W-WO *E. miniata, E. bleeseri*	1b2
3d	" " " " " "	Lithosols	M	1-3%	Ironstone gravel pavement	OW *E. miniata, E. bleeseri*	1c
3e	" " " " " "	Deep mottled yellow earths	S	<2%	No gravel	OF-W *E. tetrodonta, E. papuana*, Ironwood	1d
4a	Gentle lower slopes	Mottled grey massive earths	S	.5-1.5%	Firm	OW of *E. polycarpa, Lophostemon*, dense understory of Grevillea	5a, 6a
4b	" " "	Mottled yellow duplex soils	S	.5-1.5%	Hardset	OW of *E. polycarpa, E. papuana, Lophostemon*	-
4c	" " "	Mottled yellow earths	S	.5-1.5%	Hardset	OF-W *E. tetrodonta, E. papuana, Lophostemon*	5b 5a
4d	" " "	Shallow gravelly lithosols and yellow massive earths	S	.5-1.5%	Common gravel	Grassland	-
5a, 5b1	Narrow alluvial plains and Drainage lines	Yellow mottled duplex soils	S	<1%	Hardset	Grassland; patches of Melaleuca, *E. polycarpa*	6b, 6c
		Mottled grey earths, yellow massive earths	S	<1.5%	Firm	TS, W, OF, Grevillea, Lophostemon, Pandanus, Melaleuca with *E. polycarpa, E. papuana*	5b, 6b
5b2	Drainage lines, incised	Mottled grey massive earth	S	<.5%	Hardset	OW, S, *Melaleuca, Eugenia, E. polycarpa*	-
6a1	Broad lowland plains	Mottled yellow duplex soils	V	<.5%	Hardset	Grassland, pockets of Melaleuca S.	6c
6a2	" " "	" " " "	V		Hardset	OW-W, *E. polycarpa, E. papuana* Melaleuca	6c
6b	Broad drainage floors	Siliceous and earthy sands	S	<1.5%	Firm	TS-OW of Grevillea, Melaleuca	6b
6c	Lowland plains	Grey clays	V	<.5%	Cracked, hard	Grassland, large patches of Terminalia	-
6d	Lowland plains	Pedal mottled yellow duplex soils	S	<.5%	Hardset	Grassland, minor OW	-
6e	Lowland plains	Gravelly yellow massive earths	S	<.5%	Common gravel	*E. polycarpa* OW, Melaleuca patches	-
7a	Fringes and levees of major channels	Alluvial massive earths, deep	M		Hardset	W-OF *E. papuana, E. polycarpa, E. miniata*, Acacia, Pandanus	-
8a	Upland depressions and floodways	Siliceous and earthy sands	S	.5-1.5%	Loose	Grassland, minor W of Melaleuca, Lophostemon	2a1
8b	Swamp depressions	Friable mottled duplex soils	S	<.5%	Firm	OF-CF Melaleuca	2a2
8c	Billabongs and dry season fringe	Not sampled	P	-		Herbland as dry season progresses	2a3
9a	Estuarine fringe	Saline muds and clays	P	-	Firm	Open salt flats, samphire	8a1
9b	" "	" " " "	P	-	Soft	Mangrove, Low Closed Forest	8a2
9c	Dunes and beach ridges	Calcareous sands	R	<8%	Loose	Grassland - Low Forest	8b2

[1] VR - Very Rapid, R - Rapid, M - Moderately Rapid, S - Slow, V - Very Slow, P - Ponded.

[2] CF - Closed Forest, OF - Open Forest, W - Woodland, OW - Open Woodland, S - Shrubland, TS - Tall Shrubland, G - Grassland

[3] Fogarty *et al.* (1979) Land Resources of the Darwin Area.

[4] o/c - outcrop.

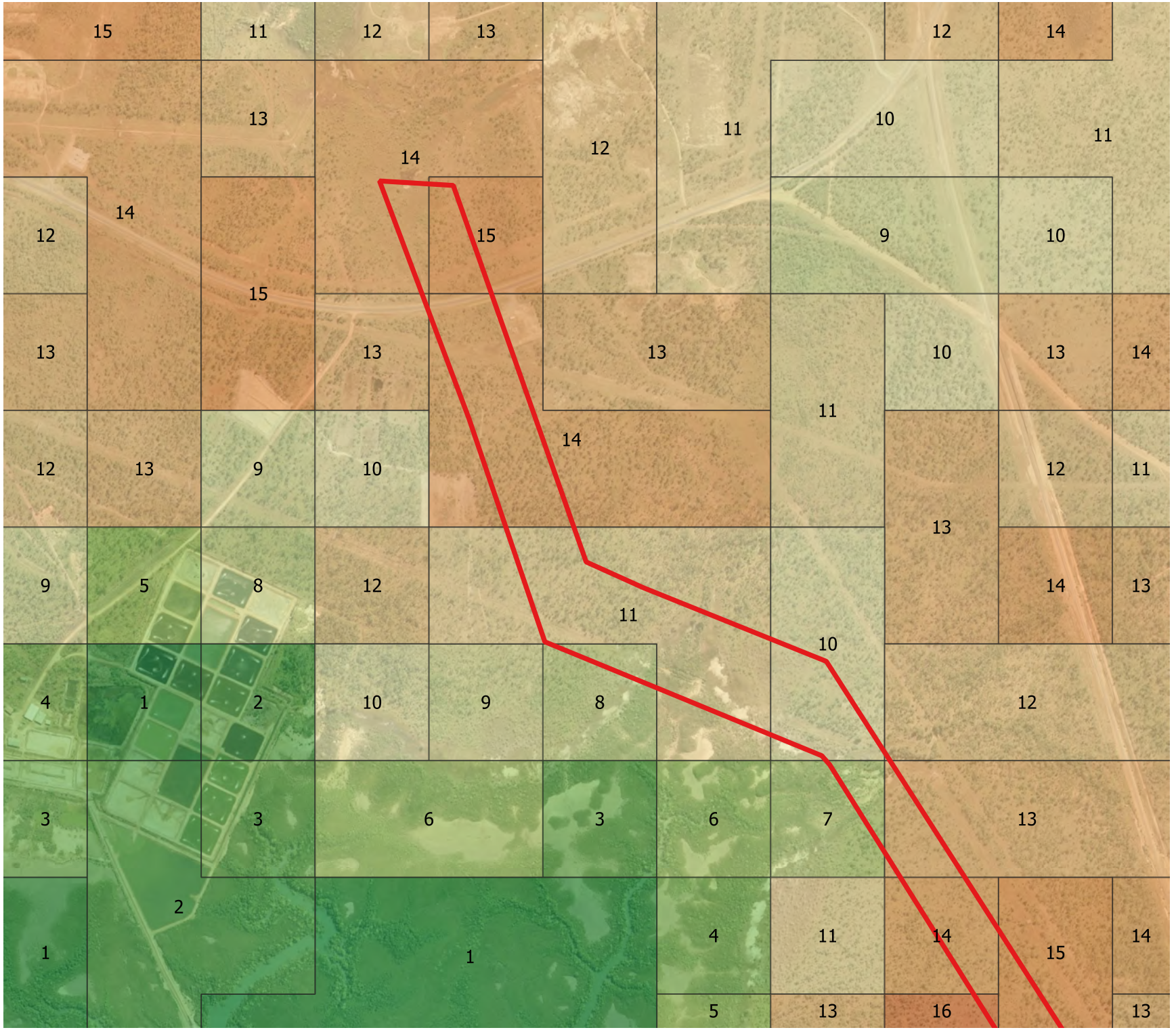


FIGURE 5
-
Fire frequency from 2000 to 2018 - north section

Client: Coffey
Date: 24 February 2020

Key

Survey area

Fire frequency (numbers are the number of years burnt from 2000 to 2018; source NAFI, 2019)

Background - Google Satellite (image dated 1/2006)

N

0 150 300 450 m

1:12500

CRS: GDA94; Page size: A4

CONNECT environmental

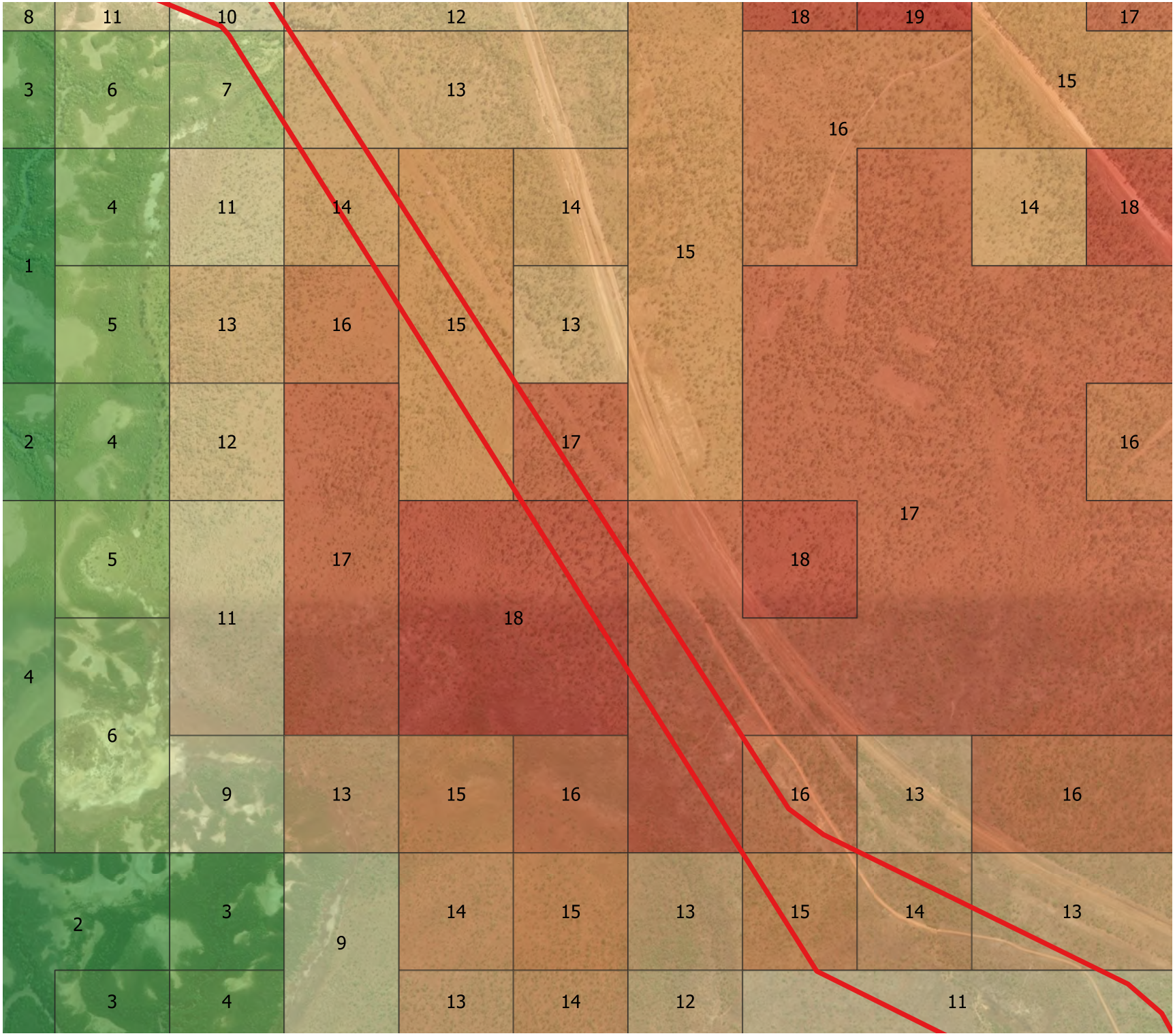


FIGURE 6
-
Fire frequency from 2000 to 2018 - central section

Client: Coffey
Date: 24 February 2020

Key

Survey area

Background - Google Satellite (image dated 1/2006)

Fire frequency (numbers are the number of years burnt from 2000to 2018; source NAFI, 2019)

N

0 250 500 m

1:12500

CRS: GDA94; Page size: A4

CONNECT environmental

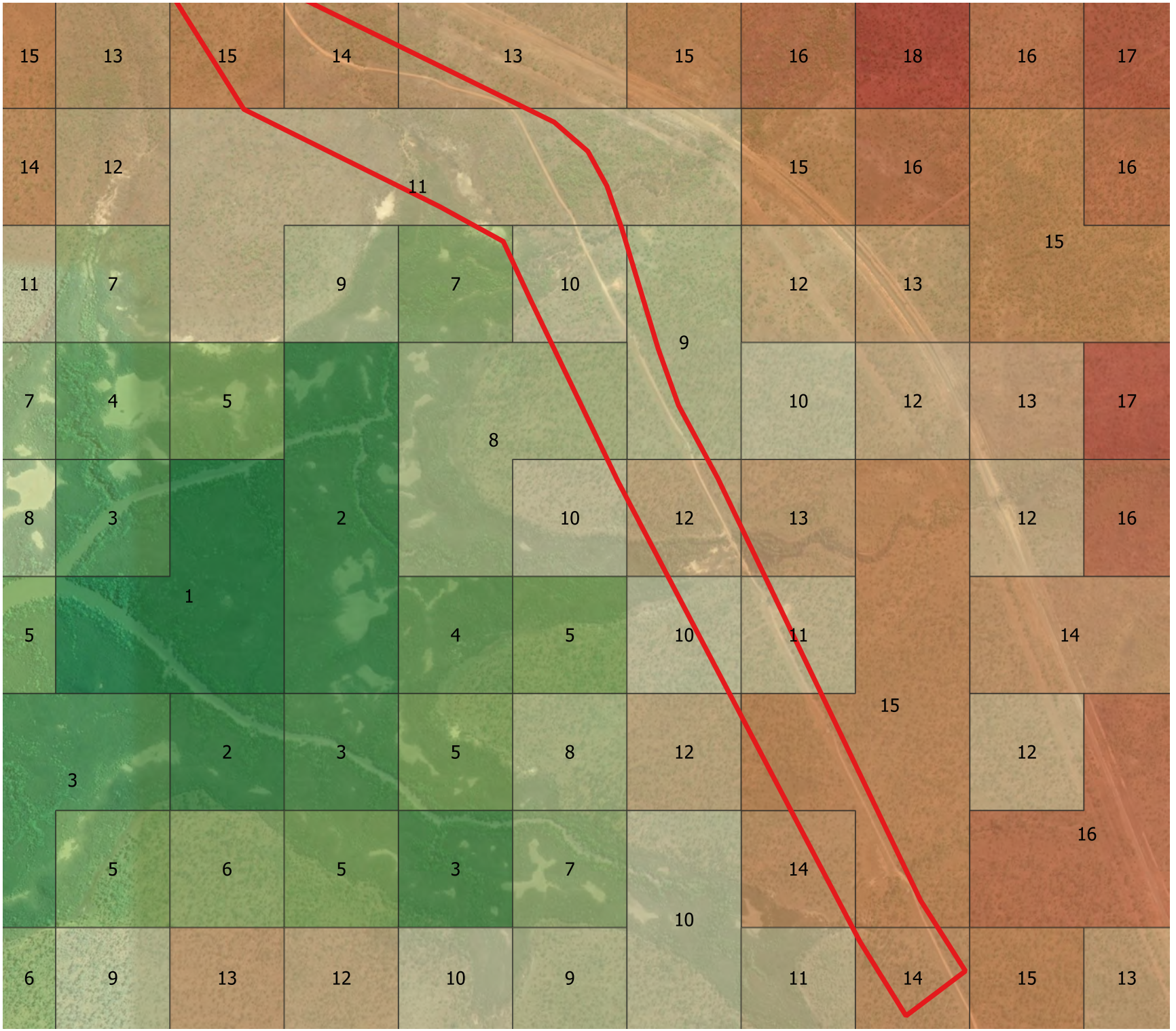


FIGURE 7
-
Fire frequency from 2000 to 2018 - south section

Client: Coffey
Date: 24 February 2020

Key

Survey area

Background - Google Satellite (image dated 1/2006)

Fire frequency (numbers are the number of years burnt from 2000to 2018; source NAFI, 2019)

N

0 250 500 m

1:12500

CRS: GDA94; Page size: A4

CONNECT environmental

3 Likelihood of Occurrence of Threatened Species

3.1 Procedure

An assessment of the likelihood of occurrence of threatened species was conducted by:

1. Mapping and analysing relevant land information including land unit mapping, vegetation communities, aerial imagery and fire history. The following datasets were used:
    a. Vegetation mapping:
        i. Remnant Vegetation Survey, Darwin to Palmerston Region (Brock, 1995)
        ii. Vegetation Mapping and Floristic Survey of the Proposed New Township of Weddell, Northern Territory (Cuff & Brocklehurst, 2011).
    b. Land units: Land Resources of the Elizabeth, Darwin and Blackmore Rivers - Greater Darwin Area, Northern Territory (Fogarty *et al.*, 1984).
2. Interrogating relevant information sources to obtain a list of potentially occurring threatened species for the area (including an appropriate geographic buffer (5 km)), including:
    a. The NT Government's 'NR Maps'
    b. The Australian Government's EPBC Act 'Protected Matters Search Tool' (**Appendix B**)
    c. Other relevant government information sources such as Site of Conservation Significance (SOCS) fact sheets
    d. Any publicly available environmental assessment documentation for nearby projects.
3. Describing each species' conservation status, habitat preferences and number of records within 5 km of the target site.
4. Analysing each species' habitat preferences and number of local and regional records (as an indicator of the species' historic presence) against the vegetation mapping, land unit mapping, aerial imagery or fire history to determine each species' likelihood of occurrence.
5. Conducting a site visit – the site was visited from 13 to 15 February 2020 to conduct surveys for *Typhonium praetermissum* and *Cycas armstrongii* and assess habitats against suitable habitat characteristics for other threatened species.
6. Categorise each species into the following likelihood of occurrence classes:
    a. **Unlikely**: species or ecological community is not expected to occur based on the lack of suitable habitat and/or local records
    b. **Possible**: species or ecological community may occur based on the occasional or potential presence of suitable habitat however it is not obvious
    c. **Likely**: species or ecological community is expected to occur based on the presence of suitable habitat and number of local records

d. **Confirmed**: species known to occur based on previous nearby projects, a site visit, online databases, local knowledge or consultation with relevant DENR staff.

3.2 Attributes Assessed

All threatened flora and fauna species recorded within 5 km of the survey area and contained within the EPBC Act Protected Matters Search Tool (**Appendix B**) were included in this likelihood of occurrence assessment. The combined list contained eight species of threatened flora and 32 threatened fauna. This included threatened migratory shorebird species.

A buffer of 5 km was considered appropriate for this project because it was expected to satisfactorily characterise local and regional abundance and distributions of threatened species and adequately capture the potential for these species to exist in the survey area. Where relevant, flora and fauna records further afield were analysed to aid in the significance of any detected species or potential impacts.

Threatened ecological communities were included in the search.

3.3 Results

The results of the likelihood of occurrence assessments are provided in full in **Appendix A** with a summary shown in **Table 2**.

Table 2 Results of likelihood of occurrence assessment

Species	Common name	Likelihood of occurring
Threatened Flora		
Cycas armstrongii	Darwin Cycad	Confirmed[1]
Typhonium praetermissum	*Typhonium praetermissum*	
Atalaya brevialata	Atalaya	Possible
Cleome insolata	Spider Flower	
Stylidium ensatum	Trigger Plant	
Typhonium taylori	*Typhonium taylori*	
Utricularia dunstaniae	Bladderwort	
Helicteres macrothix	*Helicteres macrothix*	Unlikely
Threatened Fauna		
Varanus mertensi	Merten's Water Monitor	Likely
Uperoleia daviesae	Howard River Toadlet	
Erythrotriorchis radiatus	Red Goshawk	Possible
Erythrura gouldiae	Gouldian Finch	
Antechinus bellus	Fawn Antechinus	

[1] *Typhonium samples were collected to confirm their species. Currently assumed to be T. praetermissum based on advice from DENR.*

Species	Common name	Likelihood of occurring
Dasyurus hallucatus	Northern Quoll	Possible
Geophaps smithii	Partridge Pigeon	
Mesembriomys gouldii gouldii	Black-footed Tree-rat	
Rostralata australis	Australian Painted Snipe	
Saccolaimus saccolaimus	Bare-rumped Sheath-tailed Bat	
Tyto novaehollandiae kimberli	Masked Owl	
Varanus mitchelli	Mitchells Water Monitor	
Varanus panoptes	Yellow-spotted Monitor	
Xeromys myoides	Water Mouse	
Acanthopsis hawkei	Plains Death Adder	Unlikely
Conilurus penicillatus	Brush-tailed Rabbit-rat	
Macroderma gigas	Ghost Bat	
Petrogale concinna canescens	Nabarlek	
Phascogale pirata	Northern Brush-tailed Phascogale	
Rattus tunneyi	Pale Field-rat	
Threatened and Migratory Birds[2]		
Calidris canutus	Red Knot	Possible
Calidris ferruginea	Curlew Sandpiper	
Calidris tenuirostris	Great Knot	
Charadrius leschenaultii	Greater Sand Plover	
Charadrius mongolus	Lesser Sand Plover	
Limosa lapponica baueri	Bar-tailed Godwit (baueri)	
Limosa lapponica menzbieri	Bar-tailed Godwit (menzbieri)	
Numesius madagascariensis	Eastern Curlew	
Threatened Sharks[3]		
Glyphis garricki	Northern River Shark	Possible
Pristis pristis	Largetooth Sawfish	
Pristis zijsron	Green Sawfish	
Pristis clavata	Dwarf Sawfish	Unlikely

[2] *Those migratory birds which are listed as threatened under the EPBC Act or TPWC Act, however it is applicable to all migratory shorebirds under the EPBC Act (except for Latham's Snipe)*

[3] *Not including the Great White Shark (Carcharodon carcharias) or Whale Shark (Rhincodon typus) as there is no chance of their occurrence within the survey area*

4 Survey Methods

4.1 Pre-survey Checks

Immediately prior to the surveys, a known population of *Typhonium praetermissum* was visited to determine that the species was identifiable (i.e. leaves had emerged) in the region. Individuals of the species at Middle Arm had also been recently detected by DENR (Dave Rhind, pers. comm.).

4.2 Vegetation

Existing land unit and vegetation mapping (Brock, 1995; Fogarty *et al*., 1985; Cuff & Brocklehurst, 2011), identified during the desktop assessment (**Section 2**), was validated by conducting a series of vegetation check sites. It should be recognised that Cuff and Brocklehurst's vegetation mapping, which is at a scale of 1:10,000, covered most of the survey area, with approximately 2 km at the north end not mapped. The verification of vegetation across the survey area was comprised of determining the most dominant flora species for each stratum and (at most sites) estimating cover and height values. The location of each point was recorded with a field tablet with GPS capabilities. Approximately 30 check sites were completed, which also included notes on habitat values for threatened flora and fauna. It was observed that the mapping produced by Cuff and Brocklehurst (2011) was quite accurate and hence it was determined that revision of vegetation communities across the survey area was not required. Photos were regularly taken.

The vegetation community verification was conducted in conjunction with the surveys for *Typhonium praetermissum* and *Cycas armstongii* from 13 to 15 February 2020. It was conducted to inform habitat attributes and quality for potentially occurring threatened species. No comprehensive floristic analysis and inventory was undertaken.

4.3 Cycas armstongii

Cycas armstrongii is a cycad that is endemic to the NT. It grows up to 6 m tall mainly in open grassy woodland on yellow and red earths, limited by drainage. The female plants grow clusters of seeds around the trunk while the male plants grow large cones.

Prime cycad habitat occurs in open woodlands with deep loamy soils (Kerrigan *et al.*, 2006). It is predicted that a fire frequency in excess of about one in five years will result in long-term population declines (Kerrigan *et al.*, 2006).

For this study, the preliminary analysis of existing vegetation mapping indicated that cycads were likely to be:

- A relatively common component of the mid-layer of several vegetation communities where drainage is good / rapid such as *Eucalyptus miniata* / *E. tetrodonta* dominated communities
- In low densities in areas where drainage is low to moderate such as communities dominated by *Corymbia bella*, *Melaleuca* or *Lophostemon* species
- Absent in poorly draining communities such as *Melaleuca* and mangroves communities.

The well-drained communities were targeted for systematic survey of cycads to determine their abundance and distribution. These areas contained grassy eucalypt woodlands or open woodlands typically with an open understory (in contrast to moderately well-drained areas which contained dense grass often to nearly 2 m tall). Mature cycads were easily able to be detected. In these areas, two ecologists walked along transects spaced

50 m apart and counted cycads with an above-ground trunk of at least 50 cm height in a 20 x 20 m quadrat every 50 m. The track, count point and number of cycads counted were recorded on a GPS or GPS enabled tablet.

If any areas of moderate, high or very high cycad abundance were observed (i.e. 'stands' where more than 6 adult stems were counted in a 20 m x 20 m area), the boundary was delineated with a GPS / GPS enabled tablet. Within areas containing poor to moderately well-drained soils, cycad density was assessed using a single traverse counting all cycads (rather than individual quadrats at 50 m intervals) because cycads were in low densities and could be easily estimated without comprehensive or systematic counts.

The results were entered into a GIS (QGIS 3.8) and densities of cycads mapped. Density was defined according to categories used by the NT Herbarium (see density table **Section 5.2**). To determine density per hectare from the quadrat and stand boundary delineation data, point counts were averaged per hectare or vegetation community, with areas of relatively higher cycad abundance outlined.

The surveys were conducted on 13, 14 and 15 February 2020. A combined total of approximately 45 km was walked by both ecologists in the survey area surveying for *Cycas armstrongii* and *Typhonium praetermissum* and conducting habitat assessments.

4.4 Typhonium praetermissum

T*yphonium praetermissum* is a small perennial herb that grows in relatively unshaded areas of open woodland, often in red-brown clay soils with a lateritic gravel surface (Westaway & Cowie, 2012). The plant has a bulbous corm from which a flower and leaves grow annually. A single flower first appears immediately following the first substantial rain of the wet season, and normally followed by one to five blue-green leaves (Westaway & Cowie, 2012).

Suitable habitat for the species is known to be relatively open and unshaded areas of open woodlands with red-brown clay, or shallow / gravelly lateritic soils (Westaway & Cowie, 2012). The *Threatened Species Distribution* mapping for *T. praetermissum* (Cuff & Green, 2019) states:

Current understanding of the landscape level ecology of T. praetermissum and the distribution of known records suggests a strong association with the margins of the upland lateritic plateaux and low hills typical of the Greater Darwin region. The species particularly inhabits areas of relatively lower overstorey vegetation cover in the ubiquitous Eucalyptus tetrodonta / Eucalyptus miniata dominated woodlands that occupy these land surfaces'.

Suitable habitat was assessed within the survey area via analysis of aerial imagery, vegetation and land unit mapping and DENR's species distribution modelling (Cuff & Green, 2019), and then further verified as potentially suitable / unsuitable during the survey. As a result, searches generally focused on the following vegetation communities:

- 1b – *Eucalyptus tetrodonta* (Darwin Stringybark), *Erythrophleum chlorostachys* (Ironwood) +/- *Corymbia* spp. (Bloodwood) mixed mid open woodland with a low open tussock grassland understorey
- 2a – *Eucalyptus miniata* (Darwin Woolly-butt) +/- *Eucalyptus tetrodonta* mid woodland (Darwin Stringybark) over a mixed species mid tussock grassland
- 2b – *Eucalyptus miniata* (Darwin woolly-butt), *Erythrophleum chlorostachys* (Ironwood) +/- *Corymbia confertiflora* (Cabbage Gum) mid woodland with a low open tussock grassland/shrubland understorey.

It was noted during the surveys that a small number of additional areas appeared to also contain potentially suitable habitat, and therefore these areas were surveyed. These were generally confined to vegetation community 5a (*Corymbia polysciada* (Apple Gum), *Erythrophleum chlorostachys* (Ironwood) +/- *Corymbia foelscheana* (Fan-leaved bloodwood) mid woodland to mid open woodland over a low sparse tussock grassland / low sparse shrubland ground storey), where there was an open grassy understorey. Where tall (>2 m), dense

grasses existed, searches were kept brief as vegetation was considered too dense, and soils too damp and soft underfoot, for the species to occur.

Unsuitable habitat includes wet areas on lowland plains, however it is possible that *T. praetermissum* also occurs in vegetation communities that exist between these unsuitable wetter (lowland) areas and the drier 'typical' (upland) communities. This is currently being investigated by DENR (D. Rhind, pers. comm., 5 February 2019).

As no survey guidelines were publicly available for the species, Connect Environmental has recently consulted with the NT Herbarium for other recent projects to determine the most appropriate method to detect and map the species abundance and distribution. The survey design includes two stages. The first stage involves walking transects across areas determined to contain potentially suitable habitat at a 15 m spacing, searching for individuals. This is intended to identify the presence of the species and any 'patches' of it. If any individuals are identified, then a second stage involving a greater intensity of searching is conducted to determine the abundance and distribution of that patch. Searches are conducted in a spiral pattern around the record to about 15 m. When another plant is found, the spiral search pattern is repeated until no further individuals are found within 15 m of the last detection. This approach is considered appropriate to ensure that all congregations of individuals are located (it is the congregations that are of higher conservation significance).

A leaf sample from one or more plants (depending on the form and location of those found) was collected and sent for molecular analysis to confirm the species identity. A 'permit to take or interfere with wildlife' from the NT Parks and Wildlife Service was provided on 31 January 2020 for this project (permit number 66288). As of the date of this report, the results have not been received.

The surveys were conducted on 13, 14 and 15 February 2020. A combined total of approximately 45 km was walked by both ecologists in the survey area surveying for *Cycas armstrongii* and *Typhonium praetermissum* and conducting habitat assessments.

4.5 Habitat Assessments

For species that were assessed as being possible or likely to occur within the survey area (see the likelihood of occurrence assessment results in **Section 3.3**), habitats were assessed during the surveys for *Typhonium praetermissum* and *Cycas armstrongii* to determine their suitability. Each vegetation community was assessed for its habitat characteristics and suitability for each species.

A total of 45 km was walked and about 30 vegetation and habitat checks were completed from 13 to 15 February 2020.

Each species was then re-assessed for its likelihood of occurrence in the survey area and subsequent recommendations made to survey for their presence and abundance.

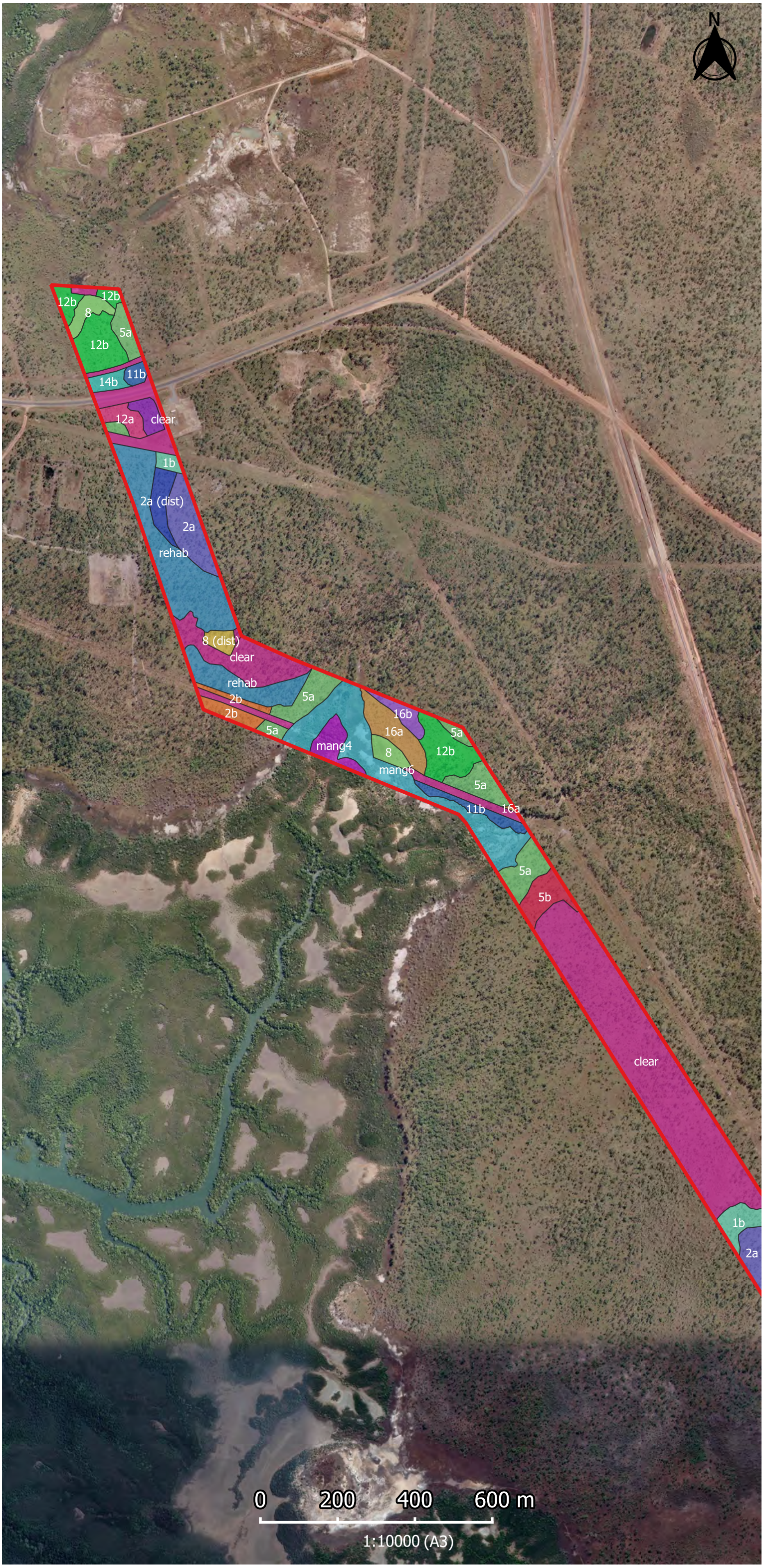
5 Results

5.1 Vegetation Communities

Vegetation communities mapped for the survey area are shown in **Figure 8** (north section), **Figure 9** (central section) and **Figure 10** (south section) and summarised in **Table 3**. A more detailed description is available in Cuff and Brocklehurst's 2011 report. It should be recognised that Cuff and Brocklehurst's vegetation mapping covered all the survey area, except for approximately 2 km at the north end. This section was verified via land unit mapping and on ground 'check sites'. Cuff and Brocklehurst's mapping was also slightly refined where necessary, though this was not extensive.

A total of 23 communities were mapped including cleared areas for roads, tracks and extractive activities.

FIGURE 8
-
Vegetation communities - north



Key

Vegetation map units

- 1b: Eucalyptus tetrodonta, Erythrophleum chlorostachys +/- Corymbia spp. mixed mid open woodland with a low open tussock grassland understorey
- 2a: Eucalyptus miniata +/- Eucalyptus tetrodonta mid woodland over a mixed species mid tussock grassland
- 2b: Eucalyptus miniata, Erythrophleum chlorostachys +/- Corymbiaconfertiflora mid woodland with a low open tussock grassland/shrubland understorey
- 5a: Corymbia polysciada, Erythrophleum chlorostachys, +/- Corymbia foelscheana mid woodland to mid open woodland over a low sparse tussock grassland/low sparse shrubland ground storey
- 5b: Corymbia polysciada mid open woodland over a tussock grassland and/or a low sparse shrubland
- 8: Eriachne burkitti mid tussock grassland +/- emergent Corymbia polycarpa and Melaleuca sp. over mid tussock grassland
- 9: Corymbia polycarpa mid open woodland with a low open tussock grassland understorey
- 10: Corymbia bella ± Corymbia polycarpa mid open woodland, grassland
- 11b: Lophostemon lactifluus low woodland/open woodland with a mid open tussock grassland understorey
- 12a: Lophostemon lactifluus +/- Corymbia polycarpa mid open woodland with an open tussock grassland understorey
- 12b: Lophostemon lactifluus, Erythrophleum chlorostachys +/-Corymbia spp. mid woodland with a mid open tussock grassland understorey
- 13: Melaleuca nervosa low open woodland with mid open rushland understorey
- 14a: Grevillea pteridifolia +/- Pandanus spiralis +/- Melaleuca nervosalow woodland with a mid tussock grassland and/or mid sedgeland understorey
- 14b: Grevillea pteridifolia ± Acacia latescens low open woodland with a mid sedgeland understorey
- 16a: Melaleuca viridiflora low woodland with a mid open tussock grassland understorey
- 16b: Melaleuca viridiflora, Grevillea pteridifolia low woodland/open woodland with a mid open tussock grassland understorey
- 31: Mixed species mid open forest - Riparian
- clear: Cleared open space
- mang4: Ceriops tagal low closed-forest/ open-forest
- mang6: Mixed species low closed-forest (hinterland)
- mang7: Mixed species low woodland/ samphire
- mang11: Salt-flats
- rehab: Recently cleared and vegetation is re-growing in various densities
- Survey area

Google Satellite

Client: Coffey Services Australia Pty Ltd
27 February 2020

CONNECT environmental

FIGURE 9
-
Vegetation communities - central

Key

Vegetation map units

- 1b: Eucalyptus tetrodonta, Erythrophleum chlorostachys +/- Corymbia spp. mixed mid open woodland with a low open tussock grassland understorey
- 2a: Eucalyptus miniata +/- Eucalyptus tetrodonta mid woodland over a mixed species mid tussock grassland
- 2b: Eucalyptus miniata, Erythrophleum chlorostachys +/- Corymbiaconfertiflora mid woodland with a low open tussock grassland/shrubland understorey
- 5a: Corymbia polysciada, Erythrophleum chlorostachys, +/- Corymbia foelscheana mid woodland to mid open woodland over a low sparse tussock grassland/low sparse shrubland ground storey
- 5b: Corymbia polysciada mid open woodland over a tussock grassland and/or a low sparse shrubland
- 8: Eriachne burkitti mid tussock grassland +/- emergent Corymbia polycarpa and Melaleuca sp. over mid tussock grassland
- 9: Corymbia polycarpa mid open woodland with a low open tussock grassland understorey
- 10: Corymbia bella ± Corymbia polycarpa mid open woodland, grassland
- 11b: Lophostemon lactifluus low woodland/open woodland with a mid open tussock grassland understorey
- 12a: Lophostemon lactifluus +/- Corymbia polycarpa mid open woodland with an open tussock grassland understorey
- 12b: Lophostemon lactifluus, Erythrophleum chlorostachys +/-Corymbia spp. mid woodland with a mid open tussock grassland understorey
- 13: Melaleuca nervosa low open woodland with mid open rushland understorey
- 14a: Grevillea pteridifolia +/- Pandanus spiralis +/- Melaleuca nervosalow woodland with a mid tussock grassland and/or mid sedgeland understorey
- 14b: Grevillea pteridifolia ± Acacia latescens low open woodland with a mid sedgeland understorey
- 16a: Melaleuca viridiflora low woodland with a mid open tussock grassland understorey
- 16b: Melaleuca viridiflora, Grevillea pteridifolia low woodland/open woodland with a mid open tussock grassland understorey
- 31: Mixed species mid open forest - Riparian
- clear: Cleared open space
- mang4: Ceriops tagal low closed-forest/ open-forest
- mang6: Mixed species low closed-forest (hinterland)
- mang7: Mixed species low woodland/ samphire
- mang11: Salt-flats
- rehab: Recently cleared and vegetation is re-growing in various densities
- Survey area

Google Satellite

Client: Coffey Services Australia Pty Ltd
27 February 2020

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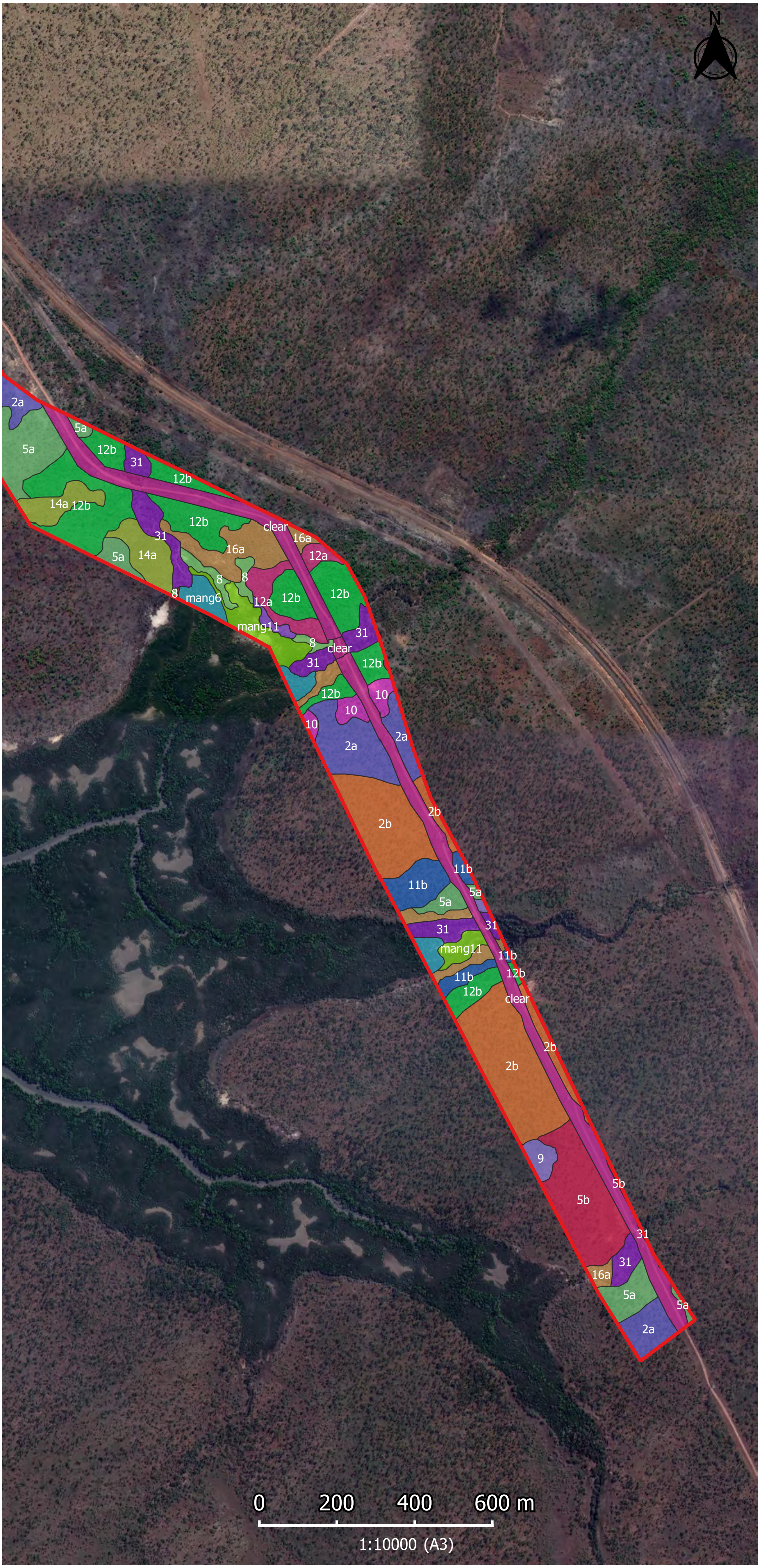
FIGURE 10
-
Vegetation communities - south



Key

Vegetation map units

- 1b: Eucalyptus tetrodonta, Erythrophleum chlorostachys +/- Corymbia spp. mixed mid open woodland with a low open tussock grassland understorey
- 2a: Eucalyptus miniata +/- Eucalyptus tetrodonta mid woodland over a mixed species mid tussock grassland
- 2b: Eucalyptus miniata, Erythrophleum chlorostachys +/- Corymbiaconfertiflora mid woodland with a low open tussock grassland/shrubland understorey
- 5a: Corymbia polysciada, Erythrophleum chlorostachys, +/- Corymbia foelscheana mid woodland to mid open woodland over a low sparse tussock grassland/low sparse shrubland ground storey
- 5b: Corymbia polysciada mid open woodland over a tussock grassland and/or a low sparse shrubland
- 8: Eriachne burkitti mid tussock grassland +/- emergent Corymbia polycarpa and Melaleuca sp. over mid tussock grassland
- 9: Corymbia polycarpa mid open woodland with a low open tussock grassland understorey
- 10: Corymbia bella ± Corymbia polycarpa mid open woodland, grassland
- 11b: Lophostemon lactifluus low woodland/open woodland with a mid open tussock grassland understorey
- 12a: Lophostemon lactifluus +/- Corymbia polycarpa mid open woodland with an open tussock grassland understorey
- 12b: Lophostemon lactifluus, Erythrophleum chlorostachys +/-Corymbia spp. mid woodland with a mid open tussock grassland understorey
- 13: Melaleuca nervosa low open woodland with mid open rushland understorey
- 14a: Grevillea pteridifolia +/- Pandanus spiralis +/- Melaleuca nervosalow woodland with a mid tussock grassland and/or mid sedgeland understorey
- 14b: Grevillea pteridifolia ± Acacia latescens low open woodland with a mid sedgeland understorey
- 16a: Melaleuca viridiflora low woodland with a mid open tussock grassland understorey
- 16b: Melaleuca viridiflora, Grevillea pteridifolia low woodland/open woodland with a mid open tussock grassland understorey
- 31: Mixed species mid open forest - Riparian
- clear: Cleared open space
- mang4: Ceriops tagal low closed-forest/ open-forest
- mang6: Mixed species low closed-forest (hinterland)
- mang7: Mixed species low woodland/ samphire
- mang11: Salt-flats
- rehab: Recently cleared and vegetation is re-growing in various densities
- Survey area

Google Satellite

Client: Coffey Services Australia Pty Ltd
27 February 2020

CONNECT environmental

Table 3 Vegetation communities

Map unit	Description
OPEN FORESTS	
31	Mixed species mid open forest - Riparian
WOODLANDS	
***Eucalyptus* dominated woodlands**	
2a	*Eucalyptus miniata* (Darwin Woolly-butt) +/- *Eucalyptus tetrodonta* mid woodland (Darwin Stringybark) over a mixed species mid tussock grassland
2b	*Eucalyptus miniata* (Darwin woolly-butt), *Erythrophleum Chlorostachys* (Ironwood) *+/- Corymbia confertiflora* (Cabba ge Gum) mid woodland with a low open tussock grassland/shrubland understorey
5a	*Corymbia polysciada* (Apple Gum)*, Erythrophleum chlorostachys (*Ironwood*),*+/- *Corymbia foelscheana* (Fan-leaved bloodwood) mid woodland to mid open woodland over a low sparse tussock grassland/low sparse shrubland ground storey
***Lophostemon* dominated woodlands**	
12b	*Lophostemon lactifluus* (Red Swamp Mahogany), *Erythrophleum chlorostachys* (Ironwood) +/- *Corymbia* spp. Mid woodland with a mid-open tussock grassland understorey
11b	*Lophostemon lactifluus* (Red Swamp Mahogany) low woodland/open woodland with a mid open tussock grassland understorey
***Melaleuca* dominated woodlands**	
16a	*Melaleuca viridiflora* (Broad-leaved Paperbark) low woodland with a mid open tussock grassland understorey
16b	*Melaleuca viridiflora* (Broad-leaved Paperbark), *Grevillea pteridifolia* (Fern-leaved Grevillea) low woodland/open woodland with a mid open tussock grassland understorey
Other woodlands	
14a	*Grevillea pteridifolia* (Fern-leaved Grevillea) +/- *Pandanus spiralis* (Screw-palm) +/- *Melaleuca nervosa* (Yellow-barked Paperbark) low woodland with a mid tussock grassland and/or mid sedgeland understorey
OPEN WOODLANDS	
Eucalyptus dominated open woodlands	
5b	*Corymbia polysciada* (Apple Gum) mid open woodland over a tussock grassland and/or a low sparse shrubland
1b	*Eucalyptus tetrodonta* (Darwin Stringybark), *Erythrophleum chlorostachys* (Ironwood) +/- *Corymbia* spp. (Bloodwood) mixed mid open woodland with a low open tussock grassland understorey
9	*Corymbia polycarpa* (Long-fruited Bloodwood) mid open woodland with a low open tussock grassland understorey
10	*Corymbia bella* (Ghost gum) ± *Corymbia polycarpa* (Long-fruited Bloodwood) mid open woodland, grassland
Lophostemon dominated open woodlands	

Map unit	Description
12a	*Lophostemon lactifluus* (Red Swamp Mahogany) +/- *Corymbia polycarpa* (Long-fruited Bloodwood) mid open woodland with an open tussock grassland understorey
Melaleuca dominated open woodlands	
13	*Melaleuca nervosa* (Yellow-barked Paperbark) low open woodland with mid open rushland understorey
Other open woodlands	
14b	*Grevillea pteridifolia* (Fern-leaved Grevillea) ± *Acacia latescens* (Wattle) low open woodland with a mid sedgeland understorey
GRASSLANDS	
8	*Eriachne burkitti* (Wanderrie Grass) mid tussock grassland +/- emergent *Corymbia polycarpa* (Long-fruited bloodwood) and *Melaleuca* sp. over mid tussock grassland
MARINE / ESTUARINE VEGETATION	
Closed forests	
mang4	*Ceriops tagal* low closed-forest/open-forest
mang6	Mixed species low closed-forest (hinterland)
Woodlands	
mang7	Mixed species low woodland/samphire
Samphire / Salt-flat	
mang11	Salt-flats
CLEARED / REHABILITATING AREAS	
Clear	Cleared open space
Rehab	Recently cleared and vegetation is regrowing with mixed species and in various densities. In the area that provides habitat for *Typhonium praetermissum*, species include *E. miniata*, *Planchonia careya*, *Terminalia ferdinandiana*, with a mixed open grassy understorey. Ground is uneven, presumably from channels built for gravel extraction or drainage.

5.2 Cycas armstrongii

When discussing the results for the survey of *Cycas armstrongii* (cycads), the density categories shown in **Table 4** are used.

The population of cycads in the survey area had the following density characteristics (**Figure 42**):

- Very high or high density: no sub-populations with densities of very high or high were observed
- Moderate densities: cycads were recorded at a moderate density across 7.4 ha (5.5% of the survey area)
- Low densities: cycads were recorded at a low density across 66.5 ha (~50% of the survey area)
- Not present: cycads were recorded as absent across 60 ha (44.5% of the survey area).

Figure 16, **Figure 17** and **Figure 18** show the densities across the northern, central and southern areas, respectively.

Table 4 Cycas armstrongii density categories

Density	Adult stems / quadrat (20 x 20 m)	Adult stems / ha
None	0	0
Low	1-5	1-129
Moderate	6-15	130-399
High	16-27	400-699
Very High	≥28	≥700

5.3 Typhonium praetermissum

A total of 406 individuals of suspected *Typhonium praetermissum* were located within the survey area in five discrete sub-populations / patches / localities (see **Figure 16**, **Figure 17** and **Figure 18**), as follows:

1. Sub-population number 1: 82 individuals
2. Sub-population number 2: 97 individuals
3. Sub-population number 3: 152 individuals
4. Sub-population number 4: 42 individuals
5. Sub-population number 5: 29 individuals.

The habitat in each location generally corresponded with that considered to be 'typical' habitat – *E. miniata* and/or *E. tetrodonta* woodlands – except for several individuals in sub-population number 5. These were found along the margin of a *Corymbia polysciada* and *Erythrophleum chlorostachys* woodland (vegetation community 5a) and *Melaleuca* woodland in a relatively unshaded situation.

Part of the northern sub-population occupies land that was cleared in about 2009 and is now re-growing as native eucalypt woodland.

At least two samples were taken from each of the five sub-populations. These will be genetically analysed for formal species confirmation. As of the date of this report, it is assumed that all individuals observed are *T. praetermissum*.

Generally, the species was located where expected, although patchily distributed in these areas. The survey effort was considered sufficient to detect most instances of *T. praetermissum*. However, given its small size (between 1 cm and 10 cm tall), it is very unlikely that the surveys detected *all* individuals.

Figure 11 Typhonium praetermissum detected in the south (sub-population 5)

Figure 12 Typhonium praetermissum detected in rehabilitating vegetation in the north (sub-population 1)

Figure 13 Typhonium praetermissum habitat in the north section (sub-population 1 – previously cleared (~2009) – vegetation unit 'rehab')

Figure 14 Typhonium praetermissum habitat (sub-population 3 - vegetation unit 2b) and Cycas armstrongii low density patch and habitat

Figure 15 Typhonium praetermissum habitat in the south (sub-population 5 - vegetation unit 5a) – on or immediately adjacent to exposed gravel areas

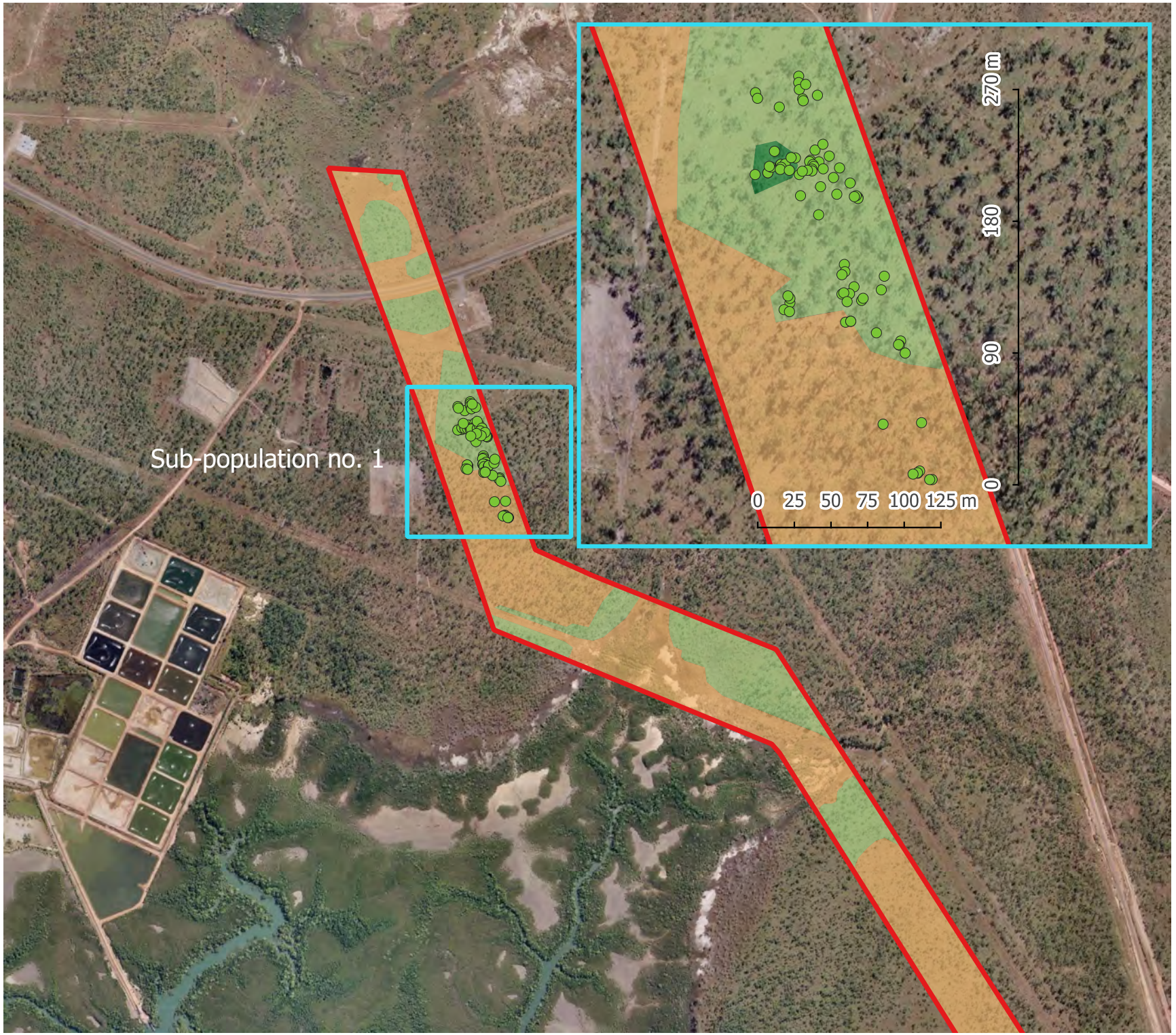


FIGURE 16
-
Cycas armstrongii density and Typhonium praetermissum detections- north section

Client: Coffey
Date: 24 Februarv 2020

Key

- Survey area
- No cycads
- Low density cycads (1-129 adult stems / ha)
- Moderate density cycads (130-399 adult stems / ha)
- Typhonium praetermissum individuals (sub-population no. 1)

Background - Google Satellite (image dated 1/2006)

N

0 150 300 450 m

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CONNECT environmental

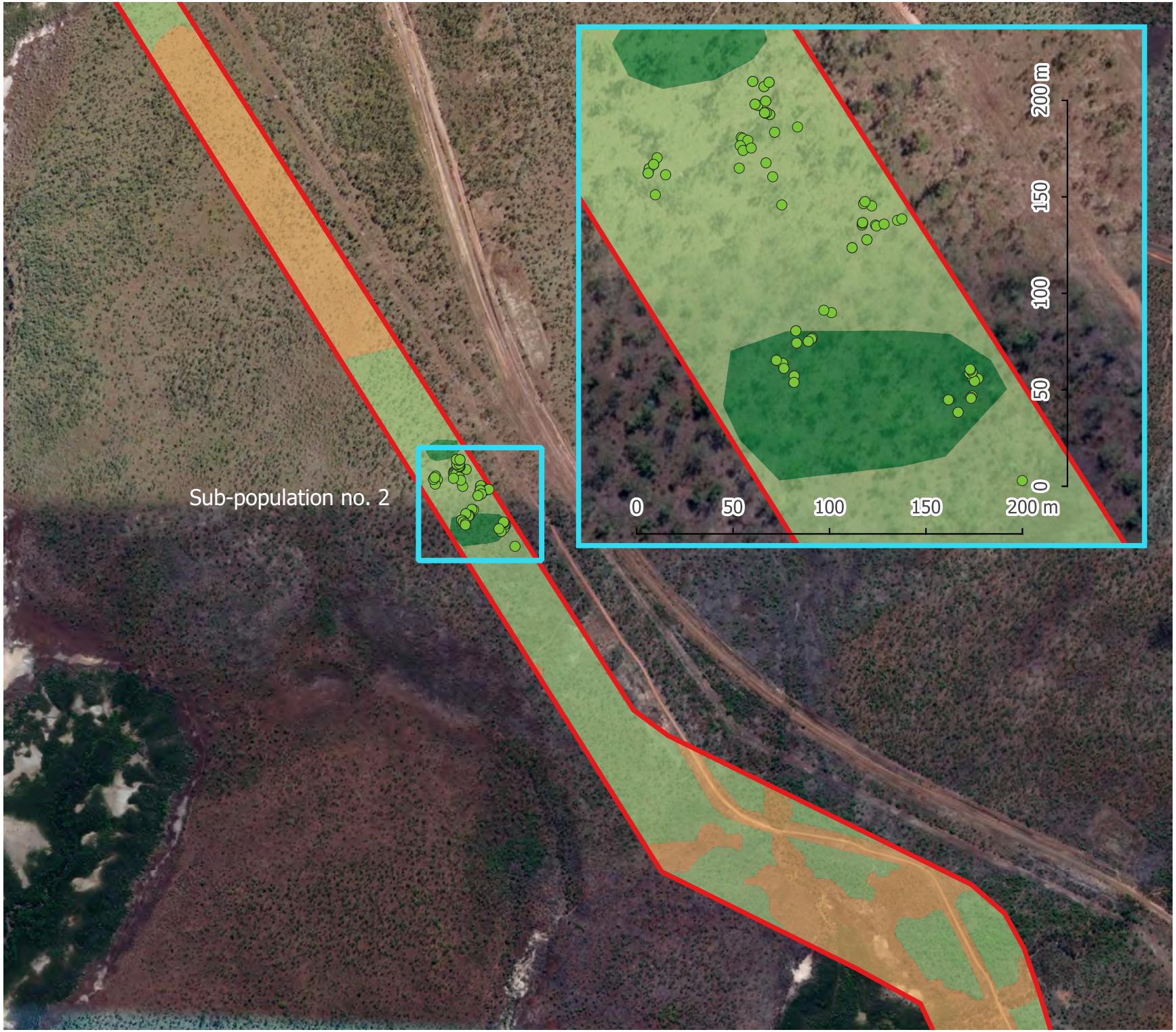

FIGURE 17 - Cycas armstrongii density and Typhonium praetermissum detections- central section

Client: Coffey
Date: 24 February 2020

Key

- Survey area
- No cycads
- Low density cycads (1-129 adult stems / ha)
- Moderate density cycads (130-399 adult stems / ha)
- Typhonium praetermissum individuals (sub-poppulation no. 2)

Background - Google Satellite (image dated 1/2006)

N

0 150 300 450 m

1:12500

CRS: GDA94; Page size: A4

CONNECT environmental

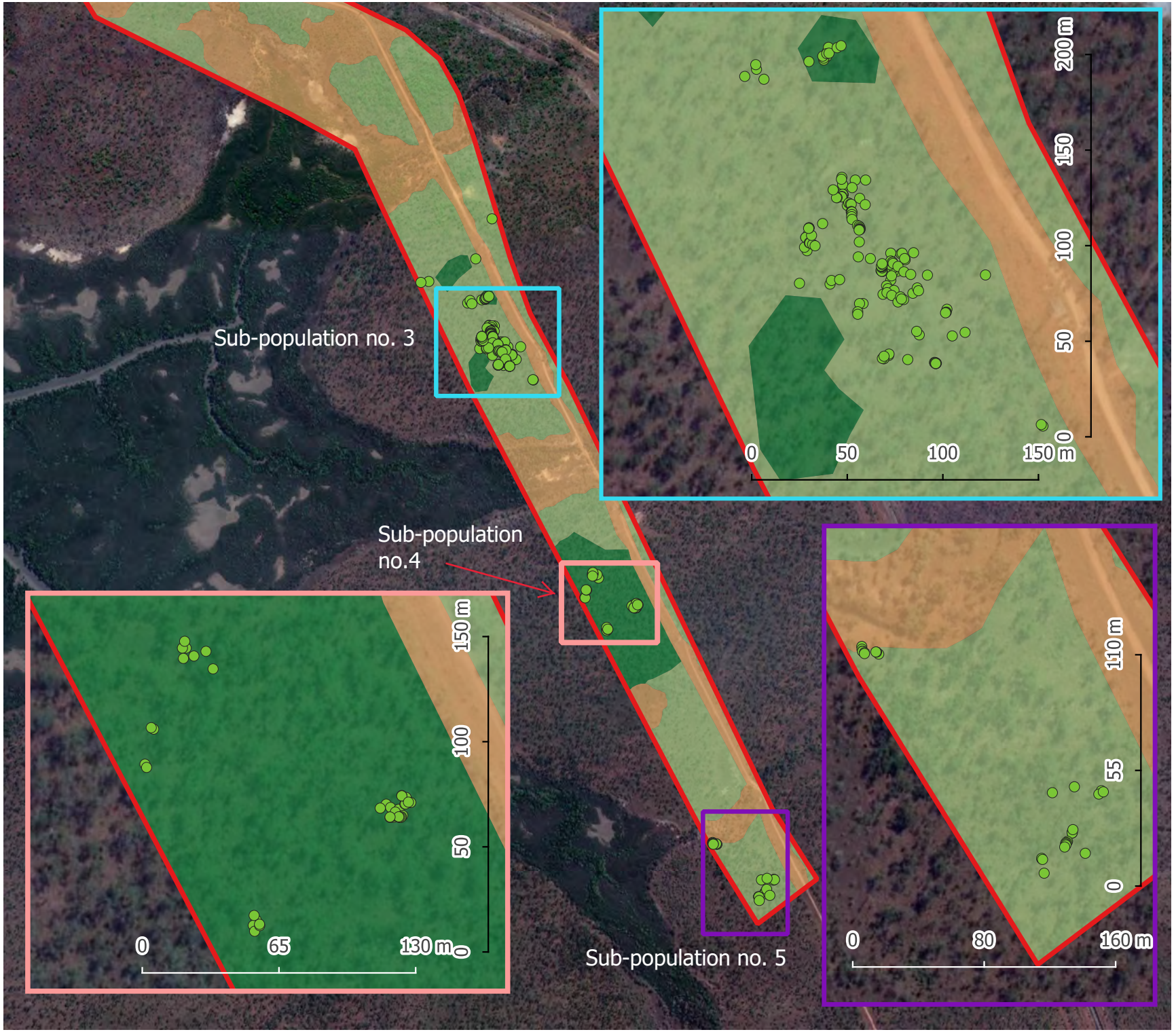

FIGURE 18 - Cycas armstrongii density and Typhonium praetermissum detections - south section

Client: Coffey
Date: 24 February 2020

Key

- Survey area
- No cycads
- Low density cycads (1-129 adult stems / ha)
- Moderate density cycads (130-399 adult stems / ha)
- Typhonium praetermissum individuals (sub-population no.'s 3, 4 and 5)

Background - Google Satellite (image dated 1/2006)

N

0 150 300 450 m

1:12500

CRS: GDA94; Page size: A4

CONNECT environmental

5.4 Habitat Assessment

The habitat assessment focused on those species considered possible or likely to occur based on the likelihood of occurrence assessment in **Section 3**. It did not include *Typhonium praetermissum* or *Cycas armstrongii* as these were already confirmed within the survey area.

Indicative vegetation units and example photos of potential habitat along the survey area are shown in **Table 5**. Maps showing the location of potential habitat for each species are shown in **Appendix C**.

Table 5 Suitable habitat for potentially occurring threatened species in the survey area

Common Name	Scientific Name	Target areas / vegetation communities[4, 5]	Photo of potential habitat in the survey area
Wetland dependent flora species			
Atalaya	*Atalaya brevialata*	Margins of 5a, 5b, 9, 10 (and possibly in 8, 14a, 14b, 16a, 16b) where upslope of sandy, poorly drained flats with surface gravel.	
Spider Flower	*Cleome insolata*	Margins of 8, 9, 14a, 16a, 16b with laterite gravel	
Trigger Plant	*Stylidium ensatum*	Margins of 12a, 12b, 16a, 16b where damp well into the dry season	
Typhonium	*Typhonium taylori*		
Bladderwort	*Utricularia dunstaniae*	14a, 14b, 16a, 16b, 8 - probably where shallow water exists	
Bladderwort	*Utricularia singeriana*		

Figure 19 Melaleuca viridiflora low open woodland (vegetation unit 16b) - northern section

[4] *When conducting the surveys in the field, a suitably experienced ecologist can further refine specific areas of suitable habitat to target within these vegetation communities.*

[5] *Further information on potential areas or types of specific habitats within these communities is provided in* ***Appendix A****.*

Common Name	Scientific Name	Target areas / vegetation communities[4, 5]	Photo of potential habitat in the survey area
Species that occur in well-drained *Eucalyptus* and/or *Corymbia* communities			
Red Goshawk	*Erythrotriorchis radiatus*	2a (potential nesting habitat; except for northern end in existing gravel extraction rehab area), elsewhere for foraging	
Masked Owl	*Tyto novaehollandiae kimberli*		
Partridge Pigeon	*Geophaps smithii*	1b, 2a, 2b (except for northern end in existing gravel extraction rehab area)	
Fawn Antechinus	*Antechinus bellus*	1b, 2a, 2b (except for areas with little ground substrate as noted during habitat assessments from 13-15 February or the northern end in existing gravel extraction rehabilitation area)	
Northern Quoll	*Dasyurus hallucatus*	1b, 2a, 2b and 16a, though only where it is structurally diverse, contains large trees, termite mounds or hollow logs, or flowing water.	
Black-footed Tree-rat	*Mesembriomys gouldii gouldii*	Suitable – 1b, 2a, 2b Potentially suitable – 10, 31 (where significant trees also exist)	
Gouldian Finch	*Erythrura gouldiae*	Any grassy eucalypt or paperbark woodlands	
Bare-rumped Sheath-tailed Bat	*Saccolaimus saccolaimus*	Several (not specified)	

Figure 20 Vegetation unit 2a - central section

Common Name	Scientific Name	Target areas / vegetation communities[4, 5]	Photo of potential habitat in the survey area
Mangrove / mudflat / saltmarsh / estuarine species			
Australian Painted Snipe	*Rostralata australis*	13, 16a, 16b, 31, 8, 9, mang4, mang6, mang7	*Figure 21 Lophostemon lactifluus low woodland (vegetation unit 11b) in mid-photo; mixed mangrove species closed forest (vegetation unit mang6) in background*
Red Knot	*Calidris canutus*	Mang11, mang6, mang7 (where sand / mud flats exist)[6]	
Curlew Sandpiper	*Calidris ferruginea*		
Great Knot	*Calidris tenuirostris*		
Greater Sand Plover	*Charadrius leschenaultii*		
Lesser Sand Plover	*Charadrius mongolus*		
Bar-tailed Godwit (baueri)	*Limosa lapponica baueri*		
Bar-tailed Godwit (menzbieri)	*Limosa lapponica menzbieri*		
Eastern Curlew	*Numesius madagascariensis*		
Water Mouse	*Xeromys myoides*	8, 31, mang4, mang6, mang7, mang11	
Northern River Shark	*Glyphis garricki*	Mang4, mang6, mang7 and mang11 (during high tide)	
Largetooth Sawfish	*Pristis pristis*		

[6] *The EPBC Act Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species also state potential habitat as including both the riparian/wetland fringe and the floodplain surrounding the core habitat (salt flats).*

Common Name	Scientific Name	Target areas / vegetation communities[4, 5]	Photo of potential habitat in the survey area
Green Sawfish	*Pristis zijsron*		
Riparian and/or seasonally saturated or inundated area species			
Pale Field-rat	*Rattus tunneyi*	31	
Howard River Toadlet	*Uperoleia daviesae*	8, 12a, 14a, 14b, 16a, 31	

Figure 22 Mixed species mid open forest (vegetation unit 31) on right, Corymbia polysciada mid woodland (vegetation unit 5a) on left, Melaleuca viridiflora low woodland (vegetation unit 16a) in background – southern section

Common Name	Scientific Name	Target areas / vegetation communities[4, 5]	Photo of potential habitat in the survey area
Mertens' Water Monitor	*Varanus mertensi*	8, 16a, 31	
Mitchells Water Monitor	*Varanus mitchelli*	8, 16a, 31	
Yellow-spotted Monitor	*Varanus panoptes*	Most habitats within survey area	

Figure 23 Water Monitor habitat - southern section - vegetation unit 31

6 Significance of Detected Threatened Species

To assist in determining the significance of threatened species identified on site, and any subsequent risk assessments that should be conducted once the proposed footprint is known, an assessment against the significant impact criteria contained within the Australian Government's *Significant Impact Guidelines* (DoE, 2013) was undertaken. These guidelines are used for NT-listed species also, in the absence of NT-specific impact criteria.

Two threatened species were so far identified:

1. *Cycas armstrongii* (Armstrong's Cycad; vulnerable - NT, not listed – national)
2. *Typhonium praetermissum*; vulnerable – NT, not listed – national).

'Important' populations and 'habitat critical to the survival' of a species are defined in the *Significant Impact Guidelines* (DoE, 2013) and are assessed against here.

6.1 Cycas armstrongii

The average density of cycads was 'moderate' (130-399 adult cycads per ha) in 5.5% of the survey area and 'low' (<129 adult cycads per ha) in 50% of it. The species was not detected elsewhere.

The species is known to be locally abundant across its range (Kerrigan *et al*., 2006). Its key threats include the expansion of rural residential areas, horticulture, agriculture and forestry (Kerrigan *et al*. 2006). Where land isn't subjected to land clearing, the species is threatened by Gamba Grass and other introduced grasses due to competition and altered fire regimes (Kerrigan *et al*. 2006).

Fire frequency varies in the survey area, most likely in relation to vegetation types (e.g. less fires in wetter environments such as melaleuca wetlands and mangroves). In drier eucalypt woodlands in the north and south sections, fires have occurred about every one to two years, on average, from 2000 to 2018, whereas in the central section, fire has burnt nearly every year (see **Section 2.4**). It is understood that high density populations of cycads are of greater importance (than lower density populations) (N. Cuff, pers. comm. 2019), probably because they are probably not substantially affected by key threats and therefore are 'source' populations. It is these high-density populations that may be 'important' populations, and necessary for maintaining genetic diversity, rather than lower density populations, such as those found in the survey area. In this case, altered fire regimes and drainage probably limit the density of the species across the survey area.

Therefore, it is expected that the cycad population identified in the survey area is not of high conservation significance, given its low to moderate density. However, subject to the scale and extent of the proposed disturbance, impacts to the population may extend outside those directly affected. This should be qualified and quantified once a proposed disturbance footprint is known. An assessment against the definition of 'important' population (as per the *Significant Impact Guidelines* (DoE, 2013)) is shown in **Table 6**.

Table 6 'Important' population assessment for Cycas armstongii

Criteria	Response
Populations identified in recovery plans	No
Key source populations either for breeding or dispersal	Unlikely – The species does not occur in high densities in the survey area, possibly as a result of altered fire regimes and drainage. It is higher density populations that would be expected to be key source populations or necessary for maintaining genetic diversity.
Populations that are necessary for maintaining genetic diversity	
Populations that are near the limit of the species range	The population is not near the limit of the species range.

6.2 Typhonium praetermissum

An assessment of the importance of the 406 individuals located in the survey area, based on the definitions provided in the Australian Government's *Significant Impact Guidelines*, is shown in **Table 7**. Based on Cuff and Green's (2019) method to delineate sub-populations of the species across its entire range, it appears that the sub-population 1 detected in the survey area may be part of the Middle Arm sub-population (number 19). It is unclear whether the other sub-populations are separate to other sub-populations identified by Cuff and Green.

Species data provided by DENR via a Digital Data Agreement (Species Data Version 3.2 (September 2019), as described by Cuff and Green (2019)), contains 803 records of the species within 5 km of the survey area and 2,267 records in total across its entire extent of known occurrence. The individuals detected in the survey area constitute approximately 15% of the entire population, if they were added together.

It is likely that the species occurs in many other locations across it modelled distribution. In this regard, the proportion of the entire population that was identified in the survey area would obviously be less.

Regardless, without further data in the local area or more broadly across the species range, it is possible that the individuals may be part of an important sub-population, as per the EPBC Act definitions. In this regard, it should be treated as such, if only as a precaution. An assessment of potential impacts to the individuals found, as well as recommendations for impact avoidance and mitigation can be further described once a proposed disturbance footprint is known.

Table 7 'Important' population assessment for Typhonium praetermissum

Key factor defining an 'important' population	Assessment
Populations identified in recovery plans	Not known to be
Key source populations either for breeding or dispersal	Possible The plants found in the survey area represent 15% of the current entire known population of the species (as of January 2020). This is not insignificant. The plants located in survey area may be part of either the Middle Arm sub-population (as identified by Cuff & Green, 2019) or their own sub-population. As a precautionary approach, it is possible that this sub-population/s is necessary for maintaining genetic diversity and as a source population either for breeding or dispersal.
Populations that are necessary for maintaining genetic diversity	
Populations that are near the limit of the species range	Uncertain

FIGURE 24
-
Typhonium praetermissum detections found in the corridor and local area

Client: Coffey
Date: 1 March 2020

Key

- Typhonium praetermissum (TBC)
- Sub-population delineations in the corridor
- Existing Typhonium praetermissum records (NT Flora Atlas)
- Extent of occurrences of existing sub-populations (Cuff & Green, 2019)
- Survey area

Background - Google Satellite (image dated 1/2006)

N

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7 Conclusions and Recommendations

Whilst these recommendations are based on the results of the survey and current knowledge of these species, detailed discussions with DENR and the Australian Government Department of the Environment and Energy in regards to the survey results and recommendations may be necessary to ensure a clear and endorsed approach to further species and impact assessment is taken.

7.1 Cycas armstongii

Survey effort for *Cycas armstrongii* is sufficient to conclude that no populations with a high or very high density occur within the survey area. No further surveys are recommended.

7.2 Typhonium praetermissum

Surveys for *Typhonium praetermissum* within all potentially suitable habitat were conducted during the species emergent period and of sufficient intensity to locate patches. A total of 406 individuals were detected across five sub-populations / patches. No further surveys are recommended.

7.3 Species Requiring Further Consideration

There are a range of other threatened species that may exist in the survey area and which require further consideration. The level of further assessment for each species will be dependent on the scale and extent of potential impacts to them. Additional species that may occur in the survey area are detailed in **Section 5.4** and include:

- Six wetland dependent flora species:
  - *Atalaya brevialata*
  - *Cleome insolata*
  - *Stylidium ensatum*
  - *Typhonium taylori*
  - *Utricularia dunstaniae*
  - *Utricularia singeriana*
- Five (non-mangrove) bird species:
  - Red Goshawk
  - Masked Owl
  - Partridge Pigeon
  - Gouldian Finch
  - Australian Painted Snipe
- Eight shorebirds:
  - Red Knot
  - Curlew Sandpiper
  - Great Knot
  - Greater Sand Plover
  - Bar-tailed Godwit (baueri)

    - Bar-tailed Godwit (menzbieri)
    - Eastern Curlew
- Five woodland mammals:
    - Fawn Antechinus
    - Northern Quoll
    - Black-footed Tree-rat
    - Pale Field-rat
    - Bare-rumped Sheath-tailed Bat
- One mangrove and coastal wetland mammal:
    - Water Mouse
- One frog:
    - Howard River Toadlet
- Three reptiles:
    - Merten's Water Monitor
    - Mitchell's Water Monitor
    - Yellow-spotted Monitor
- Three fish:
    - Northern River Shark
    - Largetooth Sawfish
    - Green Sawfish.

For each species, only some parts of the target vegetation communities (described and mapped in **Section 5.4**) will be suitable and therefore only those areas should be the focus of a targeted survey. A suitably experienced ecologist will be able to determine these areas when on site. Surveys should be conducted in accordance with relevant survey guidelines or guidance from relevant Territory or Australian Government agencies. The general survey approach for each species is shown in **Appendix A**.

8 Limitations

The objectives of this assessment were to document the presence of *Typhonium praetermissum* and *Cycas armstrongii* in the survey area and assess the likelihood of any other threatened to occur within it. For all such assessments of this nature, there are several inherent limitations including:

- When conducting database searches for threatened species, buffers of between 2 and 50 km are generally used depending on the likely amount of survey effort conducted in that area. A buffer of 5 km was used for this project as it was determined that this buffer distance would satisfactorily characterize local and regional abundance and distributions of threatened species and adequately capture the potential for these species to exist in the survey area.
- The results of the survey are just a 'snapshot' in time. Over time, habitat characteristics and the abundance and distributions of flora and fauna can change in response to climatic or anthropogenic influences.
- Similarly, best practice survey methods change over time. Additional surveys should accord with standards / guidelines that are current as of that time. Consultation with relevant government agencies is recommended.
- The conservation statuses of flora and fauna species will change over time and it is therefore necessary to review the threatened species likelihood of occurrence assessment, and any subsequent plan for surveys and the assessment of impacts, at an appropriate time in line with the timing of the proposed construction.
- Flora and fauna records (obtained through NR Maps) are not always an accurate representation of the abundance and distribution of a species in any given area. Survey effort in that area must also be recognized as a factor.
- Assessments and conclusions made by Connect Environmental were based on available information at the time of preparation and following consultation with DENR (including the NT Herbarium and Terrestrial Ecosystem Services).
- Other matters protected under the EPBC Act, such as Matters of National Environmental Significance (except for threatened species), and the NT *Environment Assessment Act*, were not assessed as part of this project.

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Appendix A: Threatened Species Likelihood of Occurrence Assessment

Note that threatened marine turtles have not been included in this assessment given that there are no sandy beaches (i.e. all threatened marine turtles have similar nesting and foraging habitats)

Common Name	Scientific Name	Status[7]		Preferred habitat	Records within 5 km[8]	Preliminary assessment of likelihood of occurrence[9]	Indicative vegetation map units[10]	Ideal survey period	General survey approach[11]
		NT	Nat.						
Plants									
Atalaya	*Atalaya brevialata*	-	CE	It appears to occur on foot slopes in open vegetation and on deeper, coarser sandy soils mostly along a specific, distinct geological boundary, often with surface gravel (DoE, 2013; Cowie, 2014). This includes in woodland with varying proportions of *Eucalyptus tectifica* and *Corymbia foelscheana* but also with *Xanthostemon paradoxus*, *Terminalia grandiflora* and *Acacia hemignosta* in the overstorey with open layer of perennial grasses such as *Eriachne avenacea* (Cowie, 2014). It has also been found in the adjoining mixed *Melaleuca viridiflora*, *Grevillea pteridifolia* and *Acacia leptocarpa* low woodland in more poorly drained situations but on slight rises (Cowie, 2014). Suitable habitat appears to often occur in a narrow band upslope of sandy, poorly drained flats dominated by the small tree *Grevillea pteridifolia* and *Dapsilanthus spathaceus*. The species is not known outside the Elizabeth River catchment (Cowie, 2014). Recorded in land units 2a1, 2b1, 3c, 5b2, 6a2, 6b and 9a (land units as per Fogarty *et al*., 1985).	0	**Possible** Nearest record is ~6 km to the east. Suitable habitat appears to exist. Whilst the species is not known outside the Elizabeth River catchment (Cowie, 2014), given the proximity of the survey area to existing records and the apparent suitability of habitat, it should not be discounted (D. Liddle, pers. Comm., 22 January 2020).	The margins of 5a, 5b, 9 and 10 though only where these communities are just upslope of sandy, poorly drained flats with surface gravel. Also, possibly in 8, 14a, 14b, 16a and 16b in more poorly drained situations but on slight rises with surface gravel.	October to December (however Jan-May less-than-ideal; June-Oct not ideal).	Walking survey along the edge of the sand sheet grassland habitat.
Spider Flower	*Cleome insolata*	V	-	Inundated sedgeland on silty loam with an overlay of laterite gravel, but also on the adjoining roadside verge (Westaway & Cowie, 2012a). Recorded in land units 2a1, 2b2, 3b, 3c, 6a2, 6b (land units as per Fogarty *et al*., 1985).	0	**Possible** Suitable habitat may exist in the form of sand sheet heath / grassland (which may be correlated with habitat for *Uperoleia daviesae*). Species may occur along the margins.	Margins of 8, 9, 14a, 16a, 16b with an overlay of laterite gravel	January to April	Walking survey along the edge of the sandsheet grassland habitat. If genus is detected on site, then further analysis of seed is required to confirm species. If species is confirmed, then distribution mapping will be required.

[7] Conservation status under either the Environment Protection and Biodiversity Conservation Act 1999 ('Nat.') or Territory Parks and Wildlife Conservation Act ('NT'): CE = Critically Endangered, E = Endangered, V = Vulnerable, M = Migratory, '-' = not listed

[8] As per the NT Flora and Fauna Atlases (as of 26 February 2020)

[9] Inclusive of habitat type and conditions noted during site assessment from 13-15 February 2020.

[10] This provides an indication of potential vegetation communities that the species may occur in. Refinement should be conducted on the ground to target areas of suitable habitat within these communities.

[11] Subject to the scale and extent of the proposed vegetation disturbance. Suggested survey approach accords with recent projects where DENR was consulted. It may change over time and further consultation with the NT or Australian Governments may be required.

Common Name	Scientific Name	Status[7]		Preferred habitat	Records within 5 km[8]	Preliminary assessment of likelihood of occurrence[9]	Indicative vegetation map units[10]	Ideal survey period	General survey approach[11]
		NT	Nat.						
Darwin Cycad	*Cycas armstrongii*	V	-	Prime cycad habitat occurs in open woodlands with deep loamy soils (Kerrigan et al., 2006). It is predicted that a fire frequency in excess of around one in five years will result in long-term population declines (Kerrigan et al., 2006).	58	**Confirmed** Species detected and densities mapped during surveys from 13 to 15 February 2020.	1b, 2a, 2b, 5a, 5b, 10 (occasional cycads may be found in other woodlands)	Any time	Quantify and map density.
Helicteres macrothix	*Helicteres macrothix*	E	E	Woodlands dominated by *Eucalyptus tectifica*, *E. tetrodonta* or *E. miniata*, on sandy loam on rocky siltstone slopes or granitic rocks.	0	**Unlikely** There does not appear to be any suitable habitat in the survey area and the species is unlikely to occur north of Manton Dam based on current knowledge (Cowie *et al*., 2012; Pers. Comm. N. Cuff, 2019).	N/A	N/A	Survey not necessary
Trigger Plant	*Stylidium ensatum*	E	E	The species is known to occur in the wet margins of drainage flats in damp heavy clay or peaty soils that are damp well into the dry season (Cowie & Westaway, 2012; TSSC, 2016b). It is associated with *Melaleuca viridiflora* and *Lophostemon lactifluus*, sedges (e.g. *Fimbristylis furva*), perennial grasses (e.g. *Eriachne burkittii*), herbs (e.g. *Burmannia* spp.) and shrubs (e.g. *Osbeckia* and *Banksia dentata*) (Holmes et al., 2005; TSSC, 2016b). Mostly recorded in land units 6b, 8a, 8b, 4c (land units as per Fogarty *et al*., 1985).	0	**Possible** Whilst the survey area occurs outside the current known extent of occurrence[12], there is potentially suitable habitat in the form of sandy *Melaleuca viridiflora* and *Lophostemon lactifluus* flats. However, it is unclear whether these areas are damp well into the dry season.	Margins of 12a, 12b, 16a, 16b where it is damp well into the dry season.	June to August	Transects or random meandering then counts or quadrats depending on abundance.
Typhonium	*Typhonium praetermissum*	V	-	Open woodland habitats including relatively open, unshaded situations (Westaway & Cowie, 2012b).	798[13]	**Confirmed (though identity to be confirmed through genetic analysis)** Species confirmed on site during survey from 13 to 15 February 2020. There is also a known population about 2 km to the north-west.	1b, 2a, 2b, 5a, 5b	January to March	Transects and systematic searches.
Typhonium	*Typhonium taylori*	E	E	The species lives in seasonally saturated sandy soil in nutrient poor grass / sedgeland with occasional Melaleuca viridiflora (TSSC, 2008; Kerrigan & Cowie, 2006b). Mostly recorded in land unit 6b (land units as per Fogarty *et al*., 1985).	0	**Possible** Suitable habitat may be in the survey area (based on the analysis of land unit mapping and aerial imagery). However, the closest record is ~14km north-east, the species is considered adequately surveyed, the genus is of high profile amongst collectors and the paucity of collections is considered to accurately reflect its very restricted distribution and abundance (on the edge of the Howard River floodplain) (DoE, 2020). In this regard, while it may be unlikely to occur there, the occurrence of potential habitat should be used as a basis to conduct a survey to confirm its presence or absence. In addition, DENR is proposing to conduct surveys for this species in the Middle Arm area (N. Cuff, pers. Comm., 21 January 2020).	14a, 14b, 16a, 16b, 8	January to March	Random meandering or transects to detect species, then absolute counts or transects depending on abundance.

[12] *Mapped distribution, Stylidium ensatum, July 2016 (https://nt.gov.au/__data/assets/pdf_file/0005/405536/stylidium-ensatum-mapped-distribution.pdf)*

[13] *As per data provided to Connect Environmental by DENR (not shown in the NT Flora Atlas)*

Common Name	Scientific Name	Status[7]		Preferred habitat	Records within 5 km[8]	Preliminary assessment of likelihood of occurrence[9]	Indicative vegetation map units[10]	Ideal survey period	General survey approach[11]
		NT	Nat.						
Bladderwort	*Utricularia dunstaniae*	V	-	Wet sand, often in shallow water in *Melaleuca nervosa* woodland or *Verticordia* shrubland. It occurs frequently where water is percolating from the ground. Populations appear to be small and very localised (Kerrigan & Cowie, 2012). Mostly recorded in land unit 6b (land units as per Fogarty *et al*., 1985).	0	**Possible** Potentially suitable habitat may exist within the survey area based on the analysis of existing land unit and vegetation mapping and aerial imagery. The nearest record is ~10 km east.	14a, 14b, 16a, 16b, 8 - probably where shallow water exists	March to May	Random meandering or transects to detect species, then absolute counts or transects depending on abundance.
Bladderwort	*Utricularia singeriana*	V	-	The margins of wet sandy flats and swamps with short relatively open grasses and sedges (C. Michell pers. comm.; Holtze, 2011; cited in Cowie & Kerrigan, 2012). Mostly recorded in land units 6b2 and 5a (land units as per Fogarty *et al*., 1985).	1	**Possible** Potentially suitable habitat may exist within the survey area based on the analysis of existing land unit and vegetation mapping and aerial imagery. The nearest record is ~2 km to the east of the southern section of the survey area.			
Threatened Birds									
Red Goshawk	*Erythrotriorchis radiatus*	V	V	Coastal and subcoastal tall, open forest and woodlands, tropical savannas traversed by rivers lined with timber, and along the edges of rainforest (including paperbark forest and gallery forests) (Woinarski, 2006; Marchant & Higgins 1993 cited in DEWHA, 2010). The species generally only nests in trees taller than 20 m and within 1 km of a watercourse or wetland, but not in areas with fragmented vegetation (Aumann & Baker-Gabb, 1991; Czechura, 2001 cited in TSSC, 2015b). The species hunts within a home range of up to 200 km^2 in open forests and gallery forests (Czechura & Hobson, 2000, cited in TSSC, 2015b).	0	**Possible** Whilst no records exist within 5 km of the survey area, suitable habitat appears to exist in the southern half of the survey area in the form of tall *E. miniata* / *E. tetrodonta* eucalypt woodlands (vegetation map unit 2a) – Cuff & Brocklehurst (2011) report the mean height of this community as 16 m with a maximum of 22 m. A habitat assessment on 15 February 2020 concluded that there is potential for the species to occur there although no nests were observed (however a dedicated survey was not conducted). The southern area is also subjected to less disturbance mostly from resource extraction activities than in the north. If the area is not used for breeding (evident via nests), the species may forage within the habitats of the survey area.	2a (potential nesting habitat; except for northern end in existing gravel extraction rehab area) Most other vegetation for foraging	Any	Nest surveys and walking / vantage point surveys[14]
Gouldian Finch	*Erythrura gouldiae*	V	E	Feb-Oct: wooded hills with *Eucalyptus tintinnans*. Nov-Jan: lowland drainages (DEWHA, 2010).	0	**Possible** Whilst no records exist within 5 km of survey area and suitable breeding habitat does not occur, the species may be seen very occasionally during the non-breeding season.	Any grassy eucalypt or paperbark woodlands	Late dry season	Survey not recommended – Survey guidelines (DEWHA, 2010) focus on breeding habitat and nearby waterholes, however there is no breeding habitat in the survey area and no known breeding populations nearby, therefore surveys are considered not to be necessary.

[14] *As per the Survey guidelines for Australia's threatened birds (DEWHA, 2010).*

Common Name	Scientific Name	Status[7]		Preferred habitat	Records within 5 km[8]	Preliminary assessment of likelihood of occurrence[9]	Indicative vegetation map units[10]	Ideal survey period	General survey approach[11]
		NT	Nat.						
Partridge Pigeon	*Geophaps smithii*	V	V	Principally in lowland eucalypt open forests and woodlands, with grassy understoreys and dominated by *Eucalyptus tetrodonta* and *E. miniata* that has a structurally diverse understorey (DEWHA, 2010).	2	**Possible** Suitable habitat may exist in the form of eucalypt open forests and woodlands. Nearest record is about 2 km to the east.	1b, 2a, 2b (except for northern end in existing gravel extraction rehab area)	Any, though focus on late dry season around waterholes (cameras) or early dry season when nesting (flushing transects).	Area searches or walking transects to flush or hear species or cameras on late dry season waterholes (if any).[15]
Australian Painted Snipe	*Rostralata australis*	V	E	Shallow, vegetated, freshwater swamps, claypans or inundated grasslands or saltmarshes (including temporary wetlands) (Marchant & Higgins 1993 cited in DEWHA, 2010; Taylor *et al*., 2013). Likely to occur on any shallow ephemeral wetlands in central or southern NT. Possibly occurs in northern areas of the NT.	0	**Possible** There is suitable habitat in the survey area in the form of ephemeral (Melaleuca) wetlands and saltmarshes. However, no records exist within 5 km (the closest is about 11 km to the east). Only four records exist in the greater Darwin region with the most recent being from 2006. Despite this, given the species is thought to be nomadic and there is apparently suitable habitat within the survey area, it may be present from time to time. As with many species, it is noted that the level of impact is subject to the nature, scale and extent of the disturbance footprint.	13, 16a, 16b, 31, 8, 9, mang4, mang6, mang7	Uncertain (previous local records are from December)	Area searches or transects through suitable wetlands, detection by sighting and flushing. Targeted stationary observations at dawn and dusk of suitable foraging locations within wetlands, detection by sighting.[12]
Masked Owl	*Tyto novaehollandiae kimberli*	V	V	Mainly in eucalypt tall open forests (esp. those dominated by *Eucalyptus miniata*, *E. tetrodonta* and *Corymbia nesophila*) and commonly roosts in monsoon rainforests and forages in more open vegetation types, including grasslands and "treeless plains" (Woinarski & Ward, 2012).	0	**Possible** Whilst no records exist within 5 km of the survey area, suitable habitat appears to exist in the southern half of the survey area in the form of tall *E. miniata* / *E. tetrodonta* eucalypt woodlands (vegetation map unit 2a) – Cuff & Brocklehurst (2011) report the mean height of this community as 16 m with a maximum of 22 m. A habitat assessment on 15 February 2020 concluded that there is potential for the species to occur there with the occasional large hollow-bearing tree noted (however a dedicated survey was not conducted). The southern area is also subjected to less disturbance mostly from resource extraction activities than in the north, perhaps indicating more favourable habitat. If the area is not used for breeding, the species may forage within the habitats of the survey area.	2a (potential nesting habitat; except for northern end in existing gravel extraction rehab area) Most other vegetation for foraging.	October to March (Ward, 2010)	Call playback surveys[12]
Threatened and Migratory Birds[16]									
Red Knot	*Calidris canutus*	V	E, M	Intertidal mudflats and sandflats[13]	0	**Possible** Suitable habitat appears to exist in the form of saltflats[13]	Mang11, mang6, mang7 (where sand /	October to March - presence	1. Assessment as 'important habitat'
Curlew Sandpiper	*Calidris ferruginea*	V	CE, M		0				

[15] As per the *Survey guidelines for Australia's threatened birds (DEWHA, 2010).*

[16] *This table lists those migratory birds which are listed as threatened under the EPBC Act or TPWC Act, however it is applicable to all migratory shorebirds under the EPBC Act (except for Latham's Snipe)*

Common Name	Scientific Name	Status[7]		Preferred habitat	Records within 5 km[8]	Preliminary assessment of likelihood of occurrence[9]	Indicative vegetation map units[10]	Ideal survey period	General survey approach[11]
		NT	Nat.						
Great Knot	*Calidris tenuirostris*	V	CE, M		0		mud flats exist)[17]	and abundance, habitat assessment April to September – habitat assessment	2. If important habitat, surveys in accordance with migratory shorebird guidelines (DEE, 2017)
Greater Sand Plover	*Charadrius leschenaultii*	V	V, M		1				
Lesser Sand Plover	*Charadrius mongolus*	V	E, M		1				
Bar-tailed Godwit (baueri)	*Limosa lapponica baueri*	V	V, M[18]		81[19]				
Bar-tailed Godwit (menzbieri)	*Limosa lapponica menzbieri*	V	V, M[14]						
Eastern Curlew	*Numesius madagascariensis*	V	CE, M		11				
Mammals									
Fawn Antechinus	*Antechinus bellus*	E	V	Savannah woodland and tall open forest; shelters in tree hollows and fallen logs (Young, 2012). It occurs mostly in open forests and woodlands dominated by *Eucalyptus miniata* and/or *E. tetrodonta*, particularly where these forests have a relatively dense shrubby understorey (Friend, 1985; Friend and Taylor, 1985; cited in TSSC, 2015a). It is less frequently found in areas with frequent intense fires (Corbett et al., 2003; cited in TSSC, 2015a)).	5	**Possible** Five records exist in the area (the nearest is about 600 m north-east) – all are from 2001. Based on the on-ground habitat assessment (13-15 February 2020), there appears to be limited suitable habitat along the survey area. Whilst the site contains some *Eucalyptus tetrodonta* and *E. miniata* dominated woodland (vegetation map units 1b, 2a and 2b), there is minimal ground substrate suitable for sheltering and breeding (i.e. fallen logs). Areas containing suitable characteristics are isolated to the south section of the survey area, as shown in **Section 5.4**. All other E. tetrodonta / E. miniata was devoid in ground substrate of anything more than a thin layer of leaf litter and the occasional log. Much of the potentially suitable habitat has burnt nearly every year between 2000 and 2018 (NAFI, 2020) – see **Section 2.4**, however only one or two burns have been late in the dry season. Either way, frequent burns are likely to have diminished the quality of habitat for the species by removing logs and other ground substrate. The species this shows a preference for areas exposed to cooler and less frequent fires (Woinarski, *et al*., 2004; cited in Young, 2012). Given the local records (even if they're nearly 20 years old) and presence of observed ground substrate within a few areas in the south, a conservative approach should be taken regarding its potential presence.	1b, 2a, 2b (except for areas with little ground substrate as noted during habitat assessments from 13-15 February or the northern end in existing gravel extraction rehabilitation area)	Late wet to early dry (when previous season's litter has matured and dispersed), though any time is acceptable	Cameras[20]

[17] The EPBC Act Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species also state potential habitat as including both the riparian/wetland fringe and the floodplain surrounding the core habitat (salt flats).

[18] At the species level

[19] Records are shown at the species level, though the EPBC Act assesses this species at the subspecies level

[20] In accordance with A guide for the use of remote cameras for wildlife survey in northern Australia (Gillespie et al., 2015)

Common Name	Scientific Name	Status[7]		Preferred habitat	Records within 5 km[8]	Preliminary assessment of likelihood of occurrence[9]	Indicative vegetation map units[10]	Ideal survey period	General survey approach[11]
		NT	Nat.						
Brush-tailed Rabbit-rat	*Conilurus penicillatus*	E	V	Eucalypt tall open forest. May also occur on coastal grasslands (with scattered large *Casuarina equisetifolia* trees, beaches, and stunted eucalypt woodlands on stony slopes). It shelters in tree hollows, hollow logs and, less frequently, in the crowns of pandanus or sand-palms. It has been demonstrated to prefer tall eucalypt forests away from wet areas in sites that had not been exposed to recent severe fires (Firth *et al*., 2006a; cited in TSSC, 2016a).	0	**Unlikely** There are no records in the vicinity of the survey area in recent history (nearest record on land is ~70 km to the east) and was recorded prior to 1992[21]) and most of the eucalypt woodlands have burnt nearly every year between 2000 and 2018 (NAFI, 2020). Both factors probably substantially contribute to the species being less likely to occur in the survey area. Forests subject to infrequent fire regimes are a limiting factor (Woinarski *et al*. 2017). Whilst several environmental features are present on site that the species requires for sheltering and raising young (Firth *et al*. 2006) (i.e. eucalypt open forest / woodland containing occasional hollow bearing trees and fallen logs (density not measured) and a shrubby understorey), there is unlikely to be any habitat critical to the species' survival in the study area (possibly relatively long-unburnt forest (Woinarski *et al*, 2017)).	1b, 2a, 2b (except for areas with little ground substrate as noted during habitat assessments from 13-15 February or the northern end in existing gravel extraction rehabilitation area)	Any	Survey not necessary
Northern Quoll	*Dasyurus hallucatus*	CE	E	Wide range of habitats, but the most suitable habitats appear to be rocky areas and it was once common in many eucalypt open forests (Woinarski & Hill, 2012). DoE (2020a) describes suitable habitat in the top end of the NT as rocky areas and tall open coastal eucalypt forests, with prime habitat being sandstone escarpment. DoE (2020a) also states that habitat in Kakadu includes open forest and woodlands on plains dominated by *Eucalyptus tetrodonta*, *E. miniata* and *E. tectifica*, and riparian areas with flowing water dominated by *Melaleuca viridiflora* and *Pandanus spiralis* (Oakwood 2000; cited in DoE (2020a). Critical habitat (relevant to the survey area), as defined by DoE (2016), includes "structurally diverse woodland or forest areas containing large diameter trees, termite mounds or hollow logs".	6	**Possible** A recent (2018) record along Jenkins Road indicates that the species is present in the area (though does not provide information of abundance). The survey area comprises eucalypt woodland with occasional hollow bearing trees and a shrubby understorey in several areas, however there is little woody ground substrate (e.g. fallen logs) (as observed during habitat assessments from 13-15 February 2020). Utilising the definition of critical habitat by DoE (2016) and Kakadu habitats by DoE (2020), potentially suitable habitats within the survey area include vegetation map units 1b, 2a, 2b and 16a, though only where it is structurally diverse, contains large trees, termite mounds or hollow logs, or flowing water. The remainder of the survey area could be used by quolls as foraging habitat. Much of the potentially suitable habitat has burnt nearly every year between 2000 and 2018 (NAFI, 2020) – see **Section 2.4**, however only one or two burns have been late in the dry season. At the very least, the site may be occasionally used for foraging or traversed by dispersing young males, given the low number of records in the area, however, given the recent record along Jenkins Road and potentially suitable characteristics of several parts of the survey area, it is appropriate to consider that the species may occur there.	1b, 2a, 2b and 16a, though only where it is structurally diverse, contains large trees, termite mounds or hollow logs, or flowing water.	Any, although early to mid-dry (mating season) may be better	Cameras and latrine searches[22]

[21] *As per the NT Fauna Atlas (downloaded on 'NR Maps' on 1 January 2020)*

[22] *In accordance with A guide for the use of remote cameras for wildlife survey in northern Australia (Gillespie et al., 2015)*

Common Name	Scientific Name	Status[7]		Preferred habitat	Records within 5 km[8]	Preliminary assessment of likelihood of occurrence[9]	Indicative vegetation map units[10]	Ideal survey period	General survey approach[11]
		NT	Nat.						
Ghost Bat	*Macroderma gigas*	-	V	Often roost in a deep crack or cave during the day and perch in vegetation nearby during the night (Ward & Milne, 2016).	0	**Unlikely** Its distribution is influenced by the availability of suitable caves and mines for roost sites. No caves / adits in the local area and the local area is not recognised as an important area for the species. Recently it has mostly been recorded in the Pine Creek, Katherine, Kakadu and Litchfield regions. However, if suitable caves are present in the region, then the species may occasionally forage within the survey area.	N/A (though may forage in woodlands)	N/A	Survey not necessary
Black-footed Tree-rat	*Mesembriomys gouldii gouldii*	V	E	The Black-footed Tree-rat lives in tropical woodlands and open forests, mainly dominated by *Eucalyptus miniata* and/or *E. tetrodonta* (TSSC, 2015c). It prefers woodlands and forests with a relatively dense shrubby understorey (Friend & Taylor, 1985; Friend, 1987; cited in TSSC, 2015c). It shelters in tree hollows and pandanus stands during the day (Hill, B., 2012). It forages both on the ground and in trees and may travel at least 500 m from roost sites to foraging areas (Friend et al., 1992), cited in TSSC, 2015c).	1	**Possible** Whilst there is a paucity of records in the local area, potentially suitable habitat appears to exist on site and there are reports that the species remains relatively abundant in Darwin's rural area. The habitat assessments on 13-15 February 2020 concluded that the presence of potentially suitable hollow-bearing trees and a density and diversity of mid storey vegetation could be suitable habitat for the species. Its potential presence should not be discounted until it can be verified otherwise. Our data from other projects in the region suggests that 'suitable' habitat includes *E. tetrodonta* and / or *E. miniata* woodlands, but that they can also occur in vegetation that contains *Pandanus spiralis* as a frequent mid-storey species and areas dominated by *Corymbia bella* ('potentially suitable' habitat). Some areas, such as the Melaleuca wetlands with Pandanus, will be too open and not contain hollow-bearing trees, though these areas may still be used for foraging.	Suitable – 1b, 2a, 2b Potentially suitable – 10, 31 (where significant trees also exist)	Any, though detection probability might increase in late dry season during peak breeding.	Cameras[23]
Nabarlek	*Petrogale concinna canescens*	V	E	Rocky areas (sandstone or granite), especially on steep slopes, with large boulders, caves and crevices (Ward & Woinarski, 2012). May move to forage in adjacent flat areas.	0	**Unlikely** No records exist in the area and no habitat exists.	Nil	N/A	Survey not necessary
Northern Brush-tailed Phascogale	*Phascogale pirata*	E	V	Tall open forests dominated by *Eucalyptus miniata* and *E. tetrodonta* and shelters in hollows during the day (Woinarski & Ward, 2012b).	0	**Unlikely** Marginal habitat may exist on site, although no local records exist (nearest record is ~60 km south. Majority of records in the Top End are from the Garig Gunak Barlu, Kakadu and Litchfield National Parks.	1b, 2a, 2b	Any	Survey not necessary
Pale Field-rat	*Rattus tunneyi*	V	-	Dense vegetation along creeks, though can reside in other dense vegetation in seasonally saturated areas (Young & Hill, 2012).	1	**Possible** Only one record from local area (i.e. within 5 km) in 2001 although several further afield exist from as recently as 2014. Suitable habitat may exist along creeks within the survey area, and, in conjunction with several relatively recent regional records, the species should be considered as potentially occurring there.	31	Any	Cameras[23]
Bare-rumped Sheath-tailed Bat	*Saccolaimus saccolaimus*	-	V	A large insectivorous bat that occurs in open *Pandanus* woodland and eucalypt tall open forests (Churchill, 2008).	0	**Possible** Whilst it has been recorded across the region from Cobourg Peninsula to Keep River, it is unlikely to be detected in the survey area (D. Milne, pers. Comm. 2019).	Several (not specified)	Any though may be more active during the warmer months.	Habitat assessment (may require consultation with DENR)

[23] *In accordance with A guide for the use of remote cameras for wildlife survey in northern Australia (Gillespie et al., 2015)*

Common Name	Scientific Name	Status[7]		Preferred habitat	Records within 5 km[8]	Preliminary assessment of likelihood of occurrence[9]	Indicative vegetation map units[10]	Ideal survey period	General survey approach[11]
		NT	Nat.						
Water Mouse	*Xeromys myoides*	-	V	DoE (2015) describes critical habitat for the species as all mangrove communities, intertidal communities, and coastal freshwater wetlands with one or more of the following features: • intact hydrology • prey resources (Crustaceans, marine polyclads and marine pulmonates and bivalves) • active water mouse nest structures • a defined supralittoral bank that could enable the construction of nests. Habitat critical to survival of the water mouse may not have all these features.	0	**Possible** Whilst there is a paucity of local and regional records, it is also acknowledged by Woinarski (2006) that there is a lack of precise information on range, population size and trends. DoE (2015) indicate that the species is likely to occur in the Darwin region. Given there is potentially suitable habitat within the survey area, it is possible that the species occurs there.	8, 31, mang4, mang6, mang7, mang11	Any	Primary methods[24] - Habitat assessment, daytime searches for nesting sites and evidence of foraging and Elliott or camera trapping Supplementary methods - spotlighting, hair tubing and pitfall trapping in non-tidal habitats. The requirement and methodology used will depend on the nature and extent of the proposed disturbance. If the proposed activity will not affect suitable habitat, then surveys may not be necessary.
Reptiles									
Plains Death Adder	*Acanthopsis hawkei*	V	V	It is known to occur on the cracking soils on floodplains of the Adelaide, Mary and Alligator Rivers, the cracking black soils of the Barkly Tableland on the NT/QLD border, the Mitchell Grass Downs of western QLD and likely on floodplains and cracking soil plains across mainland northern Australia (Ward & Phillips, 2012).	0	**Unlikely** No records exist in the local area and no suitable exists on the site.	None	N/A	Survey not necessary
Mertens' Water Monitor	*Varanus mertensi*	V	-	Coastal and inland waters, often seen climbing on rocks or trees near water (Ward *et al*., 2006).	3	**Likely** Suitable habitat appears to exist in the survey area in the form of creeks and riparian areas.	8, 16a, 31	Whenever water is present (or any time to determine potential suitability of habitat)	Transects and cameras
Mitchells Water Monitor	*Varanus mitchelli*	V	-	Margins of watercourses, swamps and lagoons (Ward, 2012).	0	**Possible** Suitable habitat appears to exist in the survey area in the form of creeks and riparian areas.			

[24] *As per the Referral guideline for the vulnerable water mouse Xeromys myoides (DoE, 2015)*

Common Name	Scientific Name	Status[7]		Preferred habitat	Records within 5 km[8]	Preliminary assessment of likelihood of occurrence[9]	Indicative vegetation map units[10]	Ideal survey period	General survey approach[11]
		NT	Nat.						
Yellow-spotted Monitor	*Varanus panoptes*	V	-	Variety of habitats, including coastal beaches, floodplains, grasslands and woodlands (Ward *et al.*, 2012a).	1	**Possible** There is a paucity of local records, however it is likely to occasionally use the site for breeding, foraging or dispersal.	Most	Any, though warmer months may be better.	Survey may not be required – species may be assumed to occur on site occasionally and the need for any further survey (if any) and impact assessment should be conducted following confirmation of proposed footprint.
Frogs									
Howard River Toadlet	*Uperoleia daviesae*	V	-	The species appears to be generally confined to sandsheet heath, areas of sandy soils with short vegetation that is inundated in the Wet season, or adjacent melaleuca woodland areas (Ward *et al*, 2012b). It is currently known only to occur within the Howard River and Elizabeth River catchments. These areas generally consist of a ground cover of a variety of sedges and herbs with an overstorey of *Grevillea pteridifolia*, *Banksia dentata*, *Verticordia cunninghamii* and *Melaleuca nervosa* (DENR, 2018c). Most records appear to be from small mounds that build up around *Dapsilanthes spathaceus*, sedges and wetland grasses within seasonally inundated open wetlands (Reynolds & Grattidge, 2013).	51	**Likely** There appears to be potentially suitable in the sedgeland / grassland that traverses several sections of the survey area. The abundance of local records may also indicate that the areas in the vicinity of the survey area contains suitable habitat.	8, 12a, 14a, 14b, 16a, 31	Wet season	Multiple nights of survey during or immediately following heavy significant rain.
Sharks[25]									
Northern River Shark	*Glyphis garricki*	V	E	Rivers, tidal sections of large tropical estuarine systems, macrotidal embayments, inshore and offshore marine habitats (Pillans et al., 2009, cited in DoE, 2014a)	0	**Possible** Unlike information relating to suitable habitats for the Dwarf, Largetooth and Green Sawfish, there is very little information on depths of habitat for the Northern River Shark. Of the seven records of the species in the NT Fauna Atlas, one appears to be in a similar situation to that within the survey area. Taking a precautionary approach, it is considered possible to occur until it can be demonstrated otherwise.	Mang4, mang6, mang7 and mang11 (during high tide only)	Start of the dry season	Methods of fishing as described in the *Survey guidelines for Australia's threatened fish* (DSEWPaC, 2011)
Dwarf Sawfish	*Pristis clavata*	V	V, M	Shallow (2–3 m) coastal waters and estuarine habitats (DEWHA, 2009)	0	**Unlikely** Suitable habitat does not appear to exist within the survey area as they prefer water that is 2-3 m deep, although it is noted that estuarine habitats are used as nursery areas by Dwarf Sawfish (Thorburn et al. 2007a, cited in DoE, 2020b).	N/A	N/A	Survey not considered necessary

[25] *Not including the Great White Shark (Carcharodon carcharias) or Whale Shark (Rhincodon typus)*

Common Name	Scientific Name	Status[7]		Preferred habitat	Records within 5 km[8]	Preliminary assessment of likelihood of occurrence[9]	Indicative vegetation map units[10]	Ideal survey period	General survey approach[11]
		NT	Nat.						
Largetooth Sawfish	*Pristis pristis*	V	V, M	Sandy or muddy bottoms of shallow coastal waters, estuaries and river mouths, as well as the central and upper reaches of freshwater rivers and isolated water holes (DoE, 2014b)	0	**Possible** Whilst their preferred habitat is muddy bottoms of river embayments and estuaries (i.e. where they are most often encountered), they are also found well upstream in shallow waters (<1 m deep) while hunting prey (Allen 1997, Wilson, 1999; cited in DoE, 2020c). Given this, it appears reasonable to suggest that the species may be found in the mangroves and salt marshes within the survey area on occasion (i.e. probably during very high tides only).	Mang4, mang6, mang7 and mang11 (during high tide only)	Start of the dry season	Methods of fishing as described in the *Survey guidelines for Australia's threatened fish* (DSEWPaC, 2011)
Green Sawfish	*Pristis zijsron*	V	V	Muddy bottom habitats in inshore marine waters, estuaries, river mouths, embankments and along sandy and muddy beaches, sometimes to very shallow (<1 m) waters (Peverell et al. 2004; Stevens et al. 2005; Thorburn et al. 2004, cited in DoE, 2020d).	0	**Possible** Given that the species can be found in very shallow muddy and sandy bottom habitats, it appears reasonable to suggest that the species may be found in the mangroves and salt marshes within the survey area on occasion (i.e. during high tide).	Mang4, mang6, mang7 and mang11 (during high tide only)		

Appendix B: EPBC Act Protected Matters Search Tool Report

Australian Government
Department of the Environment and Energy

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.

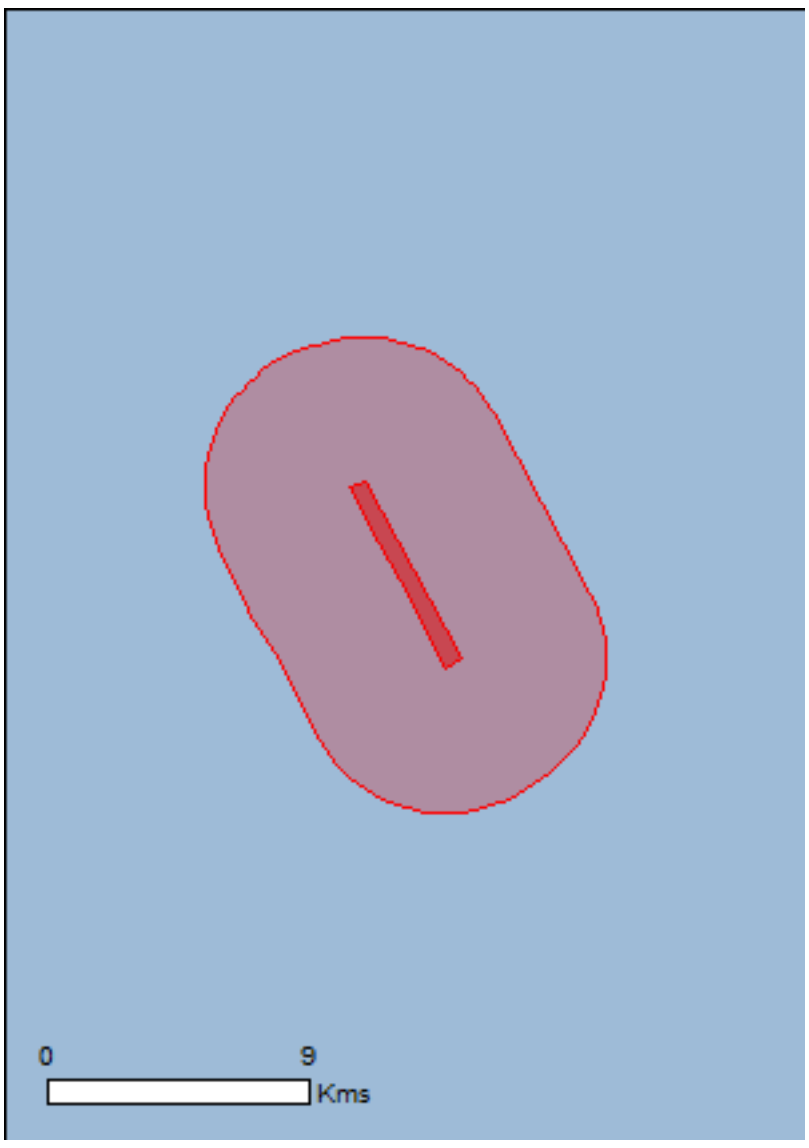
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 29/02/20 12:32:26

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates

Buffer: 5.0Km

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:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	39
Listed Migratory Species:	55

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:	93
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:	23
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat likely to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat likely to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Erythrura gouldiae Gouldian Finch [413]	Endangered	Species or species habitat known to occur within area
Geophaps smithii smithii Partridge Pigeon (eastern) [64441]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Tyto novaehollandiae kimberli Masked Owl (northern) [26048]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Mammals		
Antechinus bellus Fawn Antechinus [344]	Vulnerable	Species or species habitat known to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Conilurus penicillatus Brush-tailed Rabbit-rat, Brush-tailed Tree-rat, Pakooma [132]	Vulnerable	Species or species habitat may occur within area
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat known to occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat may occur within area
Mesembriomys gouldii gouldii Black-footed Tree-rat (Kimberley and mainland Northern Territory), Djintamoonga, Manbul [87618]	Endangered	Species or species habitat known to occur within area
Petrogale concinna canescens Nabarlek (Top End) [87606]	Endangered	Species or species habitat likely 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 Sheathtail Bat [66889]	Vulnerable	Species or species habitat likely to occur within area
Xeromys myoides Water Mouse, False Water Rat, Yirrkoo [66]	Vulnerable	Species or species habitat likely to occur within area
Plants		
Atalaya brevialata [86125]	Critically Endangered	Species or species habitat may occur within area
Stylidium ensatum a triggerplant [86366]	Endangered	Species or species habitat may occur within area
Reptiles		
Acanthophis hawkei Plains Death Adder [83821]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area

Name	Status	Type of Presence
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour 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
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 likely to 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 known 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
Sternula albifrons Little Tern [82849]		Species or species habitat may occur within area
Migratory Marine Species		
Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	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	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour 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	Foraging, feeding or related behaviour likely to occur within area
Dugong dugon Dugong [28]		Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour 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	Foraging, feeding or related behaviour known to occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat known to 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 Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area

Name	Threatened	Type of Presence
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
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Breeding known 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
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 known to occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat known to occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to 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 known to occur within area
Arenaria interpres Ruddy Turnstone [872]		Species or species habitat likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris alba Sanderling [875]		Species or species habitat likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat likely to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	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
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius phaeopus Whimbrel [849]		Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Pluvialis squatarola Grey Plover [865]		Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat 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 known to occur within area
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Anseranas semipalmata Magpie Goose [978]		Species or species

Name	Threatened	Type of Presence
		habitat may occur within area
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area
[Ardea alba](#) Great Egret, White Egret [59541]		Species or species habitat known to occur within area
[Ardea ibis](#) Cattle Egret [59542]		Species or species habitat may occur within area
[Arenaria interpres](#) Ruddy Turnstone [872]		Species or species habitat likely to occur within area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
[Calidris alba](#) Sanderling [875]		Species or species habitat likely to occur within area
[Calidris canutus](#) Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat likely to occur within area
[Calidris tenuirostris](#) Great Knot [862]	Critically Endangered	Species or species habitat likely to occur within area
[Calonectris leucomelas](#) Streaked Shearwater [1077]		Species or species habitat known to occur within area
[Charadrius leschenaultii](#) Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area
[Charadrius mongolus](#) Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat likely to occur within area
[Charadrius veredus](#) Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
[Chrysococcyx osculans](#) Black-eared Cuckoo [705]		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
[Glareola maldivarum](#) Oriental Pratincole [840]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known 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 known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius phaeopus Whimbrel [849]		Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Pluvialis squatarola Grey Plover [865]		Species or species habitat likely 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 albifrons Little Tern [813]		Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area
Fish		
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
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
Halicampus brocki Brock's Pipefish [66219]		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 spinirostris 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
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

Name	Threatened	Type of Presence
[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 area
[Astrotia stokesii](#) Stokes' Seasnake [1122]		Species or species habitat may occur within area
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
[Crocodylus johnstoni](#) Freshwater Crocodile, Johnston's Crocodile, Johnston's River Crocodile [1773]		Species or species habitat may 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	Foraging, feeding or related behaviour likely

Name	Threatened	Type of Presence
		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	Species or species habitat known to occur within area
Hydrelaps darwiniensis Black-ringed Seasnake [1100]		Species or species habitat may 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 mcdowelli 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	Foraging, feeding or related behaviour known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Parahydrophis mertoni Northern Mangrove Seasnake [1090]		Species or species habitat may occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans [Resource Information]

Name	Status	Type of Presence
Mammals		

Name	Status	Type of Presence
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Delphinus delphis Common Dophin, 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 known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Breeding 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 Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat known to occur within area
Mammals		

Name	Status	Type of Presence
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Bubalus bubalis Water Buffalo, Swamp Buffalo [1]		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
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		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
Brachiaria mutica Para Grass [5879]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Hymenachne amplexicaulis Hymenachne, Olive Hymenachne, Water Stargrass, West Indian Grass, West Indian Marsh Grass [31754]		Species or species habitat likely to occur within area
Jatropha gossypifolia Cotton-leaved Physic-Nut, Bellyache Bush, Cotton-leaf Physic Nut, Cotton-leaf Jatropha, Black Physic Nut [7507]		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, ThornySensitive Plant, Black Mimosa, Catclaw Mimosa, Bashful Plant [11223]		Species or species habitat likely to occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
Pennisetum polystachyon Mission Grass, Perennial Mission Grass, Missiongrass, Feathery Pennisetum, Feather		Species or species habitat likely to occur

Name	Status	Type of Presence
Pennisetum, Thin Napier Grass, West Indian Pennisetum, Blue Buffel Grass [21194]		within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to 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

Nationally Important Wetlands

[Resource Information]

Name	State
Port Darwin	NT

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

-12.571478 130.940609,-12.570472 130.945072,-12.623412 130.974598,-12.626427 130.969963,-12.600461 130.95623,-12.589069 130.94902,-12.571478 130.940609

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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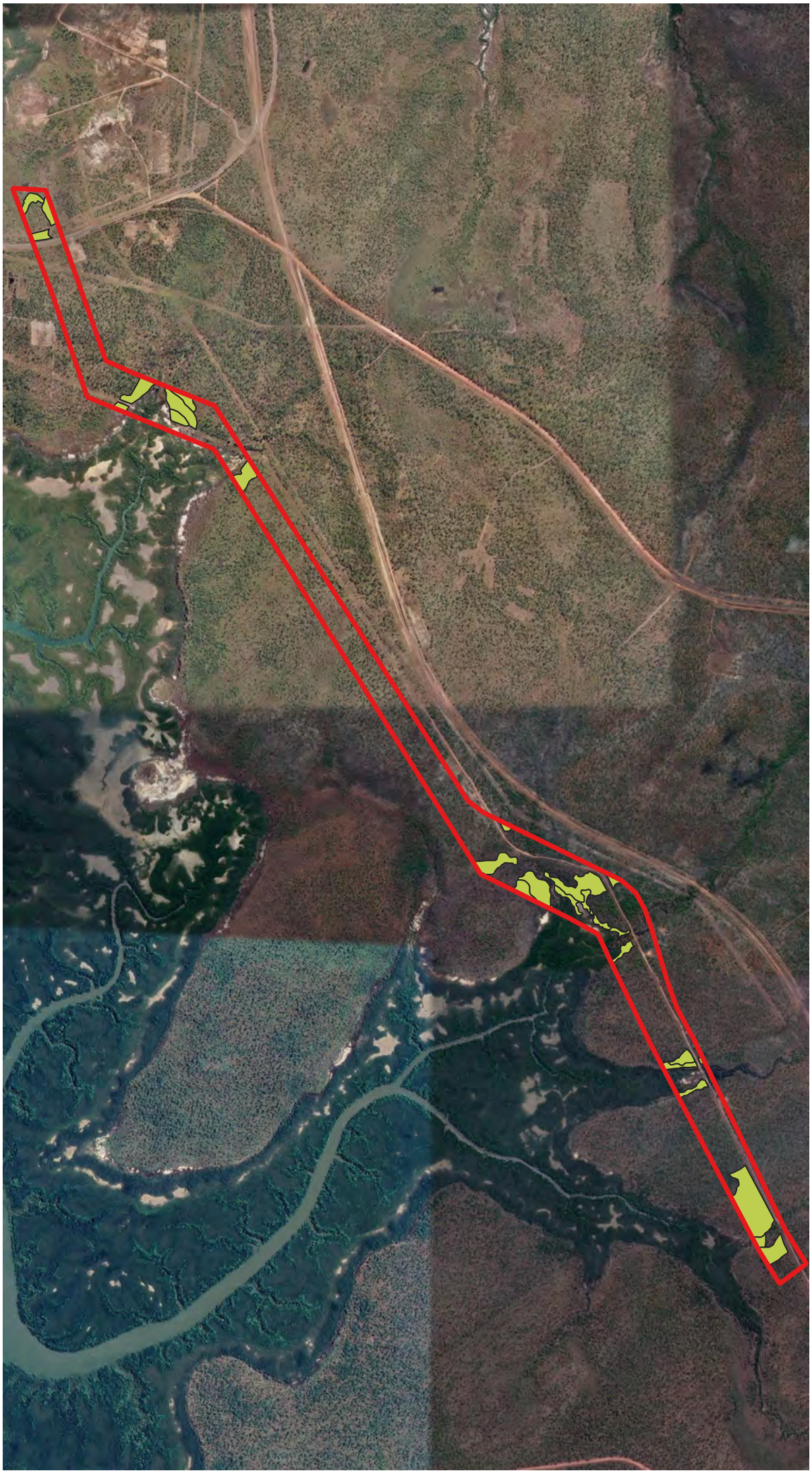
Appendix C: Maps of potentially suitable habitat for threatened species in the survey area



MAP 1 - Atalaya brevialata suitable habitat (potential)

Key

- Potential Atalaya brevialata habitat
- Survey area

Google Satellite

N

0 250 500 750 m

1:27500

Client: Coffey Services Australia Pty Ltd

27 February 2020

CONNECT environmental

MAP 2 - Cleome insolata suitable habitat (potential)

Key

- Potential Cleome insolata habitat
- Survey area

Google Satellite

N

0 250 500 750 m

1:27500

Client: Coffey Services Australia Pty Ltd

27 February 2020

CONNECT environmental

MAP 3 - Stylidium ensatum suitable habitat (potential)

Key

- Potential Stylidium ensatum habitat
- Survey area

Google Satellite

N

0 250 500 750 m

1:27500

Client: Coffey Services Australia Pty Ltd

27 February 2020

CONNECT environmental

MAP 4 - T. taylori and U. dunstaniae / singeriana suitable habitat (potential)

Key

- Potential T. taylori and U. dunstaniae / singeriana habitat
- Survey area

Google Satellite

N

0 250 500 750 m

1:27500

Client: Coffey Services Australia Pty Ltd

27 February 2020

CONNECT environmental

MAP 5 - Red Goshawk and Masked Owl suitable habitat (potential)

Key

- Potential Red Goshawk and Masked Owl habitat
- Survey area

Google Satellite

N

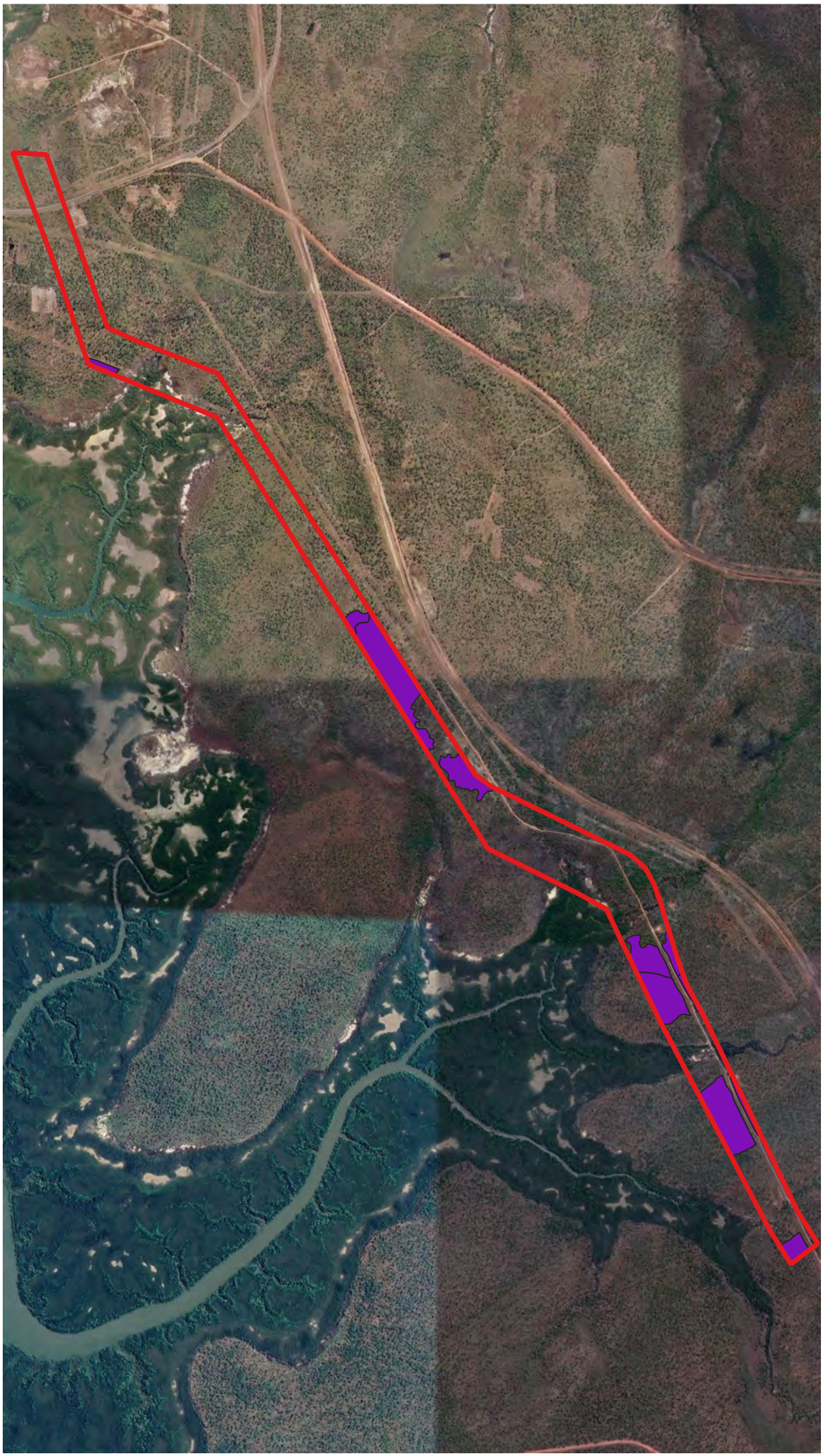
0 250 500 750 m

1:27500

Client: Coffey Services Australia Pty Ltd

27 February 2020

CONNECT environmental



MAP 6 - Partridge Pigeon suitable habitat (potential)

Key

- Potential Partridge Pigeon habitat
- Survey area

Google Satellite

N

0 250 500 750 m

1:27500

Client: Power and Water Corporation

27 February 2020

CONNECT environmental

MAP 7 - Fawn Antechinus suitable habitat (potential)

Key

- Potential Fawn Antechinus habitat
- Survey area

Google Satellite

N

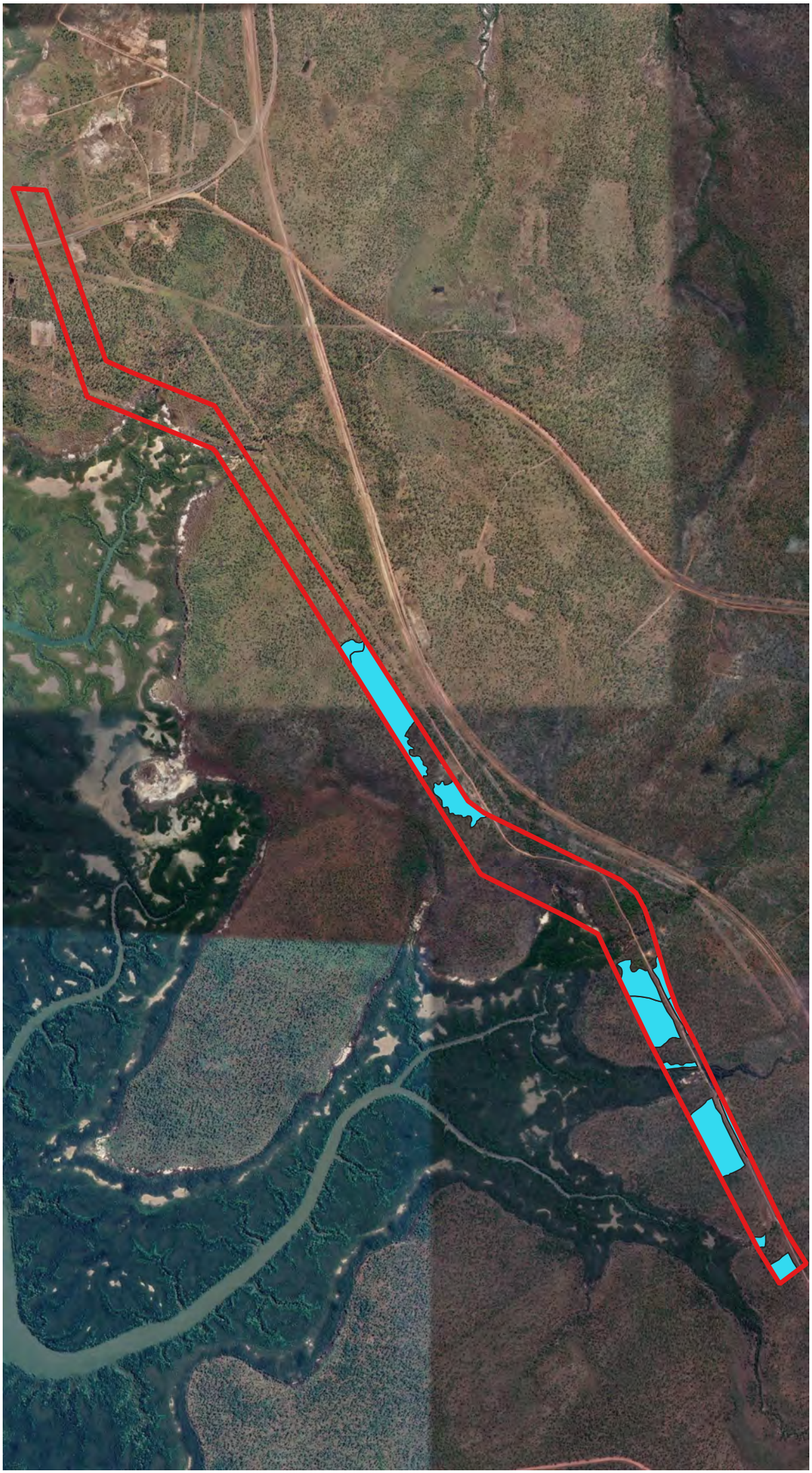
0 250 500 750 m

1:27500

Client: Coffey Services Australia Pty Ltd

27 February 2020

CONNECT environmental



MAP 8 - Northern Quoll shelter habitat (potential)

Key

- Potential Northern Quoll shelter / critical habitat
- Survey area

Google Satellite

N

0 250 500 750 m

1:27500

Client: Coffey Services Australia Pty Ltd

27 February 2020

CONNECT environmental

MAP 9 - Black-footed Tree-rat 'suitable' and 'potentially suitable' habitat

Key

- Suitable habitat
- Potentially suitable
- Survey area

Google Satellite

N

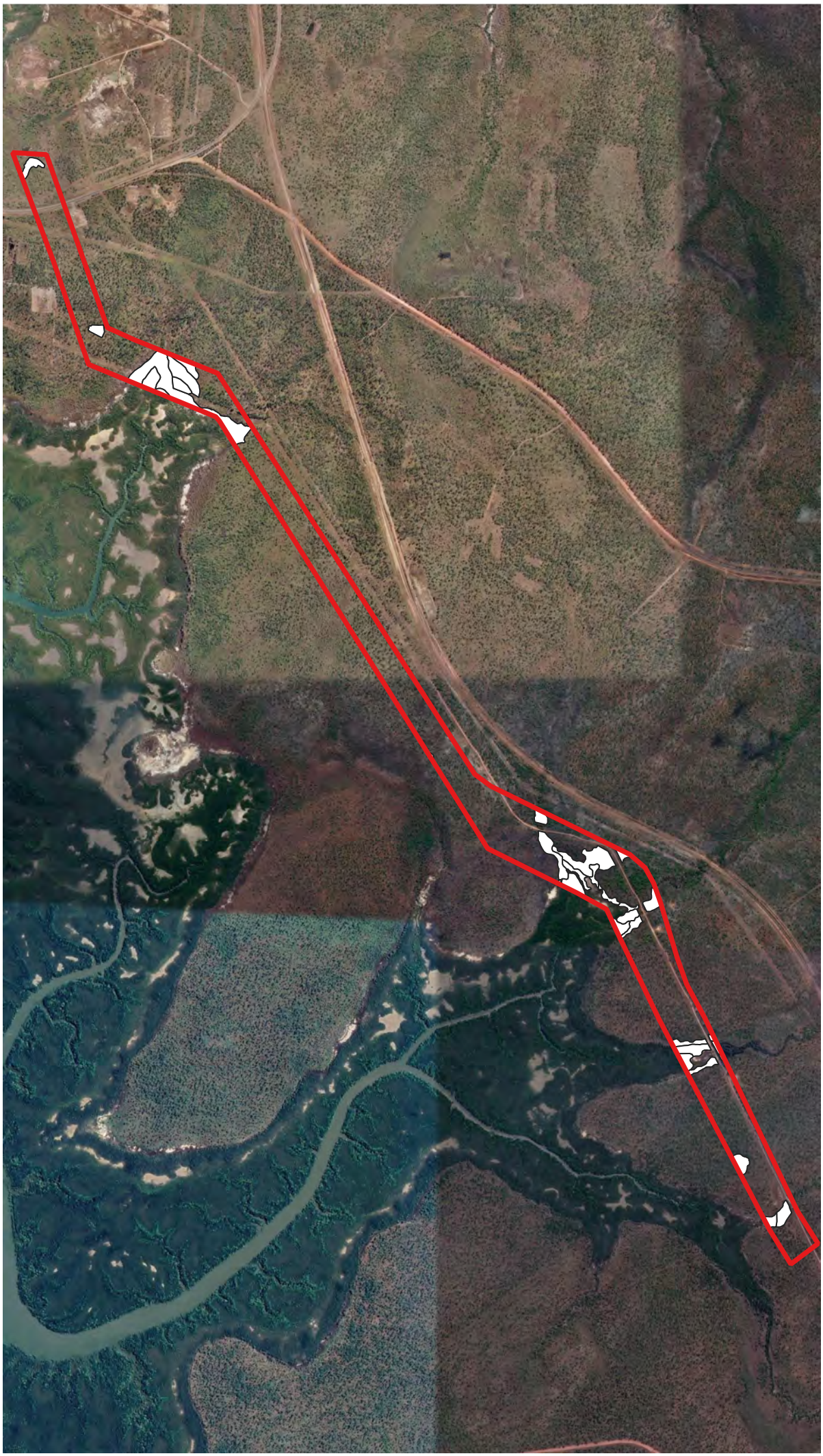
0 250 500 750 m

1:27500

Client: Coffey Services Australia Pty Ltd

27 February 2020

CONNECT environmental



MAP 10 - Australian Painted Snipe suitable habitat (potential)

Key

- Potential Australian Painted Snipe habitat
- Survey area

Google Satellite

N

0 250 500 750 m

1:27500

Client: Coffey Services Australia Pty Ltd

27 February 2020

CONNECT environmental

MAP 11 - Threatened migratory bird suitable habitat (potential)

Key

- Potential threatened migratory bird habitat
- Survey area

Google Satellite

N

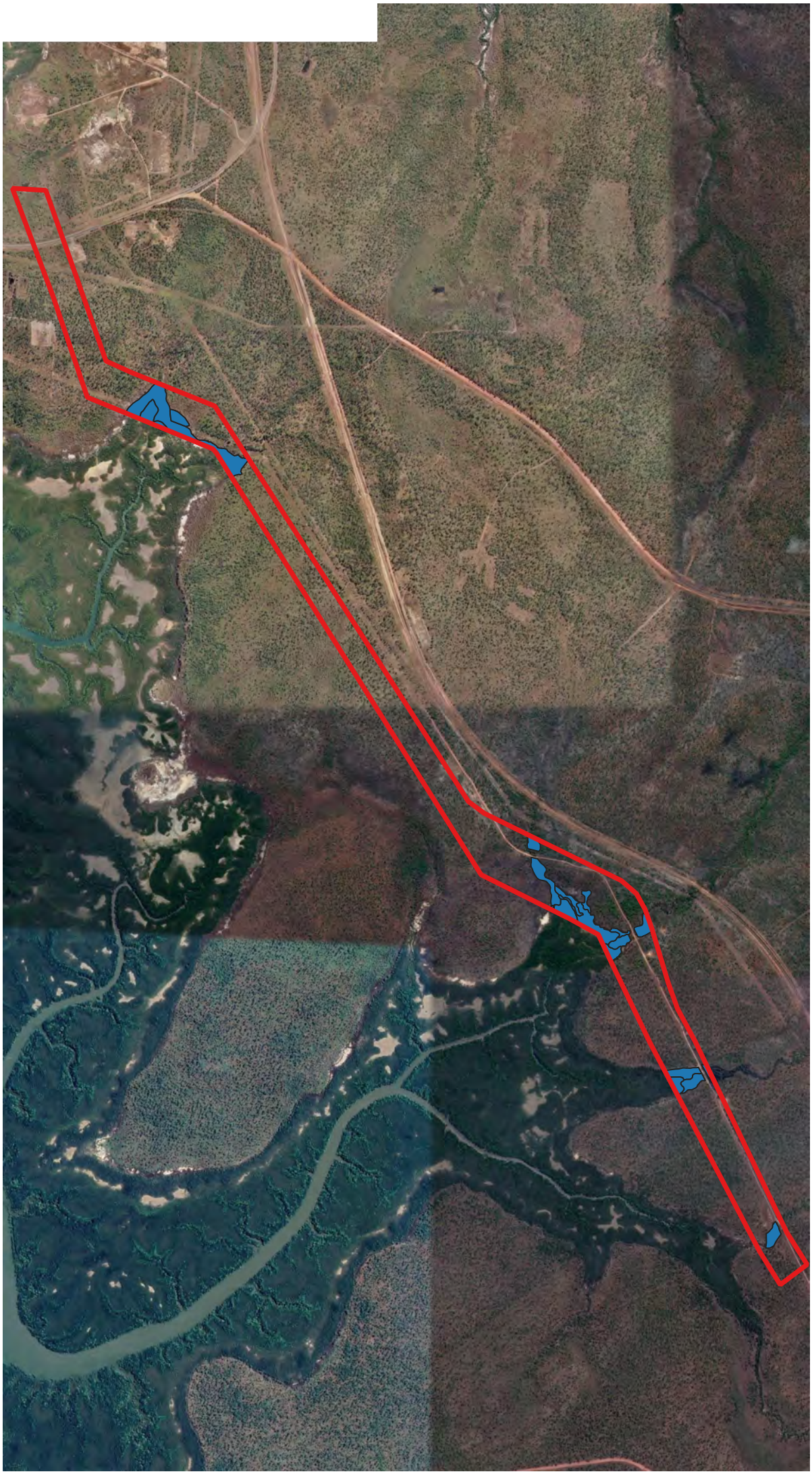
0 250 500 750 m

1:27500

Client: Coffey Services Australia Pty Ltd

27 February 2020

CONNECT environmental



MAP 12 - Water Mouse suitable habitat (potential)

Key

- Potential Water Mouse habitat
- Survey area

Google Satellite

N

0 250 500 750 m

1:27500

Client: Coffey Services Australia Pty Ltd

27 February 2020

CONNECT environmental

MAP 13 - Pale Field-rat suitable habitat (potential)

Key

- Potential Pale Field-rat habitat
- Survey area

Google Satellite

N

0 250 500 750 m

1:27500

Client: Coffey Services Australia Pty Ltd

27 February 2020

CONNECT environmental

MAP 14 - Howard River Toadlet suitable habitat (potential)

Key

- Potential Howard River Toadlet habitat
- Survey area

Google Satellite

N

0 250 500 750 m

1:27500

Client: Coffey Services Australia Pty Ltd

27 February 2020

CONNECT environmental

MAP 15 - Merten's and Mitchell's Water Monitor suitable habitat (potential)

Key

- Potential Merten's and Mitchell's Water Monitor habitat
- Survey area

Google Satellite

N

0 250 500 750 m

1:27500

Client: Coffey Services Australia Pty Ltd

27 February 2020

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Appendix C – *Typhonium praetermissum* DNA coding

Australian Tropical Herbarium

Identification of sterile *Typhonium* samples (Araceae) from the Northern Territory using DNA barcoding, June 2020

Report to Connect Environmental, Northern Territory, Australia

Research conducted by:
Dr Matthew Barrett
Australian Tropical Herbarium,
James Cook University
McGregor Rd,
Smithfield, QLD

Summary

Aim: This report details identification of thirteen (13) Typhonium plants of uncertain identity from three localities in the Northern Territory. Australian arum lilies of the genus *Typhonium* include many rare, threatened and poorly known species, including several that are restricted to the greater Darwin area, including *T. praetermissum* and *T. taylori*. Surveys for *Typhonium* are constrained by the requirement for flowering parts for identification, which are only briefly available on a subset of plants in a population each year. DNA barcoding offers a solution to the identification problem, and DNA barcodes using the chloroplast *trn*K intron have previously been successfully applied in the Northern Territory.

This study utilised *trn*K DNA sequences to identify thirteen samples representative of larger *Typhonium* populations from three discrete locations in the Northern Territory.

Method: Sequences of ~2500 base-pairs of the *trn*K intron (including the *mat*K gene) were generated from the 13 supplied samples using a previously developed protocol, and compared against a previously developed database of reference sequences.

Results: The 13 samples each produced a single *trn*K DNA sequence barcode, that belonged to one of two haplotypes differing by a single substitution, which were identical or near-identical matches to reference sequences of *Typhonium praetermissum*. All samples were therefore unambiguously identified as *Typhonium praetermissum* by the DNA barcoding methods developed for Australia *Typhonium*.

Acknowledgements

We thank Mihkel Proos of Connect Environmental for supplying material and discussion of the results.

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Background

In March 2020, Connect Environmental contracted Dr Matt Barrett, Australian Tropical Herbarium to utilise DNA barcoding to identify samples of *Typhonium* species collected from three discrete locations in the Northern Territory. The samples to be barcoded were collected during rare flora surveys for threatened *Typhonium* species in early 2020. Due to difficulties of accurately recognising non-flowering *Typhonium* species in the field, validation method was required to identify plants in leaf. DNA barcoding has previously been successfully applied to the *Typhonium* identification problem in Northern Australia, using a methodology previously developed and validated by Dr Barrett.

Australian *Typhonium* arum lilies are geophytic herbs with flowers that produce an unpleasant scent to attract flies or beetles. The genus contains more than 30 species in Australia, including 18 described species (Hay 2011) and at least 14 species in the process of being formally described and named (M.D. Barrett et al. in prep.). About 70% of the Australian *Typhonium* species are rare, restricted or poorly known from one or a few locations. It has recently been discovered (Cusimano et al. 2010) that the Australian endemic species (i.e. all except for the more widely distributed Australasian species *T. flagelliforme*, *T. roxburghii* and the introduced *T. blumei,* see Nicolson & Sivadasan 1981) form a unique lineage distinct from *Typhonium sensu stricto*. All Australian-endemic species will be transferred to the genus *Lazarum* in a forthcoming paper. The genus *Typhonium* is used here in an inclusive sense to match current literature and Australian databases.

Morphological identification techniques usually require flowering parts, which are usually only briefly available during the wet season. Only some plants in a population flower each year, and flowering in most species only occurs in a brief and unpredictable 2-3 week window at the start of each wet season. Inflorescences are solitary, and are open for only 1-3 days. As a result, even at peak flowering season, surveys typically encounter predominantly sterile plants. Compounding identification, many species of *Typhonium* exhibit extreme variation in leaf form between individual plants. Thus it is usually impossible to differentiate species with any certainty based on vegetative material alone.

The Top End of the Northern Territory is the richest area in Australia for *Typhonium* species, with at least 12 species, nine of which are found nowhere else (Hay 1992, Hay 1993, Hay & Taylor 1996, Hay 1997). At least seven species occur the vicinity of Darwin, and two species (*Typhonium johnsonianum* and *T. taylori*) are listed as threatened under IUCN criteria (Vulnerable and Endangered respectively). Consequently, new development proposals in the vicinity of Darwin have been required to conduct surveys for threatened *Typhonium* species.

This report details the results of DNA barcoding identifications of *Typhonium* samples collected to represent larger populations discovered during three localized surveys by Connect Environmental consultants in early 2020.

Aims

To apply DNA barcoding techniques to a collection of 13 *Typhonium* samples from the Northern Territory, providing accurate identification to validate mapping of threatened species.

Materials and Methods

Plant sampling

Leaf samples were taken from 16 plants located during field surveys by Connect Environmental staff in early 2020. Leaf portions of plants sampled in the field were dried in silica gel and sent to Dr. Barrett for DNA barcoding and analysis.

DNA barcoding

The *trn*K intron of the chloroplast genome was initially developed as an appropriate barcode for the following reasons: (1) part of the intron (the *mat*K gene) is a widely used as a plant barcode, (2) it has previously been shown to discriminate many taxa of *Typhonium* (Cusimano et al. 2010), (3) the chloroplast region is inherited uni-parentally, so is only single-copy in any individual (i.e. barcodes are readily and unambiguously sequenced), (4) an existing database of sequences including known outgroups is available on Genbank (http://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi and search for "*Typhonium*"), and has been further extended for Northern Territory species by unpublished sequences (M. Barrett, unpublished data). For *Typhonium johnsonianum*, *T. prastermissum* and *T. taylori*, reference barcodes are available from several populations, and include the type population in each case. DNA barcode variation in the *trn*K region within species has been experimentally verified to be extremely low, while many apomorphic substitutions exist between DNA barcodes for each species in the vicinity of Darwin. In other words, a sufficient barcode gap exists to unambiguously identify species in the vicinity of Darwin. In a few cases, the barcode gap is insufficient for *trn*K to distinguish some closely related species from Kimberley and Eastern states species. (e.g. *Typhonium angustilobium* and *Typhonium wilbertii*), but this issue has not been observed in taxa present in the Darwin area.

Controls
Two negative and three positive controls were used to detect the presence of contamination in stocks. For negative controls, two aliquots of extraction buffer (without plant tissue) were ground in a mortar and pestle, exactly following the DNA extraction procedure (detailed in Appendix 1) of other DNA samples. These three samples were carried throughout the remainder of the sequencing procedure. Presence of any readable sequence in these blank samples would indicate contamination (e.g. across samples, or of stock reagents) at some stage during the method. For positive controls, duplicate DNA extractions of three randomly selected *Typhonium* samples were performed, and processed independently. Any variation between these replicate sample pairs indicates inconsistency of some part the procedure.

As an additional control to prevent investigator bias, samples were given code names lacking any identification or location information, and processed and edited blindly, only matching codes with reference sequences after final sequence analysis.

Sequence methodology
DNA was extracted, and *trn*K intron (which contains the *mat*K gene involved in intron splicing) sequences obtained following standard procedures, detailed in Appendix 1. Priming sequences and PCR conditions followed Cusimano et al. (2010), as outlined in Appendix 1.

Sequence editing and analysis
Forward and reverse electropherogram profiles were combined and edited manually in CodonCode Aligner v. 2.0.4 (CodonCode Corporation). Edited sequences were then manually aligned in GENEIOUS v. 7.1.5 (http://www.geneious.com, Kearse et al., 2012).

Sequences were visually compared to aligned references sequences to confirm in GENEIOUS v.9 to confirm matches.

Results
Barcoding of 'unknown' samples

Sample and control sequence results
Of the six controls, all three negative controls failed to amplify a PCR product as expected, and also failed to produce any sequence product, indicating that reagents were not contaminated with any DNA, and that no wholesale cross-sample contamination occurred. For positive controls, all three replicate sequences pairs were identical to each other, demonstrating the reliability of the technique and validating operator performance, as well as again failing to detect any evidence of cross-contamination.

The 13 samples each produced a single *trn*K DNA sequence barcode, that belonged to one of two haplotypes (n1=12, n2=1), differing by a single base pair. All 13 samples from the three locations were identical or differed by a single substitution to reference sequences of *T. praetermissum*, while differing by a minimum 7 substitutions, including 5 apomorphic substitutions unique to, and fixed for, *T. praetermissum*. All samples were therefore unambiguously identified by the DNA barcoding methods developed for Australia *Typhonium*.

Several sequence reads produced poor quality chromatograms near the start or end of their read, resulting in ambiguous base-calls at some positions in the aligned contigs. In addition, only 1312 and 1491 base-pairs (bps) of the ~2500 bp trnK intron were recovered for two samples (C6 and C11). Neither issue impacted the interpretation of data for any sample, since missing data was minimal, overlap of missing data with apomorphic positions was extremely rare, and there was redundancy in unambiguously diagnostic substitutions for *T. praetermissum*.

Collection numbers and DNA barcode identification are summarized in Table 1.

Table 1. Collection numbers with DNA barcodes matching *T. praetermissum*.

T. praetermissum
Site 1
TP1-HowardSprings
TP2-HowardSprings
TP3-HowardSprings
TP4-HowardSprings
TP5-HowardSprings
TP6-HowardSprings
Site 2
Typh_C1
Typh_C6
Typh_C8
Typh_C10
Typh_C11
Site 3
Typh_prae_Y1
Typh_prae_Y2

References

Carlson JE, Tulsieram LK, Glaubitz JC, Luk VWK, Kauffeldt C & Rutledge R. (1991) Segregation of random amplified DNA markers in F1 progeny of conifers. *Theoretical and Applied Genetics* 83: 194-200.

Csaikl UM, Bastion H, Brettschneider R, Gauch S, Meir A, Schauerte M, Scholz F, Sperisen C, Vornam B & Ziegenhagen B. (1998) Comparative analysis of different DNA extraction protocols: a fast, universal maxi-preparation of high quality plant DNA for genetic evaluation and phylogenetic studies. *Plant Molecular Biology Reporter* 16: 69-86.

Cusimano N, Barrett, MD, Hetterscheid WLA & Renner SS. (2010). A phylogeny of the Areae (Araceae) implies that *Typhonium*, *Sauromatum*, and the Australian species of *Typhonoum* are distinct clades. *Taxon* 59: 439-47.

Hay, A. (1992). A new Australian genus of Araceae, with notes on generic limits and biogeography of the Areae. *Botanical Journal of the Linnaean Society* 109(3): 427-434.

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Johnson LA & Soltis DE. 1994 (1995). Phylogenetic Inference in Saxifragaceae Sensu Stricto and *Gilia* (Polemoniaceae) Using *mat*K Sequences. Annals of the Missouri Botanical Garden, Vol. 82(2), pp. 149-175.

Kearse M, Moir R, Wilson A, Stones-Havas S, Cheung M, Sturrock S, Buxton S, Cooper A, Markowitz S, Duran C, Thierer T, Ashton B, Mentjies P, & Drummond A. (2012). Geneious Basic: an integrated and extendable desktop software platform for the organization and analysis of sequence data. *Bioinformatics*, *28*(12), 1647-1649.

Nicolson DH & Sivadasan M. (1981). Four frequently confused species of *Typhonium* Schott (Araceae). *Blumea* 27: 483-497.

Appendix 1: Laboratory Methods

DNA extraction protocol

1. Grind plant tissue using a mortar and pestle (approx. 0.5 g) in liquid nitrogen until a powder is obtained.
   [*This step can be omitted if you do not have access to liquid N_2*]
2. Add 1.4 mL of Carlson extraction buffer (*) to the mortar and grind again.
   [Breaks cell walls]
3. Transfer 1 mL of the liquid to a 1.5 mL Eppendorf tube
   [Warning: - Take caution not to flick liquid into the pipette tip or chamber as lumps catch in the pipette tip]
4. Incubate samples in water bath at 65^{o}C for 10-15 minutes
   [CTAB soap, high salt, temp. disrupts nuclear membrane to release DNA]
5. Centrifuge samples at 13 000 [or at least 11 500] rpm for 10 mins
   [Cellular debris pelleted leaving DNA in solution]
6. Transfer supernatant to a new 1.5 mL Eppendorf tube.
7. In fume hood, add 500 µL chloroform: isoamyl alcohol (24:1) to each sample.
   [Excludes proteins which are preferentially attracted to chloroform layer]
8. Shake tubes on shaker for 30 mins [10-60 mins].
9. Centrifuge samples at 13 000 rpm for 10 minutes
10. Transfer 750 µL of supernatant to a new 1.5 mL Eppendorf tube taking care not to disturb debris in middle layer.
11. In fume hood, add an equal volume (750 µL) of cold isopropanol to each sample. Mix gently by inversion min. 4 times.
    [Precipitates DNA – may be visible strands at this stage]
12. Store samples in -20^{o}C freezer for 20-30 mins [theoretically, unwanted rubbish starts to precipitate after 30 mins, but if you really have to you can leave these overnight in the freezer].
13. Centrifuge samples at 13 000 rpm for 10 minutes
    [Pulls DNA into a pellet]
14. Discard liquid using a pipette taking care not to disturb the fragile DNA pellet [Don't delay removing supernatant after centrifugation - pellet will quickly become detached]
15. Add 500 µL of 70% ethanol to each sample
    [Washes further contaminants away from the DNA pellet]
16. Centrifuge samples at 13 000 rpm for 10 minutes
17. Pour off liquid and dry lip with clean paper towel. [Don't delay removing supernatant after centrifugation, pellet will quickly become detached]
18. Allow to air dry for at least 2 hours
    [70% EtOH evaporates leaving no ethanol or water traces]
19. Resuspend DNA in 80 µL TE buffer (0.1 M)

**Carlson Extraction Buffer (following Csaikl et al., 1998):*
5.00 g Poly Ethylene Glycol (PEG) 6000 (1% final conc)
10.0 g Cetyltrimethylammonium Bromide (CTAB) (2% final conc)
140 mL 5 M NaCl (1.4 M final conc)
50 mL 1 M Tris (100 mM final conc)
20 mL 0.5 M EDTA pH 9.5 (20 mM final conc)
Add deionised water to make 500 mL of buffer.

DNA Sequencing

Sequences of the *ca*. 2500 base-pair *trnK* intron (including the *mat*K gene and the pre-*mat*K spacer) was performed by PCR amplification in two parts with the primer pairs trnK-3914F (dicot) / trnK-RM and trnK-FM / trnK-16R, following Cusimano et al. 2010, and each fragment sequenced using the forward and reverse primers as used to amplify the region. Primer sequences are listed in Table 3.

Table 3. Primer sequences used to amplify the trnK intron

Primer name	**Primer sequence**	**Reference**
Part 1		
*trn*K-3914F (dicot)	5′-GGGGTTGCTAACTCAACGG-3′	Johnson & Soltis, 1994
*trn*K-RM	5′-AAGATGTTGATCGTAAATAAGAGG-3′	Cusimano et al. 2010
Part 2		
*trn*K-FM	5′-GTTTTGCTGTCATTATGGAAATTCC-3′	Cusimano et al. 2010
*trn*K-16R	5′-AACTAGTCGGATGGAGTAG-3′	Johnson & Soltis, 1994, (as "trnK-2R")

PCR reaction (per sample, total reaction volume 14 µL)

Distilled H2O	4.592 µL
5x PCR Buffer* (Fisher Biotec)	2.8 µL
MgCl2 (25 mM)	1.4 µL
DMSO (3%)	0.56 µL
BSA (2%)	0.42 µL
Forward primer (5 µM)	1.4 µL
Reverse primer (5 µM)	1.4 µL
Taq DNA polymerase (5.5 U/µL)	0.028 µL
Template DNA	1.4 µL

*with DNTP's. Final concentration of buffer: 67 mM Tris-HCl (pH 8.8 at 25oC), 16.6 mM (NH4)2SO4, 0.45% Triton X-100, 0.2 mg/mL Gelatin, 0.2 mM of each dNTP (all diluted 1:4 from 5x polymerisation buffer, Fischer Biotec, Subiaco, Australia).

PCR Thermocycling was carried out on a thermocycler with the following temperature profile:
Initial denature: 95°C for 3 min, followed by 40 cycles of: (denature 95°C for 60 sec, anneal 54°C for 60 sec, extension 72°C for 1 min 30 sec), followed by a final extension at 72°C for 7 min, and finally holding at 4 °C.

A total of 3 µL of each PCR products were visualized on a 2% agarose gel to check for a single product, and estimate concentration.

Unincorporated primers were degraded from PCR reaction products using Exo-SAP protocol, adding 1.1 µL of Exo-SAP (Exo = Exonuclease, SAP = Shrimp Alkaline Phosphatase; Affymetrix, USB Products) per sample, and placing on thermocycler for 20 mins at 37°C , then 15 min @ 80°C.

Cycle Sequencing

Two microliters of cleaned PCR products were air-dried and sent to Australian Genome Resources Facility (AGRF), Gehrmann Laboratories, Research Road, University of Queensland, St Lucia, QLD 4072 for Sanger sequencing.

A procedure for performing the cycle sequence reaction is outlined below (this procedure was used to obtain the reference sequences).

The cycle sequence PCR reaction was performed in a 10 µL reaction volume using the following ingredients per well:

PCR reaction (per sample, total reaction volume 10 µL)

H2O	6.235 µL
5x SEQ Buffer	1.875 µL
Primer (5 µM)	0.64 µL
BigDye v3.1	0.25 µL
Cleaned PCR template from above:	1 µL

The resulting reaction mix was placed in a PCR machine (Veriti®, Applied Biosystems) with the following cycle sequence thermocycle: initial denaturation for 96 °C for 1 min, followed by 25 cycles of (96 °C for 10 sec, 50 °C for 5 sec, 60 °C for 4 min), and finally holding at 4 °C hold until ready to purify.

Cycle Sequence Cleanup

Unincorporated dye terminators were removed from the Cycle sequence products following PCR using ethanol precipitation, adding to each 10 µL reaction (total 80 µL per sample):

EtOH (100%)	62.5 µL
Distilled H2O	14.5 µL
3M Sodium acetate (NaOAc)-pH 4.6	3 µL

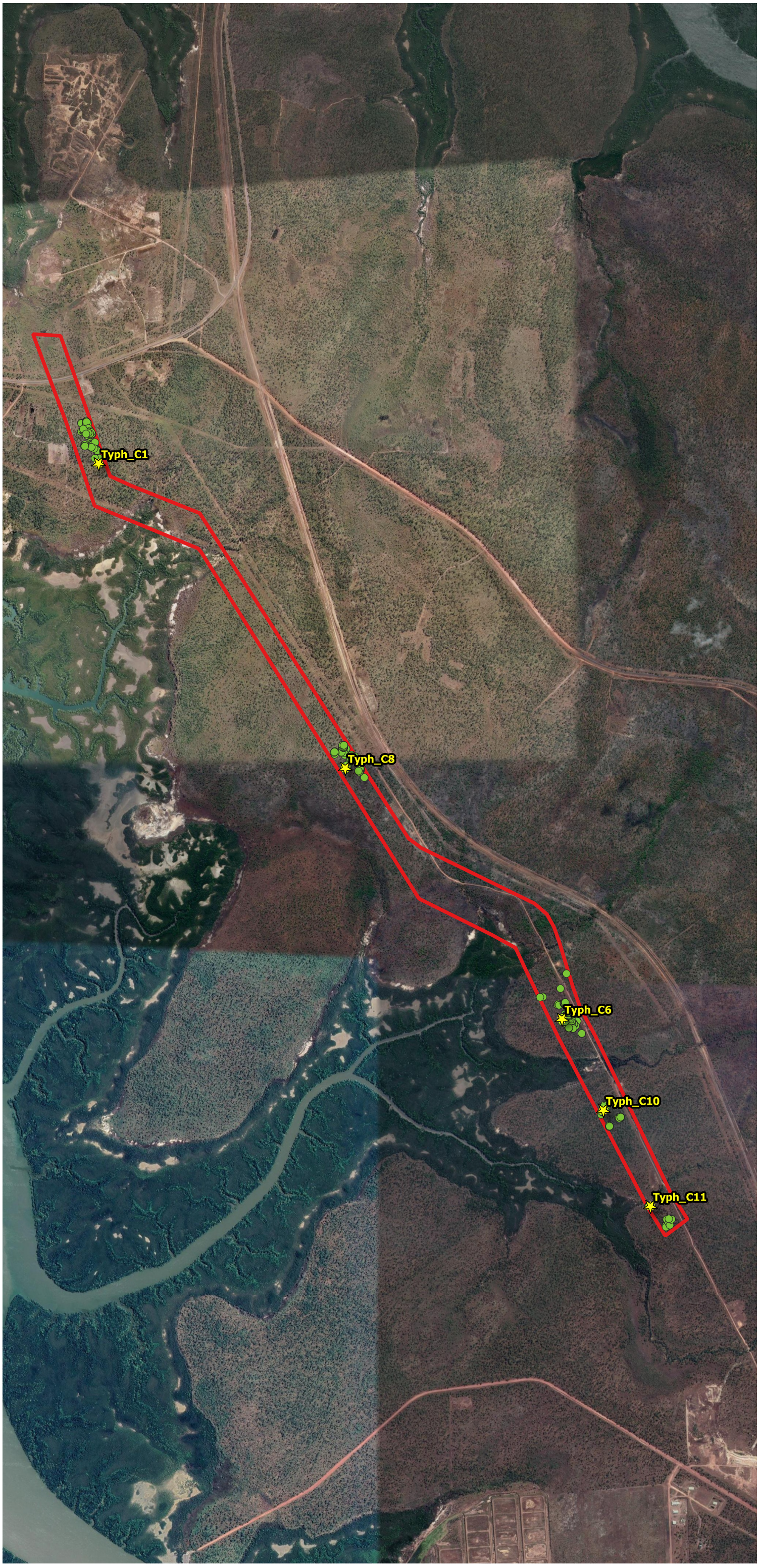
After addition of the above mixture, samples were vortexed to mix, left in the dark at room temperature for 15 mins to precipitate fragments, centrifuged at 2500g for 45 mins, after which supernatant was flicked from the plate and the sample plate dabbed on clean paper towel, the sample pellets washed by adding 150 µL of 70% EtOH, votexed briefly, centrifuged at 2500g for 10 mins, again flicking the supernatant from the plate and dabbing on clean paper towel, and finally the plate was centrifuged upside down on clean towel at 500 RPM for 1 min to remove the remaining ethanol (alternatively can leave tubes open to air-dry for 15 mins). Samples kept dry at -20oC until ready to run on the sequencer.

Cleaned products were resuspended in 12 µL HiDi Formamide, and 10 µL transferred to the sequencing plate. Sequence fragments were separated and visualised on an Applied Biosystems ABI 3500 Genetic Analysis System, with a separation time of 60 minutes.

Contig assembly

The resulting electropherograms (.ab1 files) were assembled into contigs and edited using CodonCode Aligner (CodonCode Corporation, Dedham, MA).

Typhonium praetermissum sample points



Key

- Typhonium praetermissum sample points
- All typhonium praetermissum detections

Google Satellite

N

0 0.5 1 1.5 km

1:25000

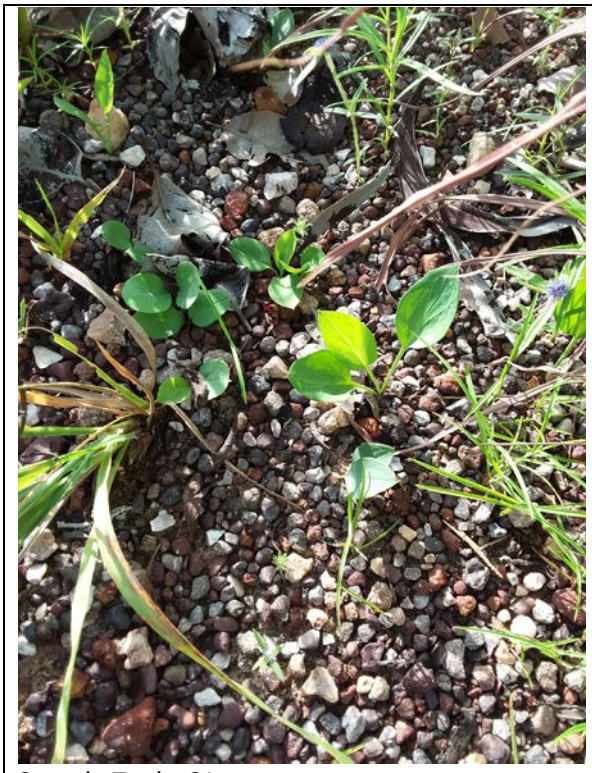
Client: Coffey Services Australia Pty Ltd
8 June 2020

CONNECT environmental

Typhonium praetermissum samples collected during surveys in January and February 2020.

Sun Cable Utilities Corridor, Wickham, NT.

Connect Environmental.



Sample Typh_C1

Sample Typh_C6

Sample Typh_C8

Sample Typh_C10

 Sample Typh_C11	

Appendix D – EPBC Protected Matters Search Tool reports

Australian Government
Department of the Environment and Energy

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.

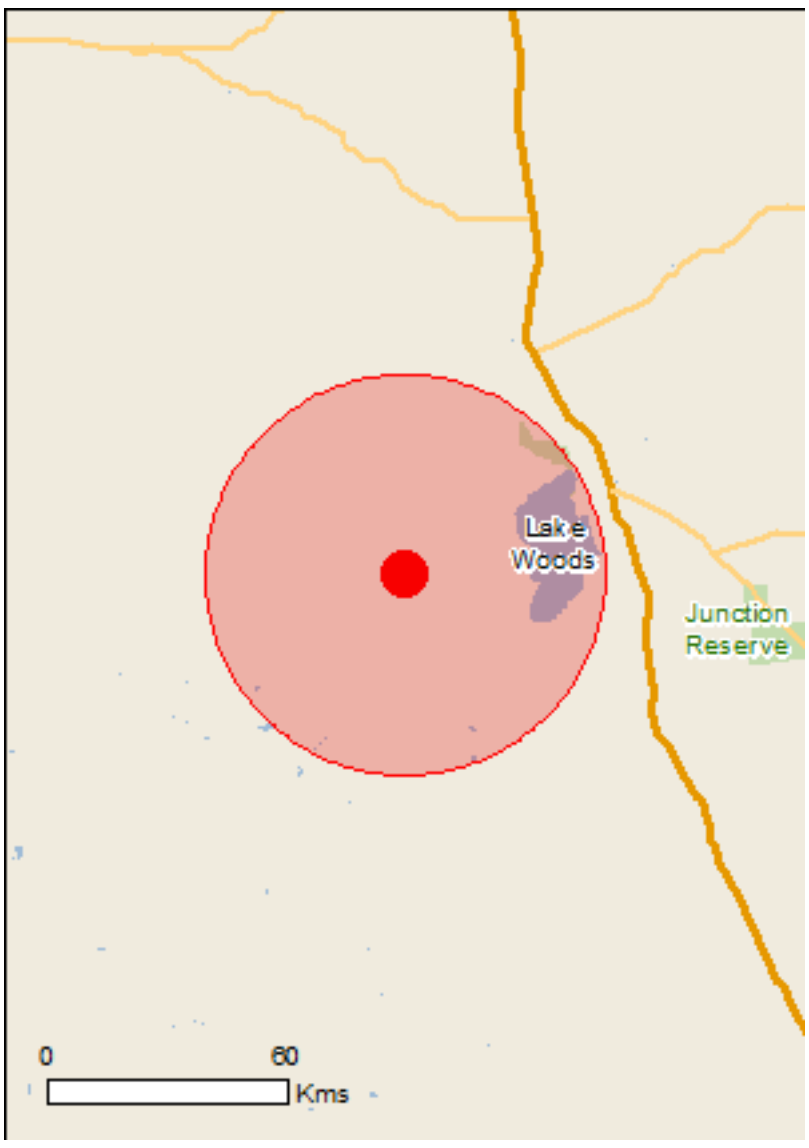
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 26/07/20 16:05:20

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

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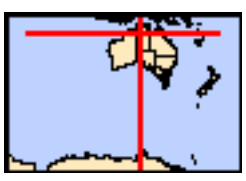

Summary

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:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	11
Listed Migratory Species:	12

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:	18
Whales and Other Cetaceans:	None
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:	2
Regional Forest Agreements:	None
Invasive Species:	15
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat may occur within area
Erythrura gouldiae Gouldian Finch [413]	Endangered	Species or species habitat may occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat known to occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Polytelis alexandrae Princess Parrot, Alexandra's Parrot [758]	Vulnerable	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Tyto novaehollandiae kimberli Masked Owl (northern) [26048]	Vulnerable	Species or species habitat may occur within area
Mammals		
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat may occur within area
Macrotis lagotis Greater Bilby [282]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Acanthophis hawkei Plains Death Adder [83821]	Vulnerable	Species or species habitat known to 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

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Cecropis daurica		
Red-rumped Swallow [80610]		Species or species habitat may occur within area
Hirundo rustica		
Barn Swallow [662]		Species or species habitat may occur within area
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
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 ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may 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
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat 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		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species

Name	Threatened	Type of Presence
		habitat known 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 ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat known 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 known 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
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Lake Woods	NT
Longreach Waterhole Protected Area	NT

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 Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat may occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Camelus dromedarius Dromedary, Camel [7]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		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		
Acacia nilotica subsp. indica Prickly Acacia [6196]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area
Jatropha gossypifolia Cotton-leaved Physic-Nut, Bellyache Bush, Cotton-leaf Physic Nut, Cotton-leaf Jatropha, Black Physic Nut [7507]		Species or species habitat likely to occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
Prosopis spp. Mesquite, Algaroba [68407]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area

Nationally Important Wetlands [Resource Information]

Name	State
Lake Woods	NT

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

-17.88524 133.17035

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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Australian Government
Department of the Environment and Energy

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.

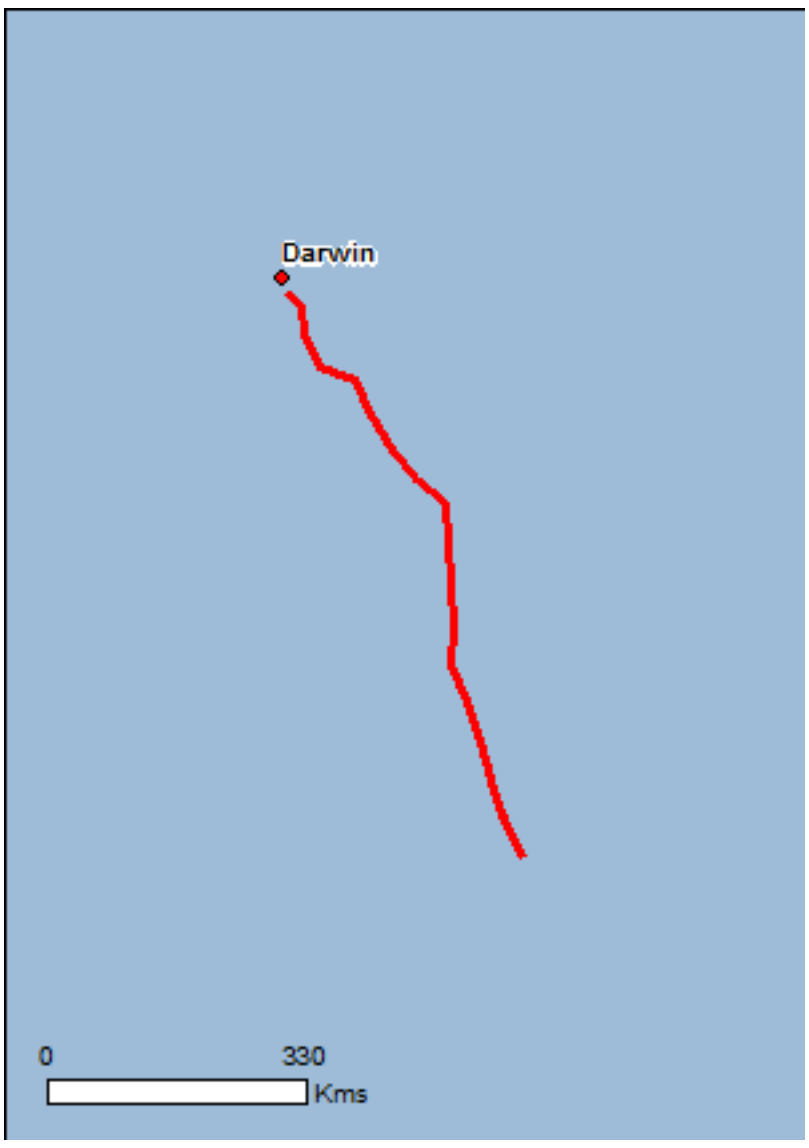
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 28/10/19 19:10:11

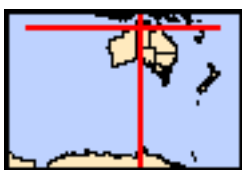
Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
Buffer: 1.0Km



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:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	48
Listed Migratory Species:	55

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:	2
Commonwealth Heritage Places:	None
Listed Marine Species:	93
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:	1
Regional Forest Agreements:	None
Invasive Species:	29
Nationally Important Wetlands:	2
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

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.

Name	Status	Type of Presence
Arnhem Plateau Sandstone Shrubland Complex	Endangered	Community may occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Amytornis woodwardi White-throated Grasswren, Yirlinkirrkirr [564]	Vulnerable	Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat likely to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat likely to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Erythrura gouldiae Gouldian Finch [413]	Endangered	Species or species habitat known to occur within area
Falcunculus frontatus whitei Crested Shrike-tit (northern), Northern Shrike-tit [26013]	Vulnerable	Species or species habitat known to occur within area
Geophaps smithii smithii Partridge Pigeon (eastern) [64441]	Vulnerable	Species or species habitat known to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within

Name	Status	Type of Presence
		area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Polytelis alexandrae Princess Parrot, Alexandra's Parrot [758]	Vulnerable	Species or species habitat may occur within area
Rostratula australis Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Tyto novaehollandiae kimberli Masked Owl (northern) [26048]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Antechinus bellus Fawn Antechinus [344]	Vulnerable	Species or species habitat known to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Conilurus penicillatus Brush-tailed Rabbit-rat, Brush-tailed Tree-rat, Pakooma [132]	Vulnerable	Species or species habitat may occur within area
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat known to occur within area
Hipposideros inornatus Arnhem Leaf-nosed Bat [86675]	Endangered	Species or species habitat known to occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Breeding known to occur within area
Macrotis lagotis Greater Bilby [282]	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 gouldii Black-footed Tree-rat (Kimberley and mainland Northern Territory), Djintamoonga, Manbul [87618]	Endangered	Species or species habitat known to occur within area
Petrogale concinna canescens Nabarlek (Top End) [87606]	Endangered	Species or species habitat likely to occur within area
Phascogale pirata Northern Brush-tailed Phascogale [82954]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Saccolaimus saccolaimus nudicluniatus		
Bare-rumped Sheath-tailed Bat, Bare-rumped Sheathtail Bat [66889]	Vulnerable	Species or species habitat likely to occur within area
Xeromys myoides		
Water Mouse, False Water Rat, Yirrkoo [66]	Vulnerable	Species or species habitat likely to occur within area
Plants		
Atalaya brevialata		
[86125]	Critically Endangered	Species or species habitat may occur within area
Helicteres macrothrix		
[86586]	Endangered	Species or species habitat likely to occur within area
Stylidium ensatum		
a triggerplant [86366]	Endangered	Species or species habitat may occur within area
Reptiles		
Acanthophis hawkei		
Plains Death Adder [83821]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Elseya lavarackorum		
Gulf Snapping Turtle [67197]	Endangered	Species or species habitat may occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Lepidochelys olivacea		
Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour known to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour 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
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	Vulnerable	Species or species

Name	Status	Type of Presence
[68442]		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 likely to 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 known 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
Sternula albifrons		
Little Tern [82849]		Species or species habitat may occur within area
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 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	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour 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	Foraging, feeding or related behaviour likely to occur within area
Dugong dugon		
Dugong [28]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour 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	Foraging, feeding or related behaviour known to occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat known to 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 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
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Breeding known 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
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 known to occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat likely to occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to 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 known to occur within area
Arenaria interpres Ruddy Turnstone [872]		Species or species habitat likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris alba Sanderling [875]		Species or species habitat likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat likely to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	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
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Numenius phaeopus		
Whimbrel [849]		Species or species habitat likely to occur within area
Pandion haliaetus		
Osprey [952]		Species or species habitat known to occur within area
Pluvialis squatarola		
Grey Plover [865]		Species or species habitat likely to occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land - Australian Government Solicitor
Defence - RAAF BASE TINDAL

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 known to occur within area
Anous stolidus		
Common Noddy [825]		Species or species habitat likely to occur within area
Anseranas semipalmata		
Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres		
Ruddy Turnstone [872]		Species or species habitat likely to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species

Name	Threatened	Type of Presence
		habitat known to occur within area
[Calidris alba](#) Sanderling [875]		Species or species habitat likely to occur within area
[Calidris canutus](#) Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat likely to occur within area
[Calidris tenuirostris](#) Great Knot [862]	Critically Endangered	Species or species habitat likely to occur within area
[Calonectris leucomelas](#) Streaked Shearwater [1077]		Species or species habitat known to occur within area
[Charadrius leschenaultii](#) Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area
[Charadrius mongolus](#) Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat likely to occur within area
[Charadrius veredus](#) Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
[Chrysococcyx osculans](#) Black-eared Cuckoo [705]		Species or species habitat known 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
[Glareola maldivarum](#) Oriental Pratincole [840]		Species or species habitat may occur within area
[Haliaeetus leucogaster](#) White-bellied Sea-Eagle [943]		Species or species habitat known 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 likely to occur within area
[Limosa lapponica](#) Bar-tailed Godwit [844]		Species or species habitat known to occur within area
[Limosa limosa](#) Black-tailed Godwit [845]		Species or species habitat likely to occur

Name	Threatened	Type of Presence within area
[Merops ornatus](#) Rainbow Bee-eater [670]		Species or species habitat may occur within area
[Motacilla cinerea](#) Grey Wagtail [642]		Species or species habitat may occur within area
[Motacilla flava](#) Yellow Wagtail [644]		Species or species habitat likely to occur within area
[Numenius madagascariensis](#) Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
[Numenius phaeopus](#) Whimbrel [849]		Species or species habitat likely to occur within area
[Pandion haliaetus](#) Osprey [952]		Species or species habitat known to occur within area
[Pluvialis squatarola](#) Grey Plover [865]		Species or species habitat likely 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 albifrons](#) Little Tern [813]		Species or species habitat may occur within area
[Tringa nebularia](#) Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area
Fish		
[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
[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
[Doryrhamphus excisus](#) Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		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
Halicampus brocki Brock's Pipefish [66219]		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 spinirostris 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
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

Name	Threatened	Type of Presence
[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 area
[Astrotia stokesii](#) Stokes' Seasnake [1122]		Species or species habitat may occur within area
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
[Crocodylus johnstoni](#) Freshwater Crocodile, Johnston's Crocodile, Johnston's River Crocodile [1773]		Species or species habitat may 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	Foraging, feeding or related behaviour 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	Species or species habitat known to occur within area
[Hydrelaps darwiniensis](#) Black-ringed Seasnake [1100]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		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 mcdowelli 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	Foraging, feeding or related behaviour known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Parahydrophis mertoni Northern Mangrove Seasnake [1090]		Species or species habitat may occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		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 may occur within area
Delphinus delphis Common Dophin, 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

Name	Status	Type of Presence
Orcaella brevirostris Irrawaddy Dolphin [45]		Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Breeding 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

State and Territory Reserves	[Resource Information]
Name	State
Manton Dam Recreation Area	NT

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 Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat known to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Bubalus bubalis Water Buffalo, Swamp Buffalo [1]		Species or species habitat likely to occur within area
Camelus dromedarius Dromedary, Camel [7]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Equus asinus Donkey, Ass [4]		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
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Plants		
Acacia nilotica subsp. indica Prickly Acacia [6196]		Species or species habitat may occur within area
Andropogon gayanus Gamba Grass [66895]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area
Hymenachne amplexicaulis Hymenachne, Olive Hymenachne, Water Stargrass, West Indian Grass, West Indian Marsh Grass [31754]		Species or species habitat likely to occur within area
Jatropha gossypifolia Cotton-leaved Physic-Nut, Bellyache Bush, Cotton-leaf Physic Nut, Cotton-leaf Jatropha, Black Physic Nut [7507]		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, ThornySensitive Plant, Black Mimosa, Catclaw Mimosa, Bashful Plant [11223]		Species or species habitat likely to occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
Parthenium hysterophorus Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566]		Species or species habitat may occur within

Name	Status	Type of Presence
		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 likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Vachellia nilotica Prickly Acacia, Blackthorn, Prickly Mimosa, Black Piquant, Babul [84351]		Species or species habitat likely to 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

Nationally Important Wetlands	[Resource Information]
Name	State
Mount Bundey Training Area - Mary River Floodplain	NT
Port Darwin	NT

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

-18.7681 133.6162,-18.3607 133.4137,-17.9425 133.235,-17.5059 133.1208,-17.0758 132.9771,-16.6796 132.7892,-16.2415 132.8241,-15.7973 132.7804,-15.3561 132.758,-14.9151 132.737,-14.6473 132.4003,-14.3128 132.1131,-13.9343 131.8932,-13.5394 131.7036,-13.3834 131.2866,-13.0363 131.1108,-12.7191 131.0873,-12.5782 130.932

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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EPBC Act Protected Matters Report

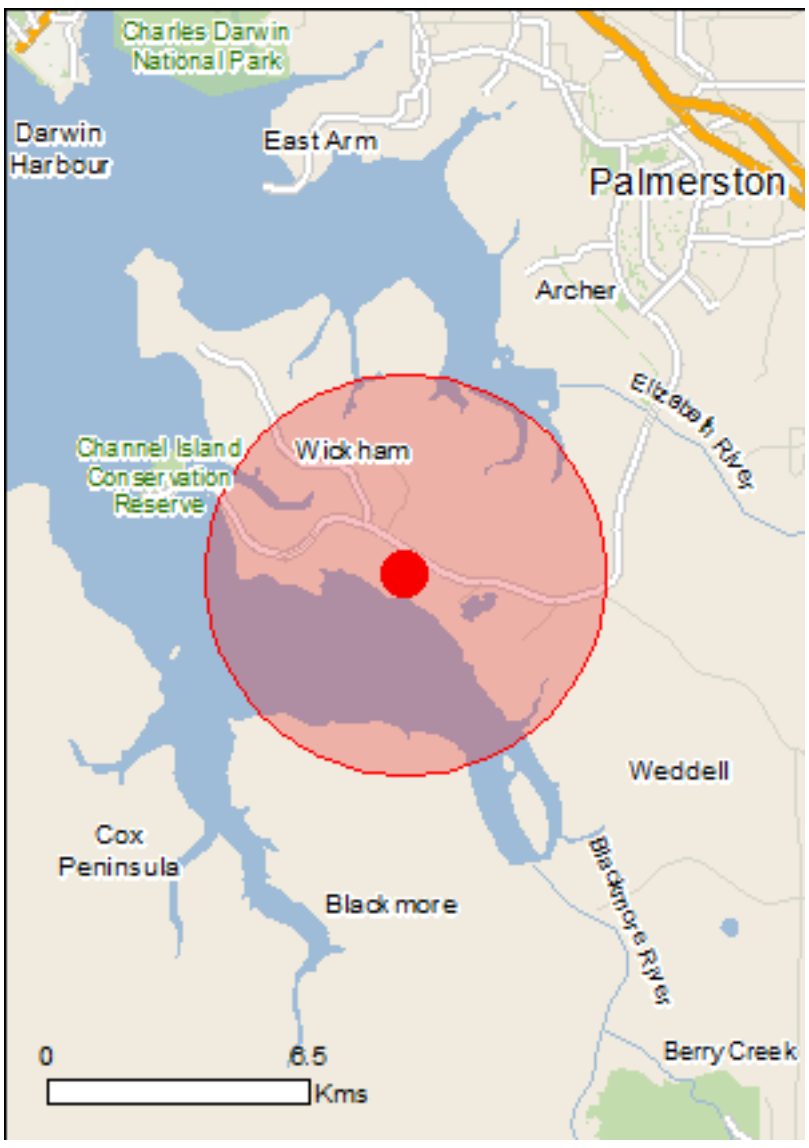
This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

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: 31/08/20 21:18:31

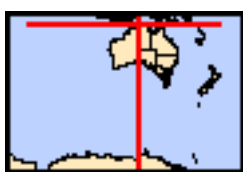
Summary
Details
Matters of NES
Other Matters Protected by the EPBC Act
Extra Information
Caveat
Acknowledgements



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates

Buffer: 5.0Km



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:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	38
Listed Migratory Species:	55

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:	93
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:	23
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat likely to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat likely to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Erythrura gouldiae Gouldian Finch [413]	Endangered	Species or species habitat known to occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Geophaps smithii smithii Partridge Pigeon (eastern) [64441]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species

Name	Status	Type of Presence
		habitat may occur within area
Tyto novaehollandiae kimberli Masked Owl (northern) [26048]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Antechinus bellus Fawn Antechinus [344]	Vulnerable	Species or species habitat known to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Conilurus penicillatus Brush-tailed Rabbit-rat, Brush-tailed Tree-rat, Pakooma [132]	Vulnerable	Species or species habitat may occur within area
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat known to occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat may occur within area
Mesembriomys gouldii gouldii Black-footed Tree-rat (Kimberley and mainland Northern Territory), Djintamoonga, Manbul [87618]	Endangered	Species or species habitat known to occur within area
Petrogale concinna canescens Nabarlek (Top End) [87606]	Endangered	Species or species habitat likely 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 Sheathtail Bat [66889]	Vulnerable	Species or species habitat likely to occur within area
Xeromys myoides Water Mouse, False Water Rat, Yirrkoo [66]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Acanthophis hawkei Plains Death Adder [83821]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
[Lepidochelys olivacea](#)		
Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour known to occur within area
[Natator depressus](#)		
Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour 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
[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 likely to 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 known 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
[Sternula albifrons](#)		
Little Tern [82849]		Species or species habitat may occur within area
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

Name	Threatened	Type of Presence
Balaenoptera musculus Blue Whale [36]	Endangered	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	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour 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	Foraging, feeding or related behaviour likely to occur within area
Dugong dugon Dugong [28]		Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour 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	Foraging, feeding or related behaviour known to occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat known to 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 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

Name	Threatened	Type of Presence
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Breeding known 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
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 known to occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat known to occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to 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 known to occur within area
Arenaria interpres Ruddy Turnstone [872]		Species or species habitat likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris alba Sanderling [875]		Species or species habitat likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	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 mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	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
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius phaeopus Whimbrel [849]		Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Pluvialis squatarola Grey Plover [865]		Species or species habitat likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat 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 known to occur within area
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species

Name	Threatened	Type of Presence
		habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]		Species or species habitat likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris alba Sanderling [875]		Species or species habitat likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat likely to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat likely to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		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
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur

Name	Threatened	Type of Presence 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 known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius phaeopus Whimbrel [849]		Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Pluvialis squatarola Grey Plover [865]		Species or species habitat likely 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 albifrons Little Tern [813]		Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area
Fish		
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
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
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
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
Halicampus brocki Brock's Pipefish [66219]		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 spinirostris 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
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

Name	Threatened	Type of Presence
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 area
Astrotia stokesii Stokes' Seasnake [1122]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Crocodylus johnstoni Freshwater Crocodile, Johnston's Crocodile, Johnston's River Crocodile [1773]		Species or species habitat may 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	Foraging, feeding or related behaviour likely to occur within area
Disteira kingii Spectacled Seasnake [1123]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		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	Species or species habitat known to occur within area
Hydrelaps darwiniensis Black-ringed Seasnake [1100]		Species or species habitat may 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 mcdowelli 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	Foraging, feeding or related behaviour known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Parahydrophis mertoni Northern Mangrove Seasnake [1090]		Species or species habitat may occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		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

Name	Status	Type of Presence
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Delphinus delphis Common Dophin, 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 known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Breeding 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 Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat known to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Bubalus bubalis Water Buffalo, Swamp Buffalo [1]		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
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		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
Brachiaria mutica Para Grass [5879]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Hymenachne amplexicaulis Hymenachne, Olive Hymenachne, Water Stargrass, West Indian Grass, West Indian Marsh Grass [31754]		Species or species habitat likely to occur within area
Jatropha gossypifolia Cotton-leaved Physic-Nut, Bellyache Bush, Cotton-leaf Physic Nut, Cotton-leaf Jatropha, Black Physic Nut [7507]		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, ThornySensitive Plant, Black Mimosa, Catclaw Mimosa, Bashful Plant [11223]		Species or species habitat likely to occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		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 likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss,		Species or species

Name	Status	Type of Presence
Kariba Weed [13665]		habitat likely to 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

Nationally Important Wetlands [Resource Information]

Name	State
Port Darwin	NT

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

-12.57438 130.92165

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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Australian Government
Department of the Environment and Energy

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.

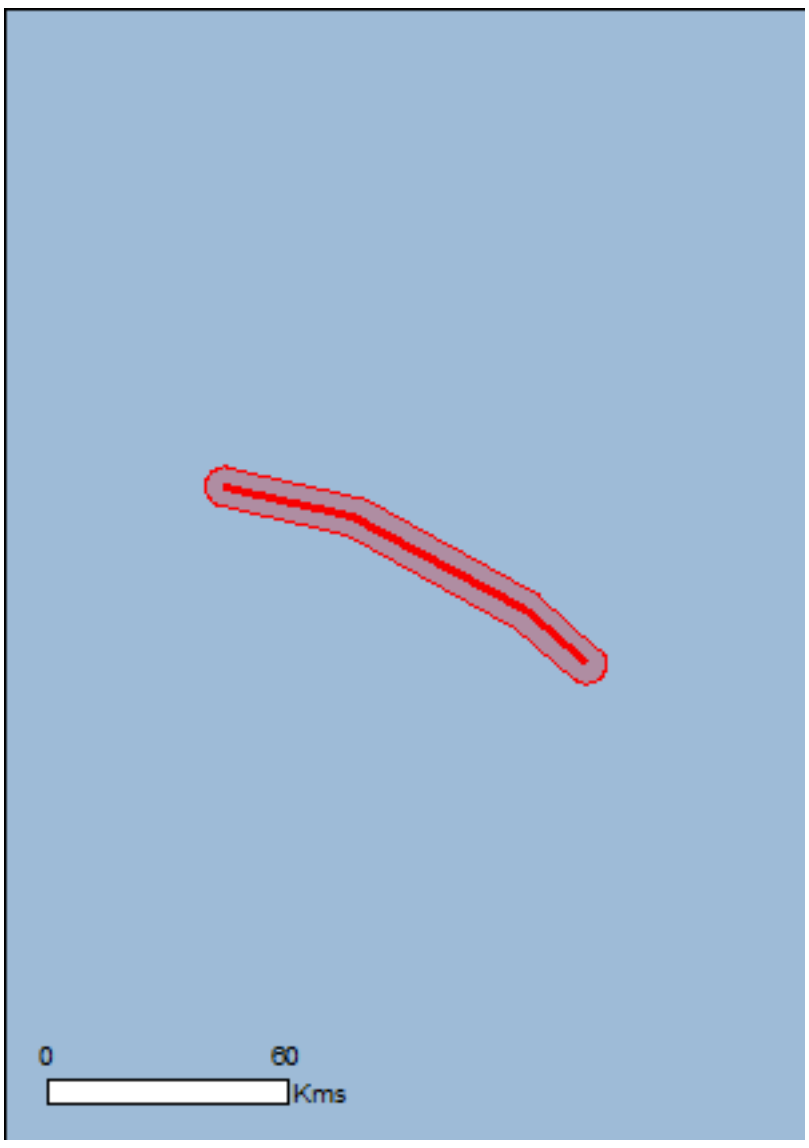
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 29/10/19 10:50:54

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates

Buffer: 5.0Km

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:	38
Listed Migratory Species:	62

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:	9
Commonwealth Heritage Places:	3
Listed Marine Species:	101
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:	3
Regional Forest Agreements:	None
Invasive Species:	30
Nationally Important Wetlands:	1
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 known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Foraging, feeding or related behaviour known to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat known to occur within area
Erythrura gouldiae Gouldian Finch [413]	Endangered	Species or species habitat known to occur within area
Geophaps smithii smithii Partridge Pigeon (eastern) [64441]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may occur within

Name	Status	Type of Presence
		area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Rostratula australis Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Tyto novaehollandiae kimberli Masked Owl (northern) [26048]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Antechinus bellus Fawn Antechinus [344]	Vulnerable	Species or species habitat known to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Conilurus penicillatus Brush-tailed Rabbit-rat, Brush-tailed Tree-rat, Pakooma [132]	Vulnerable	Species or species habitat may occur within area
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat known to occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat may occur within area
Mesembriomys gouldii gouldii Black-footed Tree-rat (Kimberley and mainland Northern Territory), Djintamoonga, Manbul [87618]	Endangered	Species or species habitat known to occur within area
Petrogale concinna canescens Nabarlek (Top End) [87606]	Endangered	Species or species habitat likely 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 Sheathtail Bat [66889]	Vulnerable	Species or species habitat likely to occur within area
Xeromys myoides Water Mouse, False Water Rat, Yirrkoo [66]	Vulnerable	Species or species habitat likely to occur within area
Plants		
Stylidium ensatum a triggerplant [86366]	Endangered	Species or species habitat may occur within area
Reptiles		
Acanthophis hawkei Plains Death Adder [83821]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known 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	Foraging, feeding or related behaviour 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
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 likely to 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 known to occur within area
Fregata ariel		
Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor		
Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat known to occur within area
Sternula albifrons		
Little Tern [82849]		Species or species

Name	Threatened	Type of Presence
		habitat may occur within area
Migratory Marine Species		
Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat known 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 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	Foraging, feeding or related behaviour known 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	Foraging, feeding or related behaviour 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 known to 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]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Breeding known 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
Migratory Terrestrial Species		
Cecropis daurica Red-rumped Swallow [80610]		Species or species habitat known to occur within area
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat known to occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat known to occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to 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 known to occur within area
Arenaria interpres Ruddy Turnstone [872]		Foraging, feeding or related behaviour known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Foraging, feeding or related behaviour known to occur within area
Calidris alba Sanderling [875]		Foraging, feeding or related behaviour known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species

Name	Threatened	Type of Presence
		habitat known to occur within area
[Calidris ruficollis](#) Red-necked Stint [860]		Foraging, feeding or related behaviour known to occur within area
[Calidris tenuirostris](#) Great Knot [862]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area
[Charadrius leschenaultii](#) Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
[Charadrius mongolus](#) Lesser Sand Plover, Mongolian Plover [879]	Endangered	Foraging, feeding or related behaviour known to occur within area
[Charadrius veredus](#) Oriental Plover, Oriental Dotterel [882]		Foraging, feeding or related behaviour may occur within area
[Gallinago megala](#) Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area
[Gallinago stenura](#) Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area
[Glareola maldivarum](#) Oriental Pratincole [840]		Foraging, feeding or related behaviour may occur within area
[Limosa lapponica](#) Bar-tailed Godwit [844]		Species or species habitat known to occur within area
[Limosa limosa](#) Black-tailed Godwit [845]		Foraging, feeding or related behaviour likely to occur within area
[Numenius madagascariensis](#) Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
[Numenius minutus](#) Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area
[Numenius phaeopus](#) Whimbrel [849]		Foraging, feeding or related behaviour known to occur within area
[Pandion haliaetus](#) Osprey [952]		Breeding known to occur within area
[Pluvialis fulva](#) Pacific Golden Plover [25545]		Foraging, feeding or related behaviour known to occur within area
[Pluvialis squatarola](#) Grey Plover [865]		Foraging, feeding or related behaviour known to occur within area
[Tringa brevipes](#) Grey-tailed Tattler [851]		Foraging, feeding or related behaviour known to occur within area
[Tringa nebularia](#) Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Xenus cinereus		
Terek Sandpiper [59300]		Foraging, feeding or related behaviour known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -
Commonwealth Land - Australian Government Solicitor
Commonwealth Land - Deputy Crown Solicitor
Defence - AUSTRALIAN ARMY BAND - DARWIN
Defence - DEFENCE FORCE CAREERS REFERENCE CENTRE
Defence - Esanda Builidng
Defence - LARRAKEYAH BARRACKS
Defence - Patrol Boat Base (DARWIN NAVAL BASE)
Defence - STOKES HILL OIL FUEL INSTALLATION

Commonwealth Heritage Places [Resource Information]

Name	State	Status
Historic		
Larrakeyah Barracks Headquarters Building	NT	Listed place
Larrakeyah Barracks Precinct	NT	Listed place
Larrakeyah Barracks Sergeants Mess	NT	Listed place

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 known to occur within area
Anous stolidus		
Common Noddy [825]		Species or species habitat likely to occur within area
Anseranas semipalmata		
Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]		Foraging, feeding or related behaviour known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Foraging, feeding or related behaviour known to occur within area
Calidris alba Sanderling [875]		Foraging, feeding or related behaviour known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Foraging, feeding or related behaviour known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Foraging, feeding or related behaviour known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Foraging, feeding or related behaviour may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area
Glareola maldivarum Oriental Pratincole [840]		Foraging, feeding or related behaviour may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Foraging, feeding or related behaviour known to occur within area
Hirundo daurica Red-rumped Swallow [59480]		Species or species habitat known to occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Foraging, feeding or related behaviour likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area
Numenius phaeopus Whimbrel [849]		Foraging, feeding or related behaviour known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Foraging, feeding or related behaviour known to occur within area
Pluvialis squatarola Grey Plover [865]		Foraging, feeding or related behaviour 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

Name	Threatened	Type of Presence
		habitat may occur within area
Sterna albifrons Little Tern [813]		Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Foraging, feeding or related behaviour known to occur within area
Fish		
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
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 schultzi Schultz's Pipefish [66205]		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
Halicampus brocki Brock's Pipefish [66219]		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 spinirostris 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		Species or species

Name	Threatened	Type of Presence
[66228]		habitat may occur within area
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

Name	Threatened	Type of Presence
Aipysurus laevis Olive Seasnake [1120]		Species or species habitat may occur within area
Astrotia stokesii Stokes' Seasnake [1122]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus johnstoni Freshwater Crocodile, Johnston's Crocodile, Johnston's River Crocodile [1773]		Species or species habitat may 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	Foraging, feeding or related behaviour known to occur within area
Hydrelaps darwiniensis Black-ringed Seasnake [1100]		Species or species habitat may 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 mcdowelli 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

Name	Threatened	Type of Presence
		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 habitat may occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		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 may occur within area
Delphinus delphis Common Dophin, 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 known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Breeding 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

State and Territory Reserves [Resource Information]

Name	State
Channel Island	NT
Charles Darwin	NT
George Brown Darwin	NT

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 Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat known to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Bubalus bubalis Water Buffalo, Swamp Buffalo [1]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur

Name	Status	Type of Presence 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
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		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
Annona glabra Pond Apple, Pond-apple Tree, Alligator Apple, Bullock's Heart, Cherimoya, Monkey Apple, Bobwood, Corkwood [6311]		Species or species habitat may occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Dolichandra unguis-cati Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
Hymenachne amplexicaulis Hymenachne, Olive Hymenachne, Water Stargrass, West Indian Grass, West Indian Marsh Grass [31754]		Species or species habitat likely to occur within area
Jatropha gossypifolia Cotton-leaved Physic-Nut, Bellyache Bush, Cotton-leaf Physic Nut, Cotton-leaf Jatropha, Black Physic Nut [7507]		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, ThornySensitive Plant, Black Mimosa, Catclaw Mimosa, Bashful Plant [11223]		Species or species habitat likely to occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		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 likely to occur within area

Name	Status	Type of Presence
Salvinia molesta		
Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus		
Asian House Gecko [1708]		Species or species habitat likely to occur within area
Lepidodactylus lugubris		
Mourning Gecko [1712]		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

Nationally Important Wetlands	[Resource Information]
Name	State
Port Darwin	NT

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

-12.57821 130.93199,-12.46256 130.79796,-12.25379 130.40739,-12.18896 130.11879

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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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: 23/01/20 16:10:41

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates

Buffer: 1.0Km

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:	20
Listed Migratory Species:	38

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:	69
Whales and Other Cetaceans:	24
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	1

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:	None
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	2

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
North-west

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	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
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Mammals		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		

Name	Status	Type of Presence
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Lepidochelys olivacea		
Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour known to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour 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
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	Foraging, feeding or related behaviour known to 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
Calonectris leucomelas		
Streaked Shearwater [1077]		Species or species habitat known 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
Migratory Marine Species		

Name	Threatened	Type of Presence
Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat may 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
Balaenoptera physalus Fin Whale [37]	Vulnerable	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	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour 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	Foraging, feeding or related behaviour likely to occur within area
Dugong dugon Dugong [28]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour 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 likely to 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 likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		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	Foraging, feeding or related behaviour known to occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat may occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat likely to occur within area
Migratory Wetlands Species		
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
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may 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		
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
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	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 known 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
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may 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 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
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 spinirostris 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 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

Name	Threatened	Type of Presence
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 may 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 area
Astrotia stokesii Stokes' Seasnake [1122]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur

Name	Threatened	Type of Presence
		within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour 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	Species or species habitat known to occur within area
Hydrelaps darwiniensis Black-ringed Seasnake [1100]		Species or species habitat may 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 mcdowelli 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	Foraging, feeding or related behaviour known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Parahydrophis mertoni Northern Mangrove Seasnake [1090]		Species or species habitat may occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat may 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
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat may occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area
Kogia simus Dwarf Sperm Whale [58]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat may occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species

Name	Status	Type of Presence
		habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat may occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Australian Marine Parks [Resource Information]

Name	Label
Oceanic Shoals	Multiple Use Zone (IUCN VI)

Extra Information

Key Ecological Features (Marine) [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Carbonate bank and terrace system of the Sahul	North-west
Pinnacles of the Bonaparte Basin	North-west

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

-12.18896 130.11879,-12.15319 129.95955,-12.08279 129.50606,-12.0486 129.0489,-12.02996 128.59028,-12.0264 128.13148,-12.04115 127.67272,-12.07426 127.21581,-12.16838 126.76808,-12.19699 126.31667,-12.15444 125.85997,-12.09743 125.40574,-12.05387 124.94882,-12.00057 124.5268

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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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: 06/08/20 11:59:47

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
Buffer: 2.0Km

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:	41
Listed Migratory Species:	60

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:	3
Commonwealth Heritage Places:	None
Listed Marine Species:	102
Whales and Other Cetaceans:	25
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	2

Extra Information

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

State and Territory Reserves:	1
Regional Forest Agreements:	None
Invasive Species:	23
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	4

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
North-west

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat likely to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat likely to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Erythrura gouldiae Gouldian Finch [413]	Endangered	Species or species habitat known to occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Geophaps smithii smithii Partridge Pigeon (eastern) [64441]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Tyto novaehollandiae kimberli Masked Owl (northern) [26048]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Antechinus bellus Fawn Antechinus [344]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat may occur within area
Conilurus penicillatus Brush-tailed Rabbit-rat, Brush-tailed Tree-rat, Pakooma [132]	Vulnerable	Species or species habitat may occur within area
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat known to occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Mesembriomys gouldii gouldii Black-footed Tree-rat (Kimberley and mainland Northern Territory), Djintamoonga, Manbul [87618]	Endangered	Species or species habitat known to occur within area
Petrogale concinna canescens Nabarlek (Top End) [87606]	Endangered	Species or species habitat likely 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	Vulnerable	Species or species

Name	Status	Type of Presence
Sheathtail Bat [66889]		habitat likely to occur within area
Xeromys myoides Water Mouse, False Water Rat, Yirrkoo [66]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Acanthophis hawkei Plains Death Adder [83821]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known 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	Species or species habitat 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
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	Foraging, feeding or related behaviour known to 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 likely to 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 known to occur

Name	Threatened	Type of Presence within area
[Fregata ariel](#) Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
[Fregata minor](#) Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur within area
[Sternula albifrons](#) Little Tern [82849]		Species or species habitat may occur within area
Migratory Marine Species		
[Anoxypristis cuspidata](#) Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat known to occur within area
[Balaenoptera borealis](#) Sei Whale [34]	Vulnerable	Species or species habitat may 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
[Balaenoptera physalus](#) Fin Whale [37]	Vulnerable	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	Foraging, feeding or related behaviour known 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	Species or species habitat known to occur within area
[Isurus oxyrinchus](#) Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
[Isurus paucus](#) Longfin Mako [82947]		Species or species habitat likely 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		Species or species

Name	Threatened	Type of Presence
Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994] Manta birostris		habitat likely to occur within area
Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to 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 known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		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	Foraging, feeding or related behaviour known to occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Breeding known 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
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 known to occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
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 known to occur within area
Arenaria interpres Ruddy Turnstone [872]		Species or species habitat likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris alba Sanderling [875]		Species or species habitat likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat likely to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	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
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius phaeopus Whimbrel [849]		Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area

Name	Threatened	Type of Presence
Pluvialis squatarola		
Grey Plover [865]		Species or species habitat likely to occur within area
Tringa nebularia		
Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -
Commonwealth Land - Australian Government Solicitor
Defence - Patrol Boat Base (DARWIN NAVAL BASE)

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 known to occur within area
Anous stolidus		
Common Noddy [825]		Species or species habitat likely to occur within area
Anous tenuirostris melanops		
Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area
Anseranas semipalmata		
Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Arenaria interpres Ruddy Turnstone [872]		Species or species habitat likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris alba Sanderling [875]		Species or species habitat likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat likely to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat likely to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known 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 known 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 known to occur within area

Name	Threatened	Type of Presence
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius phaeopus Whimbrel [849]		Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Pluvialis squatarola Grey Plover [865]		Species or species habitat likely 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 albifrons Little Tern [813]		Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat 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
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

Name	Threatened	Type of Presence
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 spinirostris 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
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

Name	Threatened	Type of Presence
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 area
Astrotia stokesii Stokes' Seasnake [1122]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known

Name	Threatened	Type of Presence
		to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus johnstoni Freshwater Crocodile, Johnston's Crocodile, Johnston's River Crocodile [1773]		Species or species habitat may 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
Emydocephalus annulatus Turtle-headed Seasnake [1125]		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	Species or species habitat known to occur within area
Hydrelaps darwiniensis Black-ringed Seasnake [1100]		Species or species habitat may 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 mcdowelli 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

Name	Threatened	Type of Presence within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Parahydrophis mertoni Northern Mangrove Seasnake [1090]		Species or species habitat may occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans [Resource Information]

Name	Status	Type of Presence
Mammals		
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat may 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
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat may occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area
Kogia simus Dwarf Sperm Whale [58]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Orcaella brevirostris Irrawaddy Dolphin [45]		Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area

Name	Status	Type of Presence
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Breeding known to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		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
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Australian Marine Parks	[Resource Information]
Name	Label
Oceanic Shoals	Multiple Use Zone (IUCN VI)
Oceanic Shoals	Special Purpose Zone (Trawl) (IUCN VI)

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Channel Island	NT

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 Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Frogs		

Name	Status	Type of Presence
Rhinella marina Cane Toad [83218]		Species or species habitat known to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Bubalus bubalis Water Buffalo, Swamp Buffalo [1]		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
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		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
Brachiaria mutica Para Grass [5879]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Hymenachne amplexicaulis Hymenachne, Olive Hymenachne, Water Stargrass, West Indian Grass, West Indian Marsh Grass [31754]		Species or species habitat likely to occur within area
Jatropha gossypifolia Cotton-leaved Physic-Nut, Bellyache Bush, Cotton-leaf Physic Nut, Cotton-leaf Jatropha, Black Physic Nut [7507]		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, ThornySensitive Plant, Black Mimosa, Catclaw Mimosa, Bashful Plant [11223]		Species or species habitat likely to occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree,		Species or species

Name	Status	Type of Presence
Horse Bean [12301] Pennisetum polystachyon		habitat likely to occur within area
Mission Grass, Perennial Mission Grass, Missiongrass, Feathery Pennisetum, Feather Pennisetum, Thin Napier Grass, West Indian Pennisetum, Blue Buffel Grass [21194] Salvinia molesta		Species or species habitat likely to occur within area
Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to 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

Nationally Important Wetlands [Resource Information]

Name	State
Port Darwin	NT

Key Ecological Features (Marine) [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Carbonate bank and terrace system of the Van	North
Pinnacles of the Bonaparte Basin	North
Carbonate bank and terrace system of the Sahul	North-west
Pinnacles of the Bonaparte Basin	North-west

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

-12.594 130.915,-12.561 130.854,-12.485 130.809,-12.458 130.795,-12.394 130.742,-12.339 130.668,-12.333 130.666,-12.288 130.558,-12.262 130.464,-12.135 129.939,-12.058 129.693,-11.579 128.094,-12.082 125.958,-12.024 125.787,-12.046 124.727

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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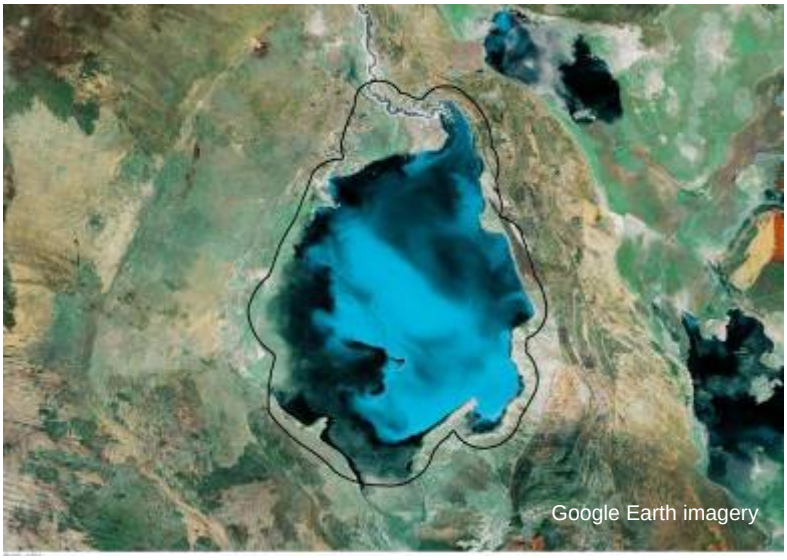
Appendix E – Lake Woods Site of Conservation Significance

Lake Woods

Location and Description

Lake Woods is a large ephemeral wetland located on the western edge of the Barkly Tableland and 220 km north of Tennant Creek. The Lake most frequently occupies an area of about 350 km², but during periods of major flooding (such as 1993 and 2001) it is broadly contiguous with the lower reaches of Newcastle Creek, and can reach 850 km² and, at times, nearer 1000 km², making it one of the largest temporary freshwater lakes in the Northern Territory and tropical Australia. The lake basin supports grass/sedge communities, including broad bands of lignum which comprise one of the largest areas of lignum swamp in the Northern Territory. The northern edge of the Lake and Newcastle Creek are fringed by river red gum and coolibah. The slopes of the Ashburton Range to the east are dominated by spinifex communities.



Tenure and Land Use

Lake Woods is located on pastoral leasehold land and encompasses two pastoral properties (Powell Creek and Newcastle Waters). The main land use within the Site is pastoral operations, but a fenced enclosure on the northern part of the lake is managed as the Longreach Waterhole Protected Area (approximately 7% of Site) by Parks and Wildlife Service NT in cooperation with the pastoral lease managers. The reserve is popular for conservation and recreation purposes.

Significance Rating

International Significance

Ecological Values

During periods of inundation, Lake Woods is a vast flooded area comprising diverse wetland habitat dominated by open water and with substantial areas of lignum shrubland and woodland at the lake margins. When conditions are suitable, the lake supports more than 100 000 waterbirds including internationally significant numbers of Plumed Whistling-Duck. The shrubland and wooded habitats provide breeding sites for several colonies of waterbird species including egrets, cormorants and spoonbills. Large numbers of shorebirds also use the lake for migration stopover, and the near permanent waterholes in Newcastle Creek are an important refuge for many species during the dry season.

Management Issues

Parkinsonia aculeata is widespread in the northern part of this lake and creek system and represents a major management issue. Cattle access to the Longreach Waterhole Reserve in the past caused erosion of creek banks, which is still apparent, and infestation by weeds has limited regeneration of native plant species in this area. Unrestricted recreational boating and visitor access could be disturbing significant waterbird breeding colonies.

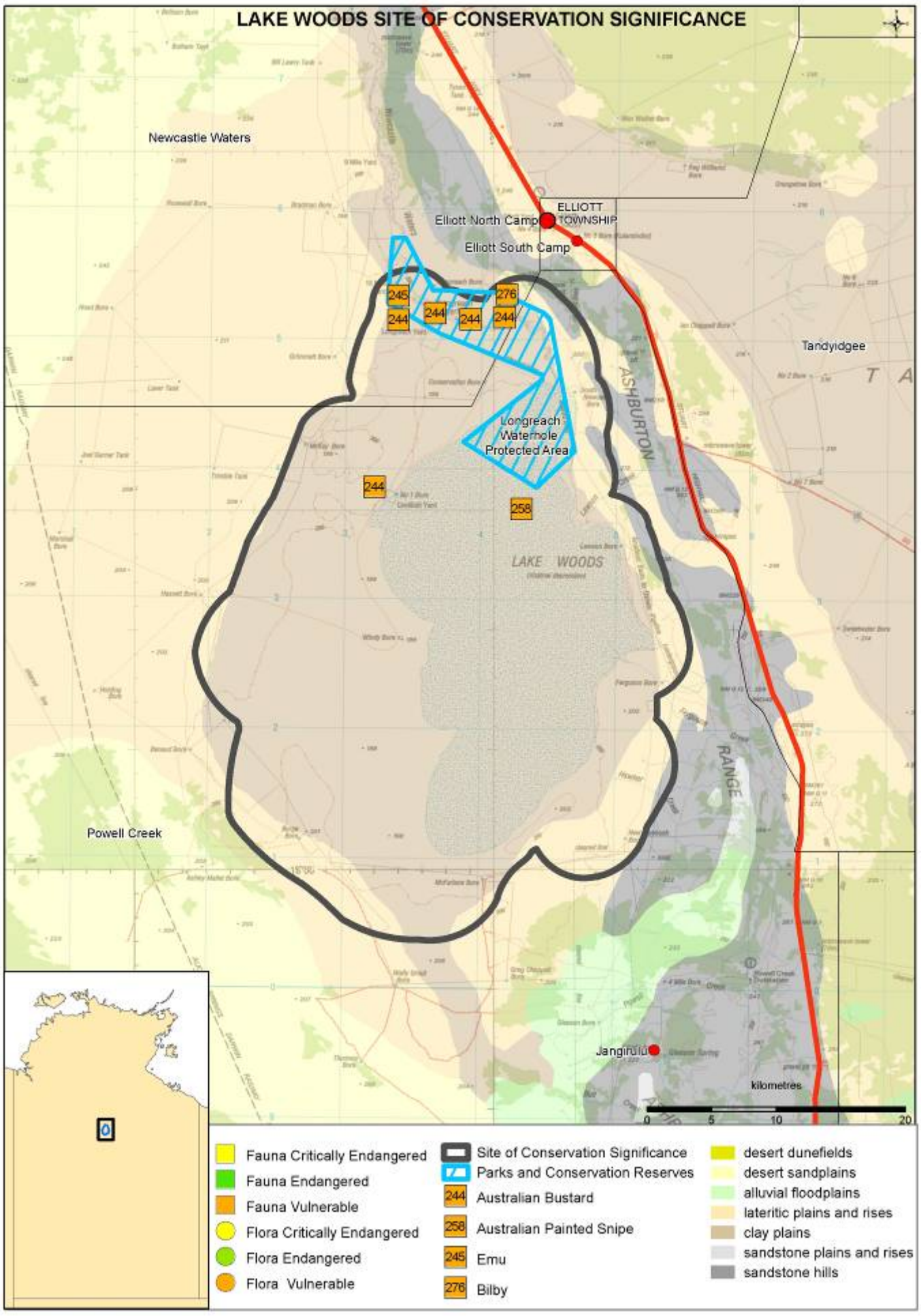
Condition

Apart from weed infestations, Lake Woods seems to be relatively resilient to grazing. Some bank erosion is apparent around the Longreach and South Newcastle Waterholes, and streamline erosion occurs in lighter-soil areas of the south-east of the site.

Current Conservation Initiatives

The Longreach Waterhole Protected Area was fenced in 1984 to exclude stock, but maintenance is difficult as the fence is effectively destroyed by each flood event. Surveys of waterbirds are conducted opportunistically by Wetlands International after major flood events.

Landholders muster the lakebed and remove cattle multiple times each dry season and have an on-going weed management program south of the protected area and in the catchment upstream of the reserve. This focuses on eradicating isolated Parkinsonia plants. The landholders, in conjunction with NRETAS, are developing a Conservation Management Plan for the site, using Ramsar guidelines.


LAKE WOODS SITE OF CONSERVATION SIGNIFICANCE
Newcastle Waters
ELLIOTT TOWNSHIP
Elliott North Camp
Elliott South Camp
Tandyidgee
ASHBURTON
RANGE
Longreach Waterhole Protected Area
LAKE WOODS
Powell Creek
Jangiruld
245
276
244
244
244
244
244
258
kilometres
0
5
10
20
Fauna Critically Endangered
Fauna Endangered
Fauna Vulnerable
Flora Critically Endangered
Flora Endangered
Flora Vulnerable
Site of Conservation Significance
Parks and Conservation Reserves
244 Australian Bustard
258 Australian Painted Snipe
245 Emu
276 Bilby
desert dunefields
desert sandplains
alluvial floodplains
lateritic plains and rises
clay plains
sandstone plains and rises
sandstone hills

LOCATION	**SOCS Number**	39 (NT Parks and Conservation Masterplan Map Number 48)
	Latitude/Longitude	17º 50´ South, 133º 28´ East (at centre)
	Bioregion	Mitchell Grass Downs (99%), Sturt Plateau (1%)
	Description	Lake Woods is located immediately west of the Stuart Highway and 7 km south of the small township of Elliot. The site includes the lower reaches of Newcastle Creek, including two near-permanent waterholes (Longreach and South Newcastle), a delta of distributary channels where the Creek meets the lake, and the lake to the maximum high water mark. The Ashburton Range clearly delineates the east side of the site, but low relief on the west side of the lake means that this boundary is less well defined. The lake most frequently occupies an inner basin of about 350 km² but the boundary of this site has been delineated based on the maximum flooded area of the lake with a 2 km buffer, and encompasses an area of 1305 km². Lake Woods is primarily fed by Newcastle Creek from a large catchment to the north-east. Surface inflows are highly variable, although the creek does flow in most years. Large floods often cause at least partial inundation of the lake, and major floods which fill the lake to capacity have occurred at least three times in the past 15 years (1993, 2001 and 2006). Although the lake is shallow (2-3 m), water can persist for more than 12 months after major flood events. Other large wetlands on the Barkly Tableland including the Lake Sylvester system, Tarrabool Lake and Eva Downs Swamp are also recognised as sites of high conservation significance in the NT.
THREATENED SPECIES	**Significance Rating**	**Regional Significance**
	Threatened plants and animals (Listings at National/NT level **CR** - Critically Endangered, **EN** - Endangered, **VU** - Vulnerable, **NT** - Near Threatened, **LC** - Least Concern, **DD** - Data Deficient)	Four threatened species are reported from this site. **Vertebrates** ▪ Australian Bustard *Ardeotis australis* (-/VU) ▪ Australian Painted Snipe *Rostratula australis* (VU/VU) ▪ Emu *Dromaius novaehollandiae* (-/VU) ▪ Greater Bilby (*Macrotis lagotis*) (VU/VU) (Fleming *et al.* 1983) The Australian Painted Snipe has been recorded on a single occasion at Lake Woods (Jaensch 2003a), but the species is potentially more common given the extent of suitable habitat and difficulty of observation (R. Jaensch, Wetlands International, pers. comm.). There are very few, scattered records for this species in northern Australia. Bustard and Emu occur widely throughout the region, but are listed as threatened due to significant decline. Fleming *et al.* (1983) found signs of Bilby in sandy areas near Longreach Yards during a biological survey of the area, but the site contains little suitable habitat for this species, Which occurs in the “desert country” to the west.
ENDEMIC SPECIES	**Significance Rating**	**Not Significant**
	Notes	Two plant species recorded from this site are endemic to the NT.
WILDLIFE AGGREGATIONS	**Significance Rating**	**International Significance**
	Marine turtles	Not applicable
	Seabirds	No major aggregations recorded
	Waterbirds	**Total numbers of waterbirds:** Maximum counts of waterbirds from aerial surveys of this lake during flood events include: 116 000 in 1993, 100 000+ in 2001, 70 000+ in 2002, and 50 000+ in 2006 (Jaensch and Bellchambers 1997; Wetlands International unpubl.), and real numbers are likely to be at least twice this number if the usual undercounting factor in aerial surveys is taken into account (Costelloe et. al. 2004; Morton *et al.* 1990). The two near-permanent waterholes in this site also support large numbers of waterbirds during the dry season. **Counts of individual species:** Maximum counts of 27 000 Plumed Whistling-Ducks (Jaensch and Bellchambers 1997) are internationally significant (>1% global population; Dutson in prep.). High counts of 3000+ Great Egrets (Wetlands International unpublished data) are nationally significant (>1% Oceania population; Wetlands International 2006). Other species that occur in high numbers include: Australian Pelican (8000); Grey Teal (5000); Intermediate Egret (2000); and Glossy Ibis (3300) (Wetlands International unpublished data). The Freckled Duck is uncommon in the NT but is reported in small numbers (35) at this site (Jaensch 2003b). **Breeding records:** 23 waterbird species are reported breeding in this site (Jaensch and Bellchambers 1997) including colonies of several hundred to several thousand Straw-necked Ibis, Intermediate and Great Egret, Little Black Cormorant, Royal Spoonbill and Australasian Darter. Great Cormorants and Magpie Geese also breed at the site (Wetlands International unpubl.). **Diversity of waterbirds:** The vast size of this lake, the diversity of habitats, and availability of near-permanent water contribute to it being one of the most species-rich inland wetlands in the NT, with 65 waterbird species (Wetlands International unpublished data).

	Shorebirds	11 shorebird species are recorded from this lake, including two species in substantial (but sub-threshold) numbers: Oriental Pratincole (6000+); and Little Curlew (700+) (Wetlands International unpubl.). A record of 26 Swinhoe's Snipe in 1993 is also notable because this species is an uncommon migrant which rarely travels this far inland (Jaensch 2003c).
	Other aggregations	Substantial numbers of Flock Bronzewing Pigeon are known to frequent the Barkly wetlands and there are historical records of large numbers at Lake Woods (Fleming et al. 1983).
WETLANDS	**Significance Rating**	**International Significance**
	Ramsar criteria met	Although no formal assessment has been conducted to date, Lake Woods is likely to meet at least five of the criteria for listing as a Wetland of International Importance under the Ramsar Convention, including criterion 1: rare or unique example of a wetland type; criterion 2: supports threatened species or communities; criterion 4: provides refuge or supports a critical life-cycle stage for important species; criterion 5: important wildlife aggregation site with >20,000 waterbirds; and criterion 6: regularly supports >1% of the individuals in a population.
	DIWA criteria met	Lake Woods is listed as a wetland of national significance in the Directory of Important Wetlands in Australia (DIWA: NT013 Lake Woods). The site meets criteria 1, 2, 3, 4, 5 and includes DIWA wetland types: B1, B6, B10, B13, B14.
	Notes	This site has been nominated as a national High Conservation Value Aquatic Ecosystem (the finalised list of HCVAE will replace the DIWA list), and is a priority HCVAE in the Caring for our Country Business Plan 2009-2010 (Commonwealth of Australia 2008). It is an outstanding example of a temporary freshwater lake and a large semi-permanent waterhole at the end of an inland-draining tropical creek system; one of the largest such lakes in the NT. The lake also includes the largest area of lignum swamp in the NT and one of the largest in tropical Australia (DIWA). Satellite imagery for this site indicates that the lake may be part of an even larger palaeo-lake basin indicative of wetter epochs in the geological past.
	Rivers	No information located
FLORA	**Significance Rating**	**Regional Significance**
	Notes	**Restricted vegetation communities:** The lignum shrubland and associated marsh present at Lake Woods is one of the most extensive occurrences in the NT (R. Jaensch, Wetlands International, pers. comm.). **Restricted range species:** The site contains a suite of plant and animal species characteristic of the blacksoil grasslands of subhumid north Australia. *Eucalyptus barklyensis* is a rarely-recorded tree almost entirely restricted to the Mitchell Grass Downs bioregion in the NT.
OTHER ENVIRONMENTAL VALUES		Lake Woods is proposed to be nominated by Birds Australia as an internationally-recognised *Important Bird Area* (G. Dutson in prep.). Lake Woods is identified as a site of significant refugia for biological diversity in arid and semi-arid Australia due to its importance as a breeding and migratory stop-over location for waterfowl in the sub-tropical inland of the NT (Morton et al. 1995). Lake Woods supports seven fish species and eight frog species are reported in the general region (Fleming et al. 1983). The rare Yellow Chat is abundant at Lake Woods and the lake is one of the few documented breeding sites on the Barkly Tableland for this species (Jaensch and Bellchambers 1997). Lake Woods is listed on the Register of the National Estate for its natural values (Australian Heritage Council 2007). Sub-humid wetlands such as Lake Woods are likely to become increasingly important in the coming decades if global climate change results in even minor rises in sea level, and saltwater inundation occurs on the vast floodplain wetlands of coastal northern Australia. At least 24 species recorded from this site are listed under international conventions or bilateral agreements protecting migratory animals.
MANAGEMENT ISSUES		**Fire:** Pastoral management generally seeks to suppress fire and in the period 1993-2004, 87% of the site was burnt in fewer than three years, and none was burnt in more than six years. **Feral animals**: The site is within the relatively intensively managed pastoral estate, and numbers of feral grazers are low. Feral cats are common in the region, and very numerous following irruptions of the native long-haired rat *Rattus villosissimus*. **Weeds:** In mid-2006 *Parkinsonia aculeata* (Weed of National Significance) was observed to be extensive in the northern part of the lake with dense thickets lining sections of Newcastle Creek down into the lake delta (R. Jaensch pers. obs. 2006). The current distribution of this weed in this site is unknown. **Other:** Cattle and horses have caused significant vegetation loss, trampling and soil erosion around the Longreach Waterhole in the past (Pitts 1994) and continued access to the broader lake area by livestock is likely to limit regeneration of tree and shrub species and cause soil compaction. The fence around the Longreach Waterhole Protected Area is damaged every time the lake floods, making maintenance difficult. Following extensive work by the landholders, at the start of the 08/09 wet season the fence was complete (M. Bolam, CPC, pers. comm.).

MANAGEMENT INFORMATION	**NRM groups**	Barkly Landcare and Conservation Association, Jeulalikari Landcare (Tennant Creek).
	Protected areas	Longreach Waterhole Protected Area (89 km²/ 7% of site).
	Current management plans	**Site-specific plans**: The protected area was created under a management agreement between Newcastle Waters Station and the NT Parks and Wildlife Service in 1985. An Environmental Management System for Newcastle Waters Station, including the Lake Woods area, commenced in 2006 and is ongoing (M. Bolam, CPC, pers. comm.). In conjunction with NRETAS, the landholder is developing a Conservation Management Plan for the site, using Ramsar guidelines. **Other management plans:** Australian Weeds Strategy (NRMMC 2007); Threat Abatement Plan for Predation by Feral Cats (Environment Australia, 1999).
	Monitoring programs and research projects	Aerial and ground surveys of waterbirds are conducted opportunistically by Wetlands International after major flood events (R. Jaensch, Wetlands International, pers. comm.). Vegetation of the Longreach Waterhole conservation area was surveyed and mapped in 1990 (Pitts 1990) and vegetation communities have since been identified and monitoring points established (Pitts 1994). There are four Tier 1 rangeland monitoring points within this site (Karfs and Bastin 2001). Fire in the tropical savannas is mapped continuously under the North Australia Fire Information Project http://www.firenorth.org.au/nafi/app/init.jsp
	Management recommendations	Conduct a comprehensive assessment of the management issues at the site and develop a formal management plan to address significant threats, including weed control and management of grazing pressure. Review the management agreement for the Longreach Waterhole protected area and investigate opportunities to include all significant areas of Lake Woods into a protected area. Review the management agreement for the Longreach Waterhole protected area in the light of a realistic assessment of NRETAS having the resources and will to manage the site as originally agreed, before consideration is given to adding further areas (M. Bolam, CPC, pers. comm.). In cooperation with landholders, determine the benefits of possible nomination as a wetland of international importance (Ramsar site) (NRETA 2005). Control priority weeds in the site in association with the Barkly Landcare and Conservation Association (NRETA 2005). In conjunction with the Northern Land Council, investigate the interest of the local Aboriginal community to undertake land management activities in the Longreach Waterhole reserve (NRETA 2005). Conduct detailed surveys and ongoing monitoring of waterbird populations, vegetation condition and weeds within the site.
KEY REFERENCES	**Papers and reports**	DIWA (A Directory of Important Wetlands in Australia). *Australian Wetlands Database*. Department of Environment, Water, Heritage & the Arts, Canberra ACT (accessed July 2007). Fleming, M.R., K.A. Johnson, P.K. Latz and J.R. McKean. 1983. *A biological survey of Junction Stock Reserve and Newcastle Waters Pastoral Lease on the Barkly Tablelands*. Unpublished report. Conservation Commission of the Northern Territory: Alice Springs. Jaensch, R.P. (1994a). *An inventory of wetlands in the sub-humid tropics of the Northern Territory*. Report to the Australian Nature Conservation Agency. Conservation Commission of the Northern Territory, Darwin. Jaensch, R. and Bellchambers, K. 1997. *Waterbird conservation values of ephemeral wetlands of the Barkly Tableland, Northern Territory*. Unpublished report to Australian Heritage Commission and Parks and Wildlife Commission of the Northern Territory, 76 pp. Pitts B. (1990). *Longreach Waterhole Vegetation Survey and Mapping*. Internal Report, CCNT: Alice Springs, NT. Pitts B. (1994). *Vegetation Communities of Longreach Waterhole*. Internal Report, CCNT: Alice Springs, NT.
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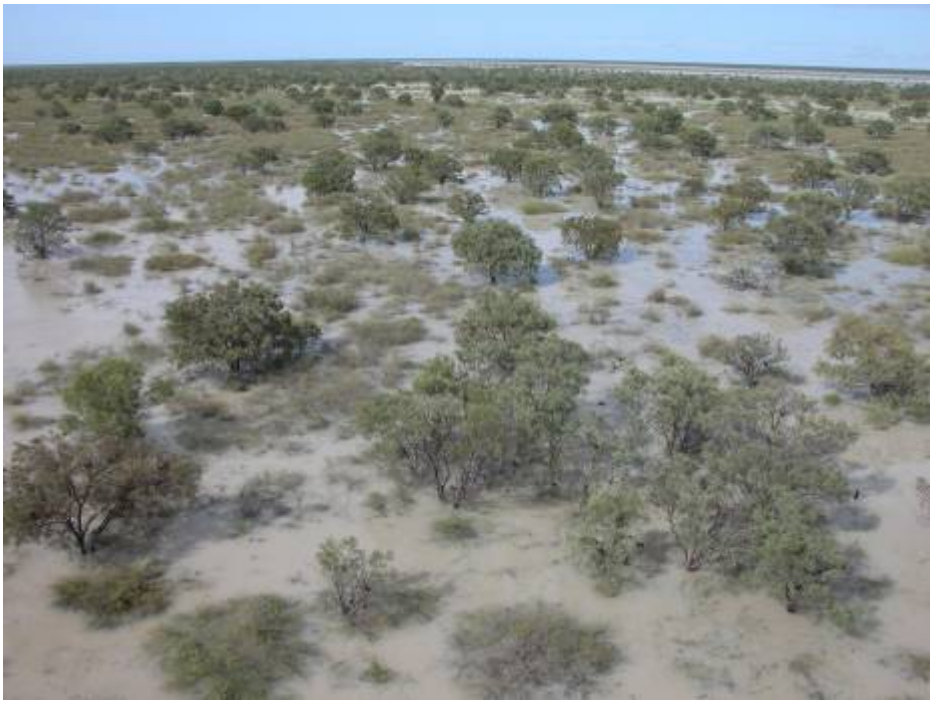
Lake Woods (Photo: Roger Jaensch)



Eva Downs Swamp (Photo: Roger Jaensch)