Imperial Oil & Gas

EP 187

Appendix 01

Environmental Assessment Report

IMP 5-3

CARPENTARIA PILOT PROJECT ENVIRONMENTAL ASSESSMENT REPORT

Client: Imperial Oil & Gas

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Prepared By		**Reviewed By**		**Authorised By**	
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EXECUTIVE SUMMARY

Imperial Oil and Gas proposes to undertake an exploration program on Exploration Permit (EP) 187, located approximately 200km east-southeast of Daly Waters, Northern Territory.

A desktop assessment and targeted ecological surveys were undertaken in October 2023 with specific focus the field assessment zones identified in the Carpentaria Pilot Project Initial Scope. The ecological assessment was carried out to identify weeds, key ecological characteristics and potential constraints to the proposed activities on EP187. A Significant Impact Assessment (SIA) on Matters of National Environmental Significance (MNES) was undertaken.

No threatened fauna or flora species were observed during on-ground surveys. One near threatened (NT) fauna species was identified (Spectacled Hare-wallaby). Habitat exists for some conservation significant species in the area, however given the location of disturbance areas, species habitat requirements and likelihood of occurrence, impacts from proposed activities are considered low.

Acronyms and Abbreviations

Acronyms/Abbreviation	Description
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Formerly DAWE/DoE) – Australian Government
DEPWS	Department of Environment, Parks and Water Security (Formerly DENR) – Northern Territory Government
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
GFU	Gulf Fall and Uplands
LCG	Land Clearing Guidelines
MNES	Matters of National Environmental Significance
SIA	Significant Impact Assessment
SREBA	Strategic Regional Environmental and Baseline Assessment
STU	Sturt Plateau
TPWC Act	Territory Parks and Wildlife Conservation Act 1976
WMP	Weed Management Plan

This report was prepared by Mr P. Fox (BSc (App. Env Sci)(Hons)). Mr Fox is a Principal Ecologist with over 20 years' experience in undertaken environmental assessments across Australia and Papua New Guinea. He has undertaken numerous surveys in the Northern Territory since 2011.

1 INTRODUCTION

Imperial Oil and Gas proposes to undertake an exploration program on Exploration Permit (EP) 187, located approximately 200km east-southeast of Daly Waters, Northern Territory. The proposed program is located north and south of the Carpentaria Highway, located in the Gulf Fall and Uplands (GFU) and Sturt Plateau (STU) geographical bioregions.

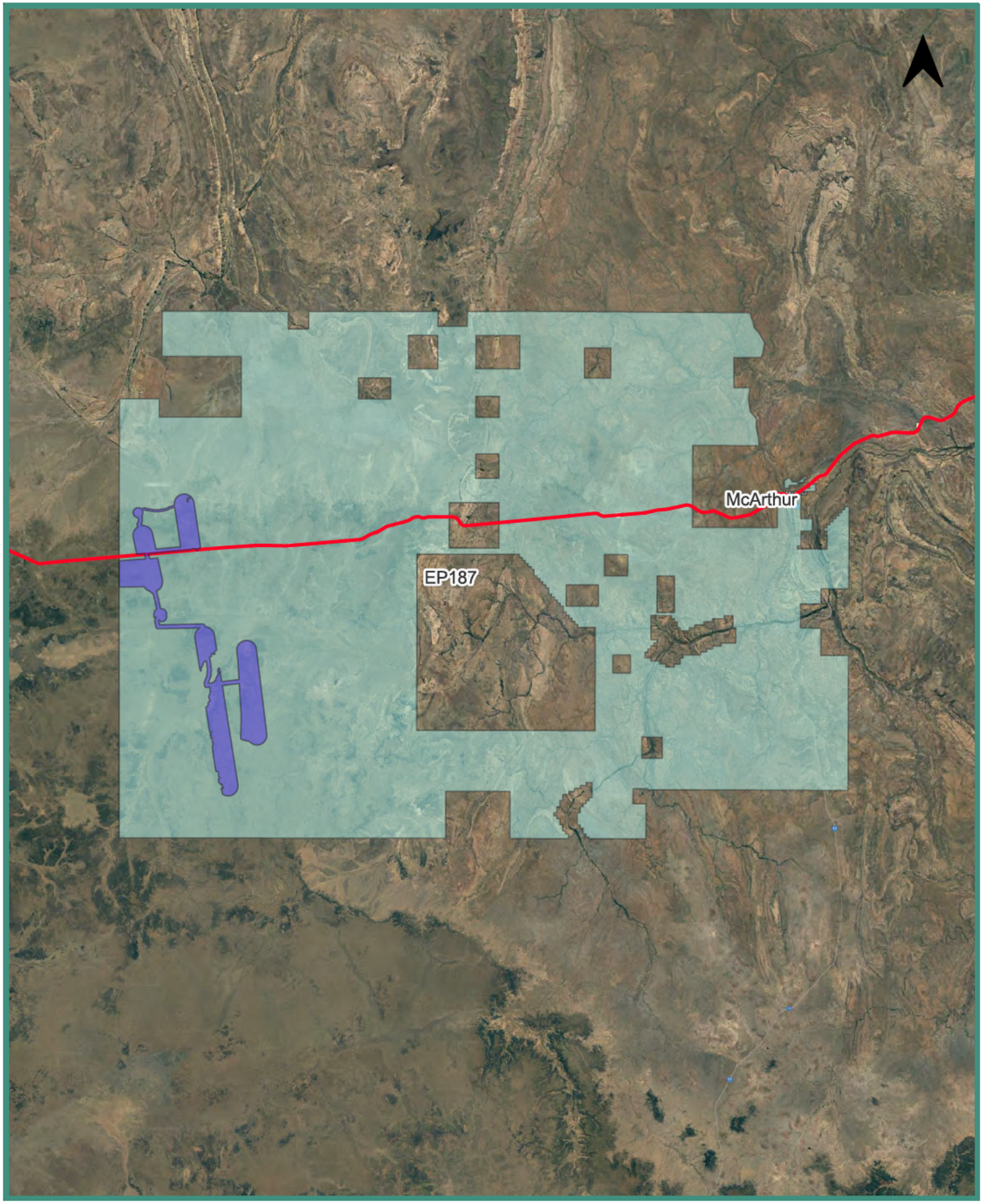
A desktop investigation and ecological assessment was carried out to identify key ecological characteristics and potential constraints to the proposed exploration and development activities. The scope of the study was to provide:

- habitat and vegetation community descriptions;
- locations and photos of communities and species present;
- locations of fauna breeding places and other habitat features;
- watercourse assessments;
- baseline weed assessment; and
- likelihood of targeted threatened species to occur within or adjacent to the proposed drilling activities and potential production infrastructure areas.

This report presents the field survey methods and the results of desktop and field investigations.

1.1 LOCATION

EP187 is situated in the upper reaches of the McArthur River in proximity to the Barkly Tablelands. The tenement lies to the west of the Tablelands Highway and is crossed east to west by the Carpentaria Highway. Figure 1 displays the location of the tenement area. Access within the tenement is primarily along the Carpentaria Highway and existing pastoral tracks.



TITLE	**Location**
MAP NO.	Figure 1
PROJECT	Carpentaria Pilot Project

LEGEND

Study Area
EP187
Carpentaria Hwy

0 5 10 15 km

FOX & CO ENVIRONMENTAL

Date: 21 11 2023 Base Imagery: Google Satellite Hybrid

1.2 CARPENTARIA PROJECT INITIAL SCOPE – FIELD ASSESSMENT ZONES

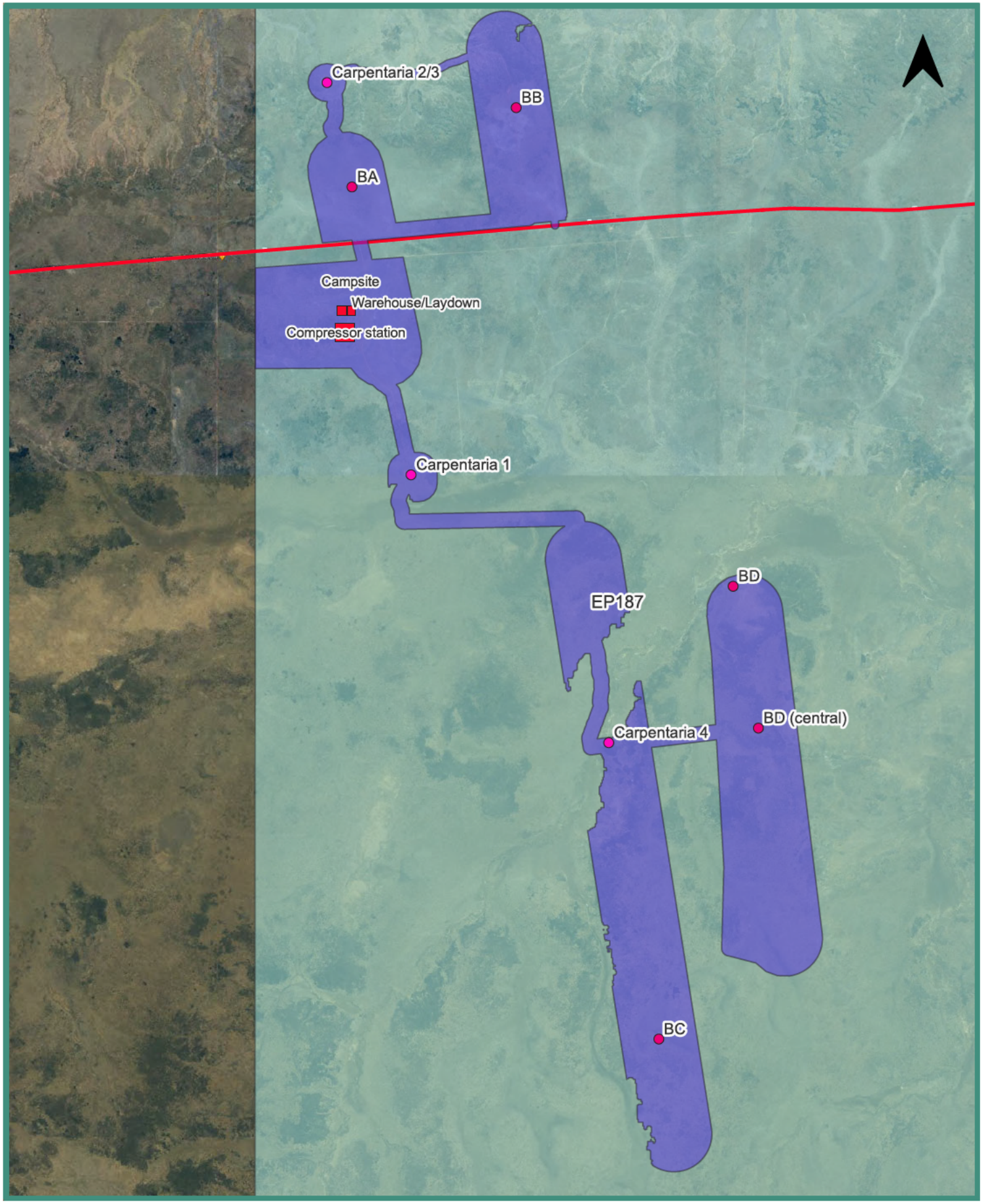
The proposed production initial scope areas include:

- Five new well locations (BA, BB, BC, BD and BD Central)
- Productions pipelines
- Infrastructure area which includes compressor station

Figure 2 shows the initial production assessment areas.

Table 1 Wellpad locations October 2023

SITE	Seismic Line	Easting	Northing
Wellpad			
BA	2019-04	511559	8150743
BB	IOG21-07	515875	8152827
BC	IOG21-07	519625	8128340
BD	2019-05	521577	8140244
BD (central)	2019-05	522241	8136515



TITLE	**Field Assessment Zones**
MAP NO.	Figure 2
PROJECT	Carpentaria Pilot Project

LEGEND

- Production Facilities Carpentaria Pilot Project
- Proposed Wells
- Exisiting Infrastructure
- Study Area
- Carpentaria Hwy
- EP187

0 2 4 6 km

FOX & CO ENVIRONMENTAL

Date: 14 12 2023 Base Imagery: Google Satellite Hybrid File Path: C:\Users\ecofo\OneDrive - Fox & Co Environmental\Clients\Imperial Oil & Gas\EP187 2023\4 Maps

2 METHOD

This section outlines the methods undertaken to describe the existing environmental values of the proposed well sites and production zones. A combination of desktop assessment and field survey was conducted as part of this study. The desktop assessments included a review of previous investigations on EP187, relevant literature, mapping, database searches and the Strategic Regional Environmental and Baseline Assessment (SREBA) for the Beetaloo Sub-basin. The field survey obtained ecological information and opportunistic observations relevant to the field assessment zones.

2.1 DESKTOP ASSESSMENT

Desktop assessments of available Northern Territory and Commonwealth databases were undertaken prior to the commencement of the field survey to identify records or potential occurrences of conservation significant species and vegetation communities within the study area. A review of previous desktop assessments was undertaken in addition to a revised search of the following databases:

- Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) protected matters search tool
- The Atlas of Living Australia (ALA) database
- BirdLife Australia's Birdata
- Northern Territory Government Department of Environment, Parks and Water Security (DEPWS) NR Maps
- Strategic Regional Environmental and Baseline Assessment (SREBA) for the Beetaloo Sub-basin.

2.2 LIKELIHOOD OF OCCURRENCE

An assessment was undertaken of the likelihood of occurrence for threatened fauna and flora species identified through the desktop review. The field survey further informed and verified this likelihood of occurrence assessment. The DCCEEW and the Northern Territory DEPWS do not have prescriptive likelihood of occurrence guidelines within their policies but rather clarify the scale of assessment required to determine the level of impact (e.g. level of assessment, previous record searches, and distribution maps). The below criteria have been developed with the aim of considering this scale of assessment in order to identify the likelihood of occurrence for threatened species:

- **Low potential to occur** – the species has not been recorded in the region (no records from desktop searches) and/or current known distribution does not encompass study area and/or suitable habitat is generally lacking from the study area.
- **Moderate potential to occur** – the species has been recorded in the region (desktop searches) however suitable habitat is generally lacking from the study area or species has not been recorded in the region (no records from desktop searches) however potentially suitable habitat occurs at the study area.
- **High potential to occur** – the species has been recorded in the region (desktop searches) and suitable habitat is present at the study area.
- **Known to occur** – the species has been recorded on-site in the recent past (i.e. last 5-10 years) and the site provides suitable habitat for it.

2.3 FIELD ASSESSMENTS

Targeted surveys were undertaken in relation to the proposed activities on EP187 in October 2023 during optimal dry-season conditions.

Surveys were undertaken with a Fox & Co principal ecologist (Paul Fox), DEPWS weed officer, an archeologist, an Imperial representative and Cultural monitors; and were undertaken on foot, helicopters and all-terrain vehicles (ATV).

3 EXISTING ENVIRONMENT

The following provides a detailed assessment of the areas relevant to the proposed program.

3.1 VEGETATION COMMUNITIES

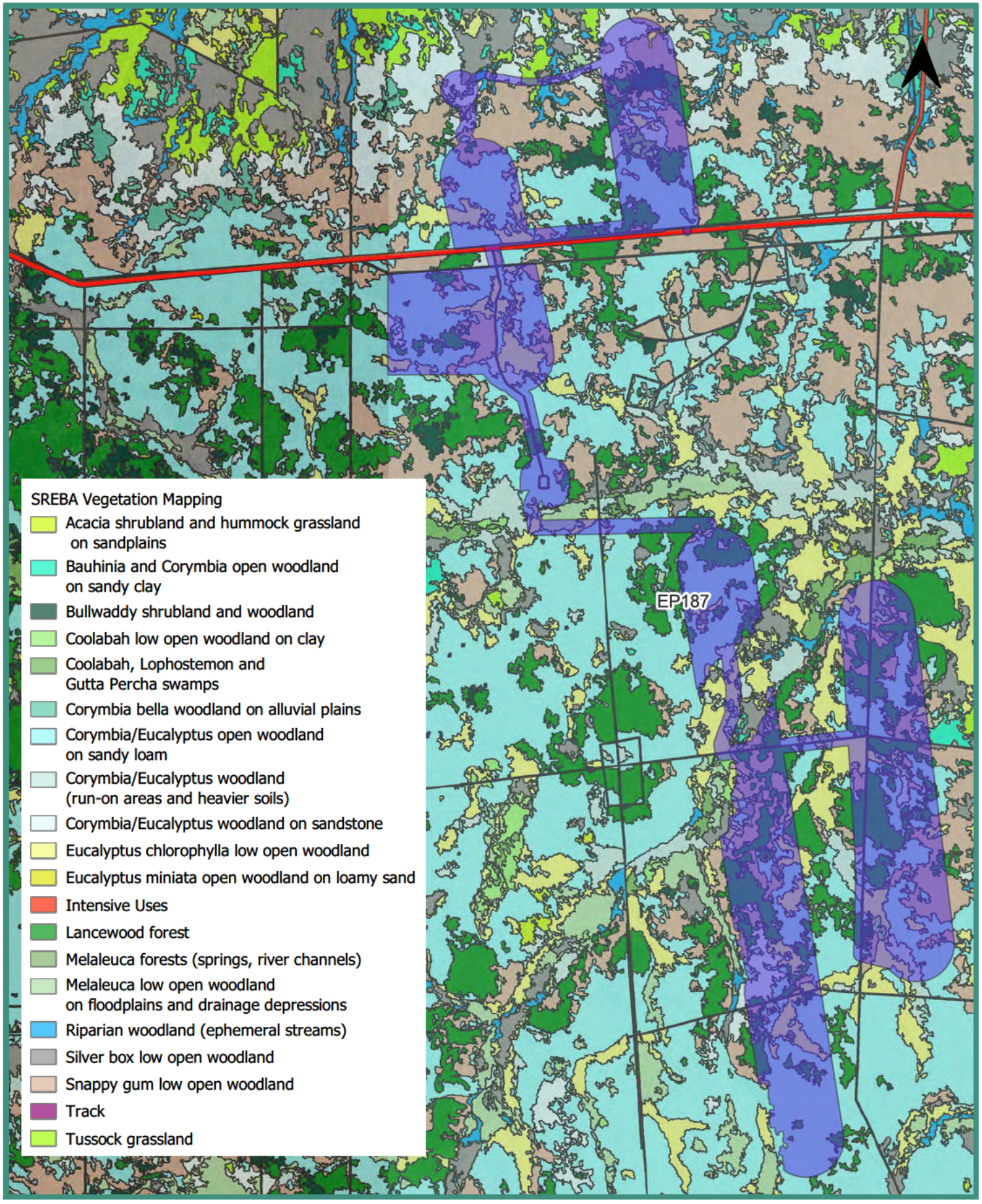
The vegetation is comprised of lancewood thickets and open eucalypt / acacia woodlands.

Table 2 provides a summary of vegetation communities within the project area. Figure 2 provides detailed ground-truthed vegetation mapping for the project area.

Table 2 Vegetation Descriptions

Vegetation Description	Typical Photo Description
Lancewood (*Acacia shirleyi*) forests. Lancewood form dense thickets with little to no shrub layer and minimal grass cover. This photo shows the edge of a lancewood thicket demonstrating the density of the vegetation.	
Eucalypt and Corymbia woodland with acacia shrub layer. Dominant canopy species include variable-barked bloodwood *(Corymbia dichromophloia)* and snappy gum (*Eucalyptus leucophloia*). Often with dense shrub layer of turpentine *(Acacia lysiphloia*).	

Vegetation Description	Typical Photo Description
Eucalypt woodland with native tussock grassland groundcover. Dominant canopy species include silver box (*Eucalyptus pruinosa*) and coolabah (*Eucalyptus microtheca*). Some areas contain monoculture stands of silver box.	
Eucalypt floodplains / ephemeral soaks. Canopy is low and open and often consists of coolabah (*Eucalyptus microtheca*), with fringing *Eucalyptus camaldulensis*.	
Low rocky undulating rises with snappy gum (*Eucalyptus leucophloia*) and spinifex.	
Riparian vegetation along ephemeral waterways. Riparian vegetation is sparsely scattered and consists of river red gum (*Eucalyptus camaldulensis*) or snappy gum (*Eucalyptus leucophloia*).	



TITLE **SREBA Vegetation Mapping**

MAP NO. Figure 3

PROJECT Carpentaria Pilot Project

LEGEND

- Study Area
- Carpentaria Hwy
- EP187

0 1 2 3 km

FOX & CO ENVIRONMENTAL

Date: 21 11 2023 Base Imagery: Google Satellite Hybrid Spatial Data: https://srebadata.nt.gov.au/view/ntg-spa-000000026 File Path: C:\Users\ecofo\OneDrive - Fox & Co Environmental\Clients\Imperial Oil & Gas\EP187 2023\4 Maps

3.2 CONSERVATION SIGNIFICANT SPECIES

Conservation significant flora and fauna species are those species listed under the provisions of the *Commonwealth EPBC Act* and/or the *Territory Parks and Wildlife Conservation Act 1976* (TPWC Act) including threatened species as well as internationally protected wildlife and migratory species. Threatened species include those with conservation status listed as Extinct in the Wild, Critically Endangered, Endangered or Vulnerable (CE, E, V) under the EPBC Act and/or TPWC Act.

The Northern Territory DEPWS also lists Data Deficient (DD) flora and fauna species. Data Deficient species are those for which there is not sufficient data on population size or trend to unambiguously determine the conservation status. Data deficient species while not considered threatened species under the EPBC Act or TPWC Act, are considered Significant Species under the TPWC Act and are therefore included in the assessment. Least Concern (LC) species are those that do not meet the International Union for the Conservation of Nature (IUCN) criteria for listing as threatened.

Potentially occurring threatened flora and fauna species are listed in **Appendix B** with an account of their likelihood of presence within the study area based on known records, species biology and ecology and habitats available within the study area. Not all of the threatened species indicated through desktop information are expected to occur within the study area due to the absence of suitable habitat for some species.

One (1) threatened fauna species, Grey Falcon (*Falco hypoleucos*) has been previously recorded within the search area. Five (5) significant fauna species have previously been recorded near the study area (within a 1km buffer) including *Apus Pacificus* (Fork-tailed Swift), listed as Marine and Migratory and *Merops ornatus* (Rainbow Bee-eater) which is listed as Marine under the EPBC Act, *Ardeotis australis* (Australian Bustard), *Heteromunia pectoralis* (Pictorella Mannikin), which are listed as Near Threatened (NT) and Common blue tongue, which is listed as Data Deficient (DD) under the TPWC Act.

No threatened flora species have previously been recorded in the study area. Two (2) significant species flora species have previously been recorded within the study area (including a 1km buffer). Both of these species, *Chamaecrista deserti and Synostemon trachyspermus,* are listed as DD under the TPWC Act.

Table 3 lists the threatened (or significant) fauna and flora species that have previously been recorded within the study area.

Table 4 lists the migratory fauna species that are at least moderately likely to occur within the study area based on the likelihood of occurrence assessment. Species which are specialists of tidal areas are not included.

The following sections summarise findings from each of the databases.

3.2.1 EPBC PROTECTED MATTERS

A Protected Matters Search Tool (PMST) has been undertaken and included in the attached.

The Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) Protected Matters search tool (PMST) was used to identify threatened species and vegetation communities listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) that may occur within the search area. The PMST is a predictive database that identifies EPBC Act listed flora and fauna species with a Moderate Potential to Occur in a given search area based on bioclimatic modelling. The search area was defined by the study area with a 20 km buffer.

The EPBC PMST identified the search area as having potential habitat for no nationally threatened flora species, 13 threatened terrestrial species and 13 migratory species listed under the EPBC Act (**Appendix A**). One (1) of the 13 migratory species species, Freshwater Sawfish, has been

excluded from the assessment as no suitable habitat exists within the study area. Shorebirds have also been excluded from the assessment due to lack of suitable habitat in the study area.

A Significant Impact Assessment (SIA) has been undertaken (*EP187 Significant Impact Assessment, Matters of National Environmental Significance, IOG-09, November 2023*) (**Appendix C**) on the following EPBC Act listed species that are known to occur or are considered highly likely to occur.

- Grey Falcon (*Falco hypoleucos)* (EPBC Act – V)
- Gouldian Finch (*Erythrura gouldiae*) (EPBC Act – E)
- Painted Honeyeater (*Grantiella picta*) (EPBC Act – V)

Migratory and Listed Marine Species assessed in the MNES SIA include:

- Glossy Ibis (*Plegadis falcinellus*) (EPBC Act – listed marine, listed migratory)
- Great Egret (*Ardea alba*) (EPBC Act – listed marine)
- Cattle Egret (*Bulbulcus ibis*) (EPBC Act – listed marine)
- Whistling Kite (*Haliastur sphenurus*) (EPBC Act – listed marine)
- Rainbow bee-eater (*Merops ornatus*) (EPBC Act – listed marine)

The assessment determined the project will not have a significant impact on the above-mentioned EPBC Act listed species.

No Threatened Ecological Communities (TEC), World Heritage Properties, National Heritage Places, Wetlands of International Importance, Great Barrier Reef Marine Park or Commonwealth Marine Areas occur within the study area.

Refer to **Appendix C** for the MNES SIA.

3.2.2 BIRDATA

BirdLife Australia's Birdata (**Appendix A**) shows records of 54 bird species observed within the search area. Of those, 2 species 8 species, *Chalcites osculans* (Black-eared Cuckoo), *Coracina novaehollandiae* (Black-faced Cuckoo-shrike), *Coracina papuensis* (White-bellied Cuckoo-shrike), *Falco cenchroides* (Nankeen Kestrel), *Grallina cyanoleuca* (Magpie-lark), *Haliastur sphenurus* (Whistling Kite) *Heteroscenes pallidus* (Pallid Cuckoo) and Todiramphus sanctus (Sacred Kingfisher) are listed as migratory species under the EPBC Act.

3.2.3 ATLAS OF LIVING AUSTRALIA

The ALA database returned records for 1 significant and/or threatened fauna species *Falco hypoleucos* (Grey Falcon) listed under the EPBC Act and/or TPWC Act within the search area.

3.2.4 DEPWS NR MAPS

The Northern Territory Government NR Maps (NT Govt. Department of Environment, Parks and Water Security, 2023) was used to identify threatened flora and fauna species, sites of conservation significance and sites of botanical significance recorded in the study area, and the broader region.

A query of the DEPWS NR Maps database returned two (2) Data Deficient (DD) plant species. There are no historical records for threatened flora species within the search area. Data Deficient species while not considered threatened species under the EPBC Act or TPWC Act, they are considered Significant Species under the TPWC Act. One (1) threatened fauna species, *Falco hypoleucos* (Grey Falcon) and six (6) significant fauna species have been historically recorded within the study area (including a 1 km buffer).

3.2.5 SREBA

The Northern Territory Government Strategic Regional Environmental and Baseline Assessment (SREBA) data sets were analysed, identifying records of threatened flora and fauna species found

during the targeted SREBA surveys. Only one (1) Data Deficient (DD) plant species was found within the study area, however the SREBA surveys did identify species within the broader region, refer to Figure 4, Figure 5 and Figure 6.

Table 3 Threatened & Significant species previously recorded in the study area

Class	Species Name	Common Name	EPBC Act Status	TPWC Act Status
Birds	*Apus Pacificus*	Fork-tailed Swift	Listed Migratory & Marine	LC
Birds	*Ardeotis australis*	Australian Bustard	Not listed	NT
Birds	*Falco hypoleucos*	Grey Falcon	V	V
Birds	*Heteromunia pectoralis*	Pictorella Mannikin	Not listed	NT
Birds	*Merops ornatus*	Rainbow bee-eater	Listed Marine	LC
Plants	*Chamaecrista deserti*	-	Not listed	DD
Plants	*Synostemon trachyspermus*	-	Not listed	DD

EPBC Act (species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), Aust.): CE = Critically Endangered, E = Endangered, V = Vulnerable, LM = Listed Marine
TPWC Act (species listed under the *Territory Parks and Wildlife Conservation Act 1976* (TPWC Act), NT): CE = Critically Endangered, E = Endangered, V = Vulnerable, NT=Near Threatened, DD = Data Deficient

Table 4 Migratory species likely to occur within the study area (PMST)

Class	Species Name	Common Name	EPBC Act Status	TPWC Act Status
Birds	*Actitis hypoleucos*	Common Sandpiper	Listed Migratory Listed Marine	SLC
Birds	*Apus pacificus*	Fork-tailed Swift	Listed Migratory Listed Marine	SLC
Birds	*Calidris acuminata*	Sharp-tailed Sandpiper	Listed Migratory Listed Marine	SLC
Birds	*Calidris ferruginea*	Curlew Sandpiper	CE Listed Migratory Listed Marine	CE
Birds	*Calidris melanotos*	Pectoral Sandpiper	Listed Migratory Listed Marine	LC
Birds	*Cecropis daurica*	Red-rumped Swallow	Listed Migratory Listed Marine	LC
Birds	*Charadrius veredus*	Oriental Plover, Oriental Dotterel	Listed Migratory Listed Marine	LC

Class	Species Name	Common Name	EPBC Act Status	TPWC Act Status
Birds	*Cuculus optatus*	Oriental Cuckoo, Horsfield's Cuckoo	Listed Migratory	LC
Birds	*Glareola maldivarum*	Oriental Pratincole	Listed Migratory Listed Marine	LC
Birds	*Hirundo rustica*	Barn Swallow	Listed Migratory Listed Marine	LC
Birds	*Motacilla cinerea*	Grey Wagtail	Listed Migratory Listed Marine	LC
Birds	*Motacilla flava*	Yellow Wagtail	Listed Migratory Listed Marine	LC

EPBC Act (species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), Aust.): MM = Migratory Marine, MT = Migratory Terrestrial, MW = Migratory Wetlands, LM = Listed Marine, MI=Listed Migratory
TPWC Act (species listed under the *Territory Parks and Wildlife Conservation Act 1976* (TPWC Act), NT): NT=Near Threatened, LC = Least Concern, SLC = Special Least Concern

Appendix B provides a table of the species reported in search results with an assessment of their likelihood of occurrence within the initial scope study area.

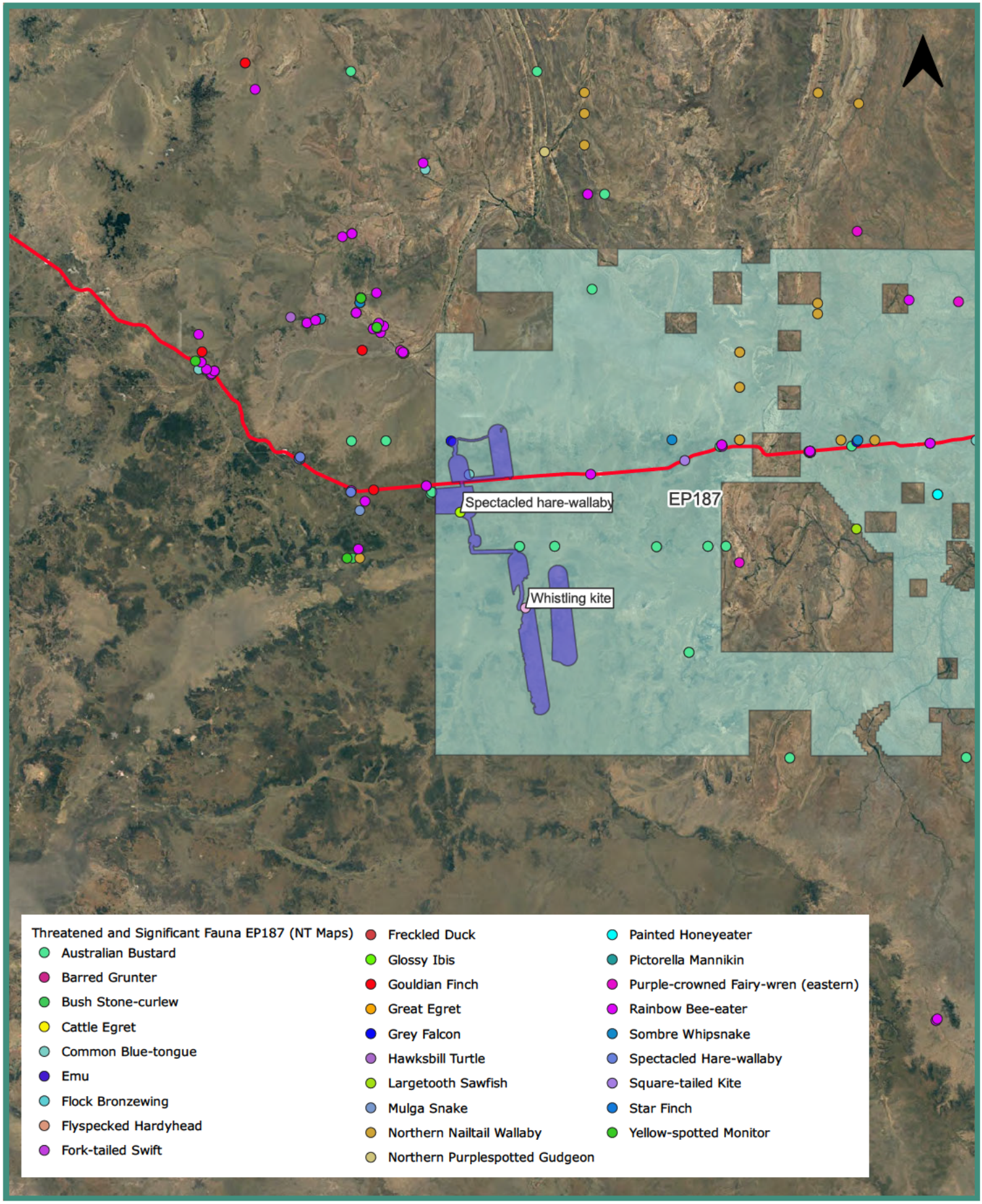
3.2.6 WEEDS AND PESTS

Details of the weeds occurring in relation to the initial scope study area are included in the Weed Management Plan (WMP) prepared by Fox & Co Environmental (Fox & Co Environmental, 2023).

Table 5 provides the weeds reported in the study area during weed surveys undertaken in October 2023. The Carpentaria Highway and existing cattle operations represents the greatest threat for weed migration into the study area.

Table 5 Weeds known to occur in the study area

Species	Common Name	WONS	NT Class
Bidens pilosa	Cobbler's peg	-	-



TITLE **Threatened & Significant Fauna Study Area**

MAP NO. Figure 4

PROJECT Carpentaria Pilot Project

LEGEND

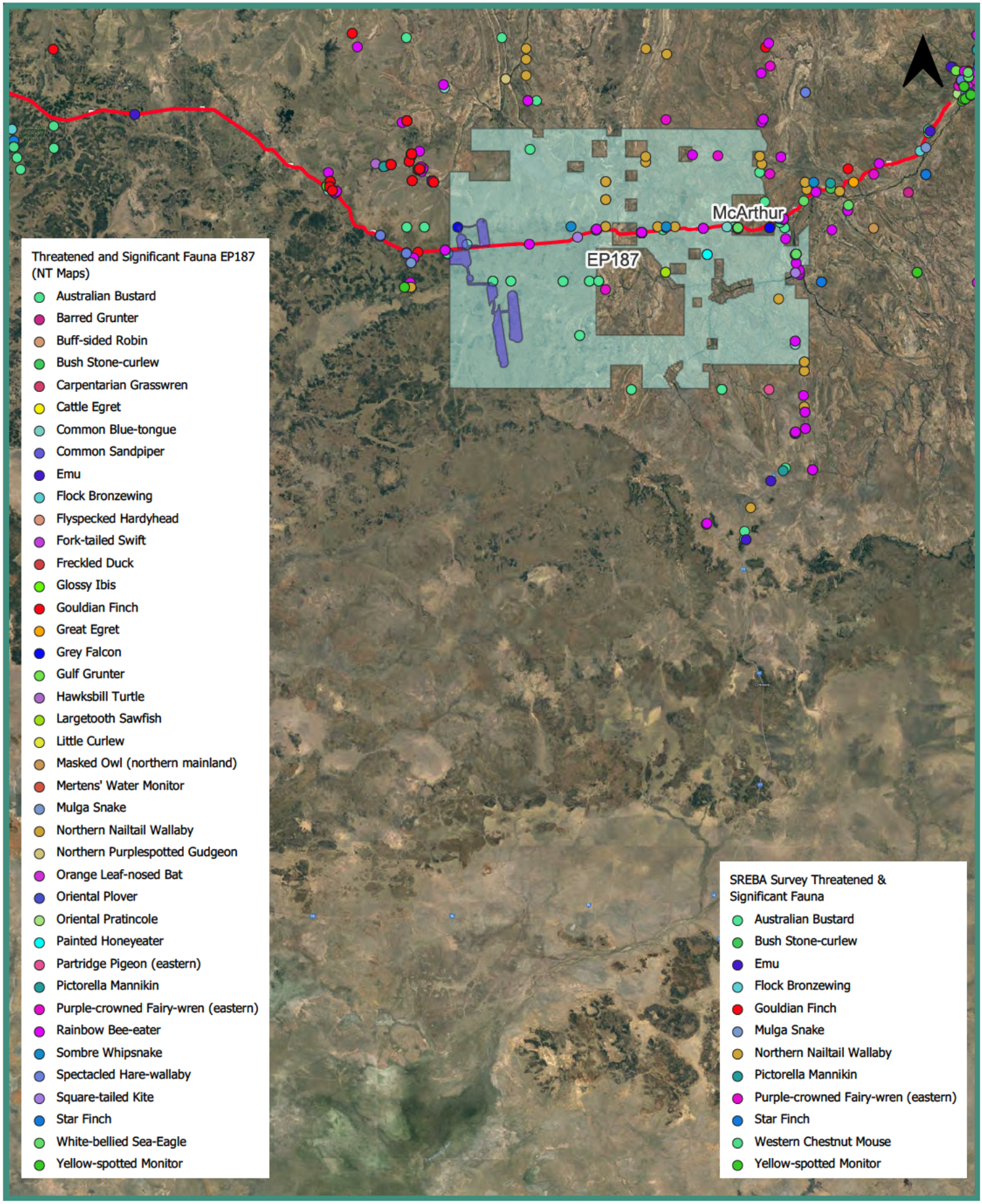
October Field Survey Results

- Spectacled hare-wallaby
- Whistling kite
- Study Area
- Carpentaria Hwy
- EP187

0 5 10 15 km

FOX & CO ENVIRONMENTAL

Date: 30 01 2024 Base Imagery: Google Satellite Hybrid Spatial Data: https://nrmaps.nt.gov.au/nrmaps.html File location: C:\Users\ecofo\OneDrive - Fox & Co Environmental\Clients\Imperial Oil & Gas\EP187 2023\4 Maps



TITLE	**Threatened & Significant Fauna Regional Scale**
MAP NO.	Figure 5
PROJECT	Carpentaria Pilot Project

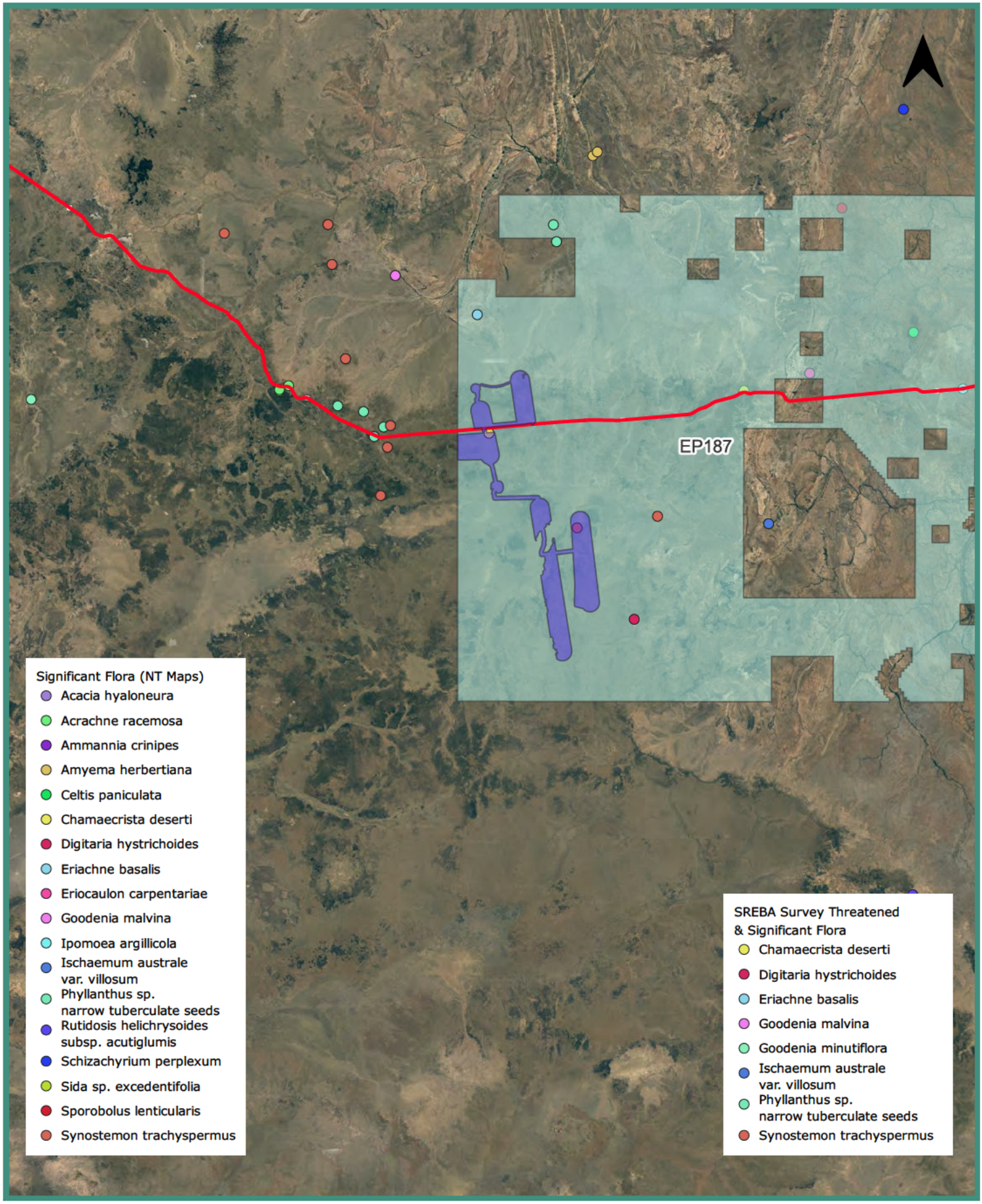
LEGEND

- Study Area
- Carpentaria Hwy
- EP187

0 10 20 30 km

FOX & CO ENVIRONMENTAL

Date: 30 01 2024 Base Imagery: Google Satellite Hybrid Spatial Data: https://srebadata.nt.gov.au/view/ntg-spa-000000026 File Path: C:\Users\ecofo\OneDrive - Fox & Co Environmental\Clients\Imperial Oil & Gas\EP187 2023\4 Maps



TITLE **Threatened & Significant Flora**

MAP NO. Figure 6

PROJECT Carpentaria Pilot Project

LEGEND

- Study Area
- Carpentaria Hwy
- EP187

0 5 10 15 km

FOX & CO ENVIRONMENTAL

Date: 30 01 2024 Base Imagery: Google Satellite Hybrid Spatial Data: https://srebadata.nt.gov.au/datatype/NTG-SPA https://nrmaps.nt.gov.au/nrmaps.html File location: C:\Users\ecofo\OneDrive - Fox & Co Environmental\Clients\Imperial Oil & Gas\EP187 2023\4 Maps

4 FIELD ASSESSMENT RESULTS

4.1 THREATENED SPECIES

No threatened flora was observed during the October 2023 baseline survey. One near threatened (NT) fauna species was identified (Spectacled hare-wallaby). This species is highly mobile and are unlikely to be impacted by proposed exploration and development activities. One (1) species of conservation significance under the EPBC Act was recorded (Whistling Kite) (*Haliastur sphenurus* – EPBC – Listed Marine)).

4.2 WATERWAYS

There are several Stream Order 1 and 2 ephemeral waterways and one (1) Stream Order 3 (Relief Creek) within the general study area (refer Figure 7). Proposed exploration and production facility areas have been sited to avoid waterways and drainage lines.

Disturbance from cattle was observed on most waterways and drainage lines across the exploration areas. The stream order 2 and 3 (amber and red on Figure 7) waterways, often contains riparian vegetation, including *eucalyptus camaldulensis* (river red gum) and *eucalyptus leucophloia* (snappy gum) vegetation with hollows which will be avoided by maintaining buffer distances in accordance with Table 19 (Recommended Widths for Riparian Buffers) of the Land Clearing Guidelines (LCG) (2021). These buffers distances are:

- Drainage lines and 1st order streams = 25m buffer from outer edge of drainage depression or riparian vegetation / levee
- 2nd order streams = 50 m buffer
- 3rd order creeks = 100 m buffer

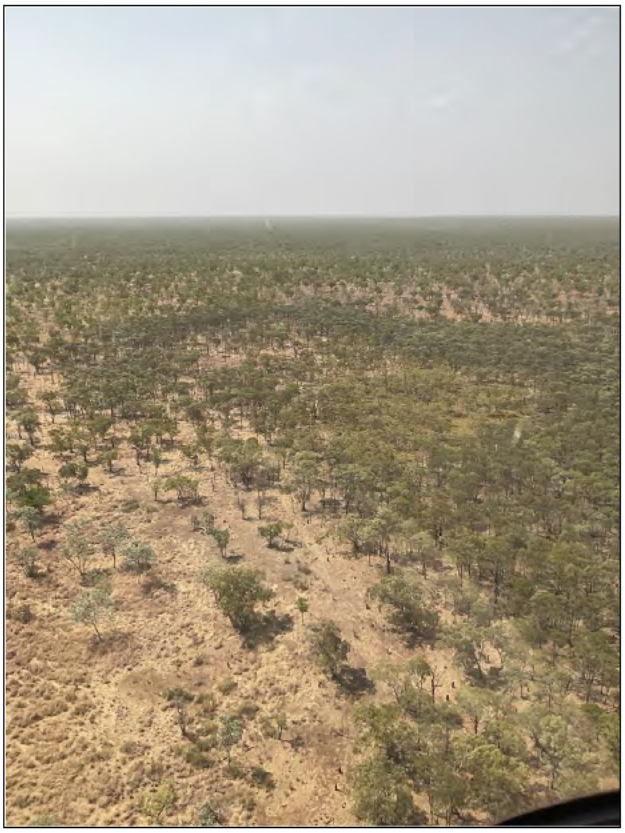
4.3 EXPLORATION AND PRODUCTION ZONES

The following table provides a description of the proposed exploration / infrastructure areas for wells (BA, BB, BC, BD and BD Central) and the production facility area south of the Carpentaria Highway (refer Figure 2 for locations).

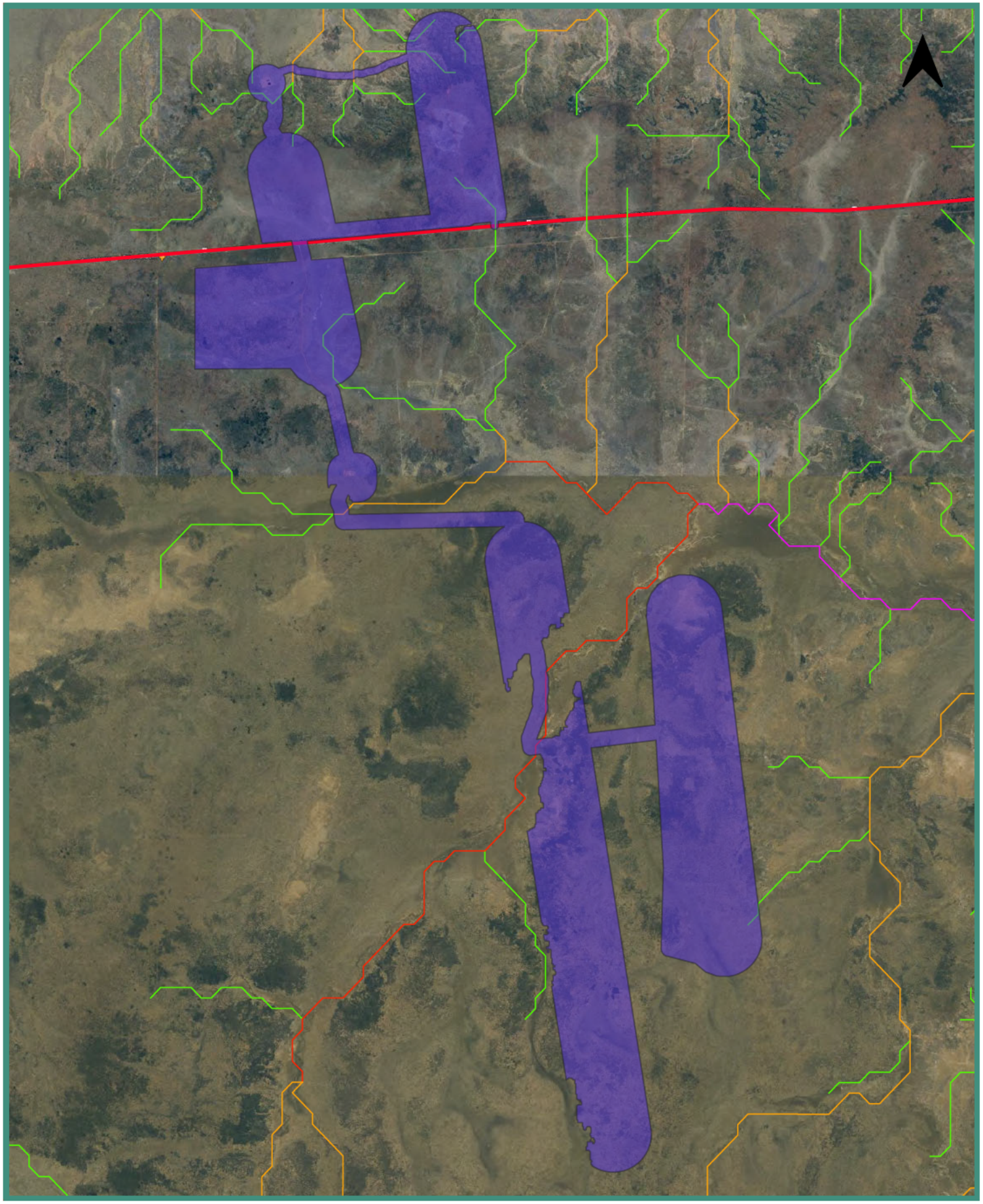
Table 6 Infrastructure Locations

Infrastructure	Photo Description
BA Open mixed eucalypt woodland with grassy understorey. Adjacent areas contain large habitat trees with small to large hollows. The location was positioned to minimize the loss of hollow-bearing trees.	

Infrastructure	Photo Description
BB – view looking south Eucalypt and Corymbia woodland with grassy understorey. Dominant canopy species include variable-barked bloodwood *(Corymbia dichromophloia*). Note Carp 2 and 3 access track.	
BC Mixed open lancewood and eucalypt woodland. This area has previously burnt and lacks large habitat trees. Typical species include Silver grevillea (*Grevillea parallela*), emergent Variable-barked bloodwood (*Corymbia dichromophloia*) and Quinine bush (*Petalostigma pubescens*). Bird species observed: peaceful doves, diamond doves and crested pigeons. An ephemeral soak is located north-east of BC. This area was ground-truthed and	

Infrastructure	Photo Description
identified as a no-go zone.	
BD The initial proposed location for BD was surveyed and determined unsuitable due to ecological and construction constraints. The area was within a low-lying area consisting of a monoculture of Silver Box (*Eucalyptus pruinosa*). These monoculture stands are found on low-lying floodplain areas. The proposed well location was moved approximately 500m north, to avoid this ephemeral area. BD is situated on open mixed eucalypt woodland with some lancewood.	
BD Central Mixed eucalypt woodland. Typical species include Variable-barked bloodwood (*Corymbia dichromophloia*), Lancewood (*Acacia shirleyi*) and *Petalostigma pubescens* (Quinine bush)	

Infrastructure	Photo Description
Production Facilities Mixed low open eucalypt and corymbia woodland with some patches of lancewood (*Acacia shirleyi*). Typical species include snappy gum, variable-barked bloodwood with either a grassy understorey and/or a low shrub layer dominated by turpentine (*Acacia lysiphloia).* There are no mapped waterways in the production facility area. Two (2) spectacled hare-wallabies were observed in the south-eastern corner (-16.7677, 135.1091) of this area. Spectacle hare-wallaby are NT under the TPWC Act. They are not listed under the EPBC Act. Aerial photo taken from approximate center of proposed production facility area (-16.7577, 135.0995).	 



TITLE **Waterways**

MAP NO. Figure 7

PROJECT Carpentaria Pilot Project

LEGEND

Study Area

Water Drainage Stream Order

1

2

3

4

Carpentaria Hwy

0 1 2 3 km

FOX & CO ENVIRONMENTAL

Date: 21 11 2023 Base Imagery: Google Satellite Hybrid Spatial Data: https://data.nt.gov.au/ File Path: C:\Users\ecofo\OneDrive - Fox & Co Environmental\Clients\Imperial Oil & Gas\EP187 2023\4 Maps

4.4 HABITAT DESCRIPTIONS

The following table describes the habitats that occur within the exploration areas, including adjacent areas. The areas of intact vegetation provide a range of habitats that may support a diversity of fauna species.

Table 7 Habitat Descriptions

Ephemeral Waterways and Riparian Vegetation

Plate 1 Ephemeral waterway and riparian vegetation (left), Relief Creek (right)
Riparian areas often have significantly higher fauna diversity than surrounding areas. Whilst the riparian vegetation in the study area is predominantly sparse woodland (as per the above photos), habitat values include: • Provides water (in wet season) and larger pools in the dry season. Supports flowering and seeding vegetation as well as prey (aquatic species, invertebrates and small vertebrates) for small mammals, birds and reptiles • Riparian vegetation provides refuge, sheltered movement corridors for fauna • Riparian vegetation includes sparse *E. camaldulensis* (river red gum) which have some hollows which are important for hollow-dependent animals (e.g. parrots, bats, finches (eg. Gouldian Finch)) • Drainage lines and waterways were impacted by cattle • Potential habitat for Gouldian finch (*Erythrura gouldiae*) where eucalypt and paperbark woodlands, usually with a grassy understorey, occur in the vicinity • Potential habitat for Grey falcon (*Falco hypoleucos)* where waterways intersect open woodland areas. • Riparian *E. camaldulensis* vegetation along the Stream Order 2 and 3 waterways, is likely a Groundwater Dependent Ecosystem (GDE), which is typical in highly monsoonal environments with prolonged dry seasons. These will not be impacted as the exploration will adhere to the LCG buffer areas associated with waterways and drainage lines.

Lancewood Thickets



Plate 2 Lancewood thickets

Lancewood (*Acacia shirleyi*) provide the thickest vegetation cover in the landscape and therefore provides:

- Shade and refuge for a variety of fauna species
- Fallen branches provide ground cover and refugia for small mammals and reptiles

Woodlands



Plate 3 Eucalypt and Corymbia woodlands

Woodland or shrubland habitat values include:

- Woodland trees and shrubs provide food for sap and nectar eaters and supports prey (invertebrates and small vertebrates) for small mammals, birds and reptiles
- Provide shelter and protected areas for breeding for a variety of fauna, including live vegetation and fallen woody debris
- Woodlands with hollow bearing trees are of critical importance for hollow-dependent animals (e.g. parrots, bats)
- Potential habitat for spectacled hare-wallaby (*Lagorchestes conspicillatus leichardti*) and yellow-spotted monitor (*Varanus panoptes*). Dry *Eucalyptus* and *Acacia* in open forests, open woodland, tall shrublands, tussock grasslands and hummock grasslands.

5 CONCLUSION

The ecological assessment was carried out to identify weeds (refer Weed Management Plan, November 2023), key ecological characteristics such as habitat for significant and threatened species, and potential constraints to the proposed activities on EP187 in the Northern Territory.

Relief Creek is the main waterway in the study area with a number of other smaller order waterways and drainage lines. These waterways and riparian areas offer potential habitat for a range of conservation significant species and should be avoided. Buffers will be required as per the Land Clearing Guidelines when working around these waterways.

As previously identified during previous assessments on EP187, the area is quite "clean" in the context of introduced plants species. Traffic on the Carpentaria Highway represents the biggest risk for the introduction of weed species. Works should be undertaken in accordance with the project specific Weed Management Plan (WMP, 2023).

No threatened fauna or flora species were observed within EP187 during the October 2023 survey. One (1) near threatened (NT) fauna species was identified (Spectacle hare-wallaby). These species are highly mobile and are unlikely to be impacted by proposed activities. One (1) species of conservation significance under the EPBC Act was recorded (Whistling Kite) (*Haliastur sphenurus* – EPBC – Listed Marine)).

Habitat exists for some conservation significant species in the area, however given the location of disturbance areas, species habitat requirements and likelihood of occurrence, impacts from proposed activities are considered low.

6 RECOMMENDATIONS

The following is recommended to ensure compliance with regulatory provisions:

- Undertake pre-clearance surveys prior to clearing works to identify significant habitat trees that should be avoided.
- Undertake post-works weed and rehabilitation surveys.
- Maintain buffer distances from waterways in accordance with the LCG (2021)
- Undertake works in accordance with approved clearing permits and environmental management plans.

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APPENDIX A - SEARCH RESULTS

Birdata Species List - Study Area EP187

Common Name	Scientific Name	EPBC
Apostlebird	Struthidea cinerea	
Australian Magpie	Gymnorhina tibicen	
Banded Honeyeater	Cissomela pectoralis	
Bar-shouldered Dove	Geopelia humeralis	
Black Kite	Milvus migrans	
Black-chinned Honeyeater	Melithreptus gularis	
Black-eared Cuckoo	Chalcites osculans	Listed Marine
Black-faced Cuckoo-shrike	Coracina novaehollandiae	Listed Marine
Black-faced Woodswallow	Artamus cinereus	
Black-tailed Treecreeper	Climacteris melanurus	
Blue-winged Kookaburra	Dacelo leachii	
Brown Falcon	Falco berigora	
Brown Honeyeater	Lichmera indistincta	
Budgerigar	Melopsittacus undulatus	
Cockatiel	Nymphicus hollandicus	
Crested Bellbird	Oreoica gutturalis	
Diamond Dove	Geopelia cuneata	
Galah	Eolophus roseicapilla	
Great Bowerbird	Ptilonorhynchus nuchalis	
Grey Shrike-thrush	Colluricincla harmonica	
Grey-crowned Babbler	Pomatostomus temporalis	
Grey-fronted Honeyeater	Ptilotula plumula	
Hooded Robin	Melanodryas cucullata	
Jacky Winter	Microeca fascinans	
Little Friarbird	Philemon citreogularis	
Little Woodswallow	Artamus minor	
Long-tailed Finch	Poephila acuticauda	
Magpie-lark	Grallina cyanoleuca	Listed Marine
Masked Woodswallow	Artamus personatus	
Mistletoebird	Dicaeum hirundinaceum	
Nankeen Kestrel	Falco cenchroides	Listed Marine
Olive-backed Oriole	Oriolus sagittatus	
Pallid Cuckoo	Heteroscenes pallidus	Listed Marine
Peaceful Dove	Geopelia placida	
Pied Butcherbird	Cracticus nigrogularis	
Red-backed Fairy-wren	Malurus melanocephalus	
Red-browed Pardalote	Pardalotus rubricatus	
Red-tailed Black-Cockatoo	Calyptorhynchus banksii	
Red-winged Parrot	Aprosmictus erythropterus	
Restless Flycatcher	Myiagra inquieta	
Rufous Whistler	Pachycephala rufiventris	
Rufous-throated Honeyeater	Conopophila rufogularis	
Sacred Kingfisher	Todiramphus sanctus	Listed Marine
Singing Honeyeater	Gavicalis virescens	
Striated Pardalote	Pardalotus striatus	
Torresian Crow	Corvus orru	
Varied Lorikeet	Psitteuteles versicolor	
Wedge-tailed Eagle	Aquila audax	

Common Name	Scientific Name	EPBC
Weebill	Smicrornis brevirostris	
Whistling Kite	Haliastur sphenurus	Listed Marine
White-bellied Cuckoo-shrike	Coracina papuensis	Listed Marine
White-throated Gerygone	Gerygone olivacea	
White-winged Triller	Lalage tricolor	
Willie Wagtail	Rhipidura leucophrys	

Retrieved from: https://birdata.birdlife.org.au/explore#map=-16.8209363_135.2717849_11&polygon=7l3lDswt4Zht1BwVnIqhe-y3BriB&public_source=default

EPBC Act Protected Matters Report

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

Report created: 13-Sep-2023

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

Caveat
Acknowledgements

Summary

Matters of National Environment Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	13
Listed Migratory Species:	13

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	18
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

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

Details

Matters of National Environmental Significance

Listed Threatened Species			[Resource Information]
Status of Conservation Dependent and Extinct are not MNES under the EPBC Act. Number is the current name ID.			
Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Erythrotriorchis radiatus Red Goshawk [942]	Endangered	Species or species habitat may occur within area	In feature area
Erythrura gouldiae Gouldian Finch [413]	Endangered	Species or species habitat known to occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area	In feature area
Falcunculus frontatus whitei Crested Shrike-tit (northern), Northern Shrike-tit [26013]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area	In feature area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area	In feature area
Tyto novaehollandiae kimberli Masked Owl (northern) [26048]	Vulnerable	Species or species habitat likely to occur within area	In feature area
MAMMAL			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat may occur within area	In feature area
Macrotis lagotis Greater Bilby [282]	Vulnerable	Species or species habitat may occur within area	In feature area
Trichosurus vulpecula arnhemensis Northern Brushtail Possum [83091]	Vulnerable	Species or species habitat may occur within area	In feature area
REPTILE			
Elseya lavarackorum Gulf Snapping Turtle [67197]	Endangered	Species or species habitat may occur within area	In feature area
SHARK			
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area	In feature area

Listed Migratory Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Marine Species			
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area	In feature area
Migratory Terrestrial Species			
Cecropis daurica Red-rumped Swallow [80610]		Species or species habitat may occur within area	In feature area
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area	In feature area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Motacilla cinerea			
Grey Wagtail [642]		Species or species habitat may occur within area	In feature area
Motacilla flava			
Yellow Wagtail [644]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Calidris acuminata			
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area	In feature area
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Calidris melanotos			
Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
Charadrius veredus			
Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area	In feature area
Glareola maldivarum			
Oriental Pratincole [840]		Species or species habitat may occur within area	In feature area

Other Matters Protected by the EPBC Act

Listed Marine Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Anseranas semipalmata](#) Magpie Goose [978]		Species or species habitat may occur within area overfly marine area	In feature area
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
[Bubulcus ibis as Ardea ibis](#) Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area	In feature area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
[Cecropis daurica as Hirundo daurica](#) Red-rumped Swallow [80610]		Species or species habitat may occur within area overfly marine area	In feature area
[Chalcites osculans as Chrysococcyx osculans](#) Black-eared Cuckoo [83425]		Species or species habitat may occur within area overfly marine area	In feature area
[Charadrius veredus](#) Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Glareola maldivarum			
Oriental Pratincole [840]		Species or species habitat may occur within area overfly marine area	In feature area
Haliaeetus leucogaster			
White-bellied Sea-Eagle [943]		Species or species habitat may occur within area	In feature area
Hirundo rustica			
Barn Swallow [662]		Species or species habitat may occur within area overfly marine area	In feature area
Merops ornatus			
Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla cinerea			
Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla flava			
Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area	In feature area
Rostratula australis as Rostratula benghalensis (sensu lato)			
Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Reptile			
Crocodylus johnstoni			
Freshwater Crocodile, Johnston's Crocodile, Johnstone's Crocodile [1773]		Species or species habitat may occur within area	In feature area

Extra Information

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area

Caveat

1 PURPOSE

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

The report contains the mapped locations of:

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

2 DISCLAIMER

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

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

3 DATA SOURCES

Threatened ecological communities

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

Threatened, migratory and marine species

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

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

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

4 LIMITATIONS

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

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

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

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

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

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

Acknowledgements

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

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

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

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

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APPENDIX B - LIKELIHOOD OF OCCURRENCE

Table 8 Likelihood of Occurrence – Threatened and Significant Fauna

Species Name	EPBC Act Status	TPWC Act Status	IUCN Status	Habitat Preference	Likelihood of Occurrence
AVES					
Ardeotis australis Australian Bustard	Not listed	NT	LC	This species is a ground-dwelling bird, found on dry plains, grasslands and open woodland. They were once widespread in open habitats across much of mainland Australia, they are still widespread in the inland and tropical north, however are increasingly rare or extinct in the south (Birdlife, 2023).	**Known to occur** Recorded in previous surveys. Previous records within 1 km of study area.
Burhinus grallarius Bush Stone-curlew	Not listed	NT	LC	Bush Stone-curlews occur throughout mainland Australia. They are a ground-dwelling bird found throughout grasslands, heathlands and sometimes found in cemeteries and golf courses (Birdlife, 2023).	**High potential to occur** Suitable habitat occurs and previous records within 10km of the study area
Calidris ferruginea Curlew Sandpiper (also in Migratory spp.)	CE Listed Marine Listed Migratory	V	NT	In Australia, this species occurs around the coasts and are also quite widespread inland, though in smaller numbers. They are mainly found on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters and occasionally are recorded around floodwaters (Department of the Environment, 2023).	**Low potential to occur** Lack of suitable habitat and no previous records
Dromaius novaehollandiae Emu	-	NT	LC	Emu are mainly found in sclerophyll forest and savanna woodland, across most of mainland Australia, from coastal regions to highlands, including the Snowy Mountains (Australian Museum, 2023).	**High potential to occur** Suitable habitat occurs and previous records within 30km of the study area

Species Name	EPBC Act Status	TPWC Act Status	IUCN Status	Habitat Preference	Likelihood of Occurrence
Erythrotriorchis radiatus Red Goshawk	E	V	EN	Occurs in coastal and sub-coastal areas in riverine, wooded and forested lands of tropical and warm-temperate Australia. Known to prefer forest and woodland with a mosaic of vegetation types, large prey populations (birds), and permanent water. The vegetation types include eucalypt woodland, open forest, tall open forest, gallery rainforest, swamp sclerophyll forest, and rainforest margins. The Red Goshawk nests in large trees, frequently the tallest and most massive in a tall stand, and nest trees are invariably within one km of permanent water (Department of the Environment, 2021).	**Low potential to occur** No previous records and no suitable habitat
Erythrura gouldiae Gouldian Finch	E	V	LC	Inhabits open woodlands that are dominated by Eucalyptus trees and support a ground cover of Sorghum and other grasses. Often found in vegetation along watercourses and mangrove edges. Critical components of suitable core habitat for the Gouldian Finch include the presence of favoured annual and perennial grasses (especially Sorghum), a nearby source of surface water and, in the breeding season, unburnt hollow-bearing Eucalyptus trees (especially *E. tintinnans, E. brevifolia* and *E. leucophloia*) Its breeding habitat is usually confined to ridges and rocky foothills, probably due to the presence of Sorghumgrasses (Department of the Environment, 2021) (Morcombe, Steve Parish Field Guide: Australian Birds, 2004)	**High potential to occur** Suitable habitat occurs and previously recorded on EP187 and within 6km of study area.
Falco hypoleucos Grey Falcon	V	V	VU	Grey Falcons live in areas of lightly-timbered lowland plains, typically on inland drainage systems, where the average annual rainfall is less than 500 mm. They use	**Known to occur** Suitable habitat exists and previous records within study area.

Species Name	EPBC Act Status	TPWC Act Status	IUCN Status	Habitat Preference	Likelihood of Occurrence
				nests built by other species and prefer nests in the tallest trees along watercourses. The majority of records from the Northern Territory (NT) are from the southern half, but there are records all the way up to Darwin and also a record from Groote Eylandt (Northern Territory Government, 2012).	
Falcunculus frontatus whitei Crested Shrike-tit (northern), Northern Shrike-tit	V	NT	-	Generally found in open Eucalypt woodlands dominated by Bloodwood, Darwin Box and Roughleaf Cabbage Gum. Species has been recorded in areas with grassy and shrubby understoreys. Seasonally waterlogged areas may attract the species (Department of the Environment , 2021).	**Moderate potential to occur** No previous records, however suitable habitat exists
Grantiella picta Painted Honeyeater	V	V	LC	The painted honeyeater is the most specialised of Australia's honeyeaters. Its diet mainly consists of mistletoe fruits, but also includes nectar (from flowering mistletoe, eucalypts and possibly banksias) and arthropods, especially in the non-breeding season The species is sparsely distributed from south-eastern Australia to north-western Queensland and eastern Northern Territory. The greatest concentrations and almost all records of breeding come from south of 26°S, on inland slopes of the Great Dividing Range between the Grampians, Victoria and Roma, Queensland (Department of the Environment, 2023).	**High potential to occur** Suitable habitat exists and previous records within 40km of the study area.
Heteromunia pectoralis Pictorella Mannikin	Not listed	NT	LC	This species is found across northern Australia, inhabiting dry grasslands and edges of wetlands, including spinifex (eBird, 2023).	**High potential to occur** Suitable habitat exists and previous records within 1km of the study area.
Lophoictinia isura Square-tailed Kite	Not listed	NT	LC	In northern Australia, it utilizes a diverse range of habitat dominated by eucalypts, pandanus, gallery	**High potential to occur**

Species Name	EPBC Act Status	TPWC Act Status	IUCN Status	Habitat Preference	Likelihood of Occurrence
				forest and heath (Morcombe, Field Guide to Australian Birds, 2004)	Suitable habitat exists and previous records within 20km of the study area.
Malurus coronatus Purple-crowned fairy wren	Not listed	NT	LC	Margins of rivers and creeks, pandanus and paperbark clumps with dense undercover of tall cane grass (Morcombe, Field Guide to Australian Birds, 2004)	**High potential to occur** Suitable habitat exists and previous records within 10km of study area. Previously recorded at Leila Creek (Paul Fox, 2018).
Neochmia ruficauda Star Finch	Not listed	NT	LC	Star finch favour lush green vegetation, tall, rank grass along temporary or permanent watercourses, rushy margins of swamps, moist green crops (Morcombe, Field Guide to Australian Birds, 2004)	**High potential to occur** Suitable habitat exists and previous records within 20km of study area. Previously recorded at Leila Creek (Paul Fox, 2018).
Phaps histrionica Flock Bronzewing	Not listed	NT	LC	Nomadic inhabitant of grasslands of the northern interior, often forming large flocks in the thousands. Lives on open plains among clumped grasses, small shrubs with open spaces (Morcombe, Field Guide to Australian Birds, 2004)	**High potential to occur** Suitable habitat exists and previous records within 30km of the study area.
Psephotellus dissimilis Hooded Parrot	Not listed	NT	LC	This species is found in savannah woodlands with termite mounds in the north of the Northern Territory, with some scattered records from the centre of the NT and far northern Queensland (Simpson & Day, 2004).	**Moderate potential to occur** No previous records, however suitable habitat occurs
Rostratula australis Australian Painted Snipe	E	V	EN	This species has been recorded at wetlands in all states of Australia. They are generally found in shallow terrestrial freshwater wetlands, including temporary and permanent lakes, swamps and claypans. They also are found to use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. Typically, this species are found in sites that include those with rank emergent tussocks of grass,	**Low potential to occur** No previous records and no suitable habitat

Species Name	EPBC Act Status	TPWC Act Status	IUCN Status	Habitat Preference	Likelihood of Occurrence
				sedges, rushes or reeds, or samphire; often with scattered clumps of lignum *Muehlenbeckia* or canegrass or sometimes tea-tree (Department of the Environment , 2023).	
Stictonetta naevosa Freckled Duck	Not listed	NT	LC	Prefers permanent fresh water swamps and creeks with heavy growth of cumbungi (bullrushes), lignum or tea-tree. During drier times, the Freckled Duck moves from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewerage ponds. They generally rest in dense cover (Australian Museum, 2023)	**High potential to occur** Suitable habitat in wet season. 1 previous record within 30km of the study area
Tyto novaehollandiae kimberli Masked Owl (northern)	V	V	V	Inhabits tall, open Eucalypt forests (particularly those dominated by *Eucalyptus miniata* and *E. tetrodonta*). Forages in open vegetation and grasslands and typically roosts and nests in tree hollows, though there are recordings of roostings in monsoon rainforests. Home range is estimated to be 5-10 km^2. Very similar in appearance to the Barn Owl (*Tyto alba*), though the Masked Owl is larger, darker and has more feathering on the feet (Department of the Environment, 2021) (Higgins, Handbook of Australian, New Zealand and Antarctic Birds Volume 4: Parrots to Dollarbird, 1999).	**Moderate potential to occur** Lack of suitable habitat although there are previous records in region, 80kms from study area.
MAMMALIA					
Macroderma gigas Ghost bat	V	NT	V	Ghost bats move between a number of caves seasonally or as dictated by weather conditions and/or foraging opportunities, so they require a range of cave sites (Bat Call WA, 2021). The Northern Territory subpopulations are distributed among 5 broad regions (Gulf of Carpentaria, Groote Eylandt, Litchfield, Katherine/Pine Creek, Kakadu) with	**Low potential to occur** No previous records and no suitable habitat

Species Name	EPBC Act Status	TPWC Act Status	IUCN Status	Habitat Preference	Likelihood of Occurrence
				a total population of approximately 2,500 to 3,500 individuals (Bat Call WA, 2021). Roost sites include caves, rock crevices and disused mine adits. In the Northern Territory, major colonies of over 100 are reported in caves in sandstone and limestone strata (Bat Call WA, 2021). In the Northern Territory they have been recorded throughout the mainland Top End north of approximately 17º latitude (north of the study area which is 16º latitude) as well as Elcho Island, Groote Eylandt and other nearby islands (Department of the Environment, 2021).	
Lagorchestes conspicillatus Spectacled Hare-wallaby	Not listed	NT	LC	This species of-wallaby is found across northern Australia from QLD to WA in tropical tussock or spinifex habitats (Atlas of Living Australia, 2023). They can be found in forests, woodlands, and arid grasslands, preferring areas with shrubs, grass tussocks, or spinifex hummocks for shelter (Ingleby & Westoby, 1992).	**Occurs** Identified during October 2023 surveys on EP187. Additional previous records within 10kms of study area.
Macrotis lagotis Greater Bilby	V	V	V	Bilby occur in a variety of habitats, usually on landforms with level to low slope topography and light to medium soils. It occupies three major vegetation types; open tussock grassland on uplands and hills, mulga woodland/shrubland growing on ridges and rises, and hummock grassland in plains and alluvial areas. Laterite and rock feature substrates are an important part of Greater Bilby habitat. These habitat support shrub species, such as *Acacia kempeana, A. hilliana* and *A. rhodophylla*, which have root-dwelling larvae that provide a constant food source for the Greater Bilby. They also contain Spinifex hummocks which are quite uniform and discrete, providing runways between hummocks, enabling easier movement and foraging. Greater bilbies occurrence is strongly associated with	**Low potential to occur** No suitable habitat and lack of previous records in study area.

Species Name	EPBC Act Status	TPWC Act Status	IUCN Status	Habitat Preference	Likelihood of Occurrence
				higher rainfalls and temperatures, particularly as these conditions may not be favoured by foxes, which are one of their main threats (Department of the Environment , 2021).	
Onychogalea unguifera Northern Nailtail Wallaby	Not listed	NT	LC	This species inhabits Acacia woodlands and shrublands with tussock grasses or spinifex, especially at the edges of blacksoil plains. They are found across northern Australia from the tropical north of QLD through to the Kimberley region of WA (NESP Threatened Species Recovery Hub, 2021).	**High potential to occur** Suitable habitat and previous records within 10km of the study area
Trichosurus vulpecula arnhemensis Northern Brushtail Possum	V	-	-	This subspecies occurs discontinuously from the Gulf of Carpentaria hinterland through to the Kimberley region. They are found mainly in tall eucalypt open forests with large hollow-bearing trees, particularly where the understorey includes some shrubs that bear fleshy fruits They also occur in some mangrove communities, some rainforests and some semi-urban areas (Department of Agriculture, Water and the Environment, 2021).	**Low potential to occur** No suitable habitat and lack of previous records in study area.
REPTILIA					
Acanthophis hawkei Plains Death Adder	V	V	V	Suitable habitat for the plains death adder consists of flat, treeless, cracking-soil riverine floodplains (Department of Sustainability, Environment, Water, Population and Communities, 2023)	**Low potential to occur** No suitable habitat and lack of previous records in study area.
Demansia quaesitor Sombre Whipsnake	Not listed	DD	LC	Found in tropical seasonally dry woodlands to semi-arid savannahs and scrunlands from the eastern Kimberley region in WA through the mid north of the NT to NW QLD (Cogger, 2014).	**High potential to occur** Suitable habitat occurs and previous records within 20kms of study area
Elseya lavarackorum Gulf Snapping Turtle	E	LC	LC	The Gulf Snapping Turtle distribution is restricted to rivers draining into the Gulf of Carpentaria. This species is found in deep pools in the upper catchments of permanently flowing spring-fed river systems,	**Low potential to occur**

Species Name	EPBC Act Status	TPWC Act Status	IUCN Status	Habitat Preference	Likelihood of Occurrence
				particularly in areas with intact riparian vegetation. They inhabit large rivers and their associated overflow lagoons and oxbow lakes and are found in deeper permanent pools most often with muddy, sandy or rocky bottoms. The species is also found in the middle reaches of rivers, upstream of saline regions and downstream of escarpments, including plunge pools, particularly food plants, such as the Cluster Fig Ficus racemosa and Pandanus aquaticus are found (Department of the Environment, 2023) (NT Govt. Department of Environment, Parks and Water Security, 2021).	No suitable habitat and lack of previous records in study area.
Pseudechis australis Mulga Snake	Not listed	NT	LC	This species has the widest distribution of any snake species in Australia, ranging throughout the continent (except for the very south/SE areas). They are found across a wide variety of habitats, including highly disturbed areas such as wheat fields (Australian Museum, 2023).	**High potential to occur** Suitable habitat occurs and previous records within 10kms of study area.
Tiliqua scincoides Common Blue-tongue	Not listed	DD	LC	This species is found across central and eastern mainland Australia, inhabiting coastal regions, montane areas and sclerophyll forests (Atlas of Living Australia, 2023). Blue-tongues are usually found in open country with lots of ground cover such as tussocky grasses or leaf litter (Australian Museum, 2023).	**High potential to occur** Suitable habitat occurs and previous records within the study area.
Varanus mertensi Mertens' Water Monitor	Not listed	V	EN	This species has a broad distribution across coastal and inland waters in the far north of Australia, from the Kimberley to the western side of Cape York Peninsula. In the NT the species has been recorded across most of the Top End and the Gulf Region. Mertens' Water Monitor is semi-aquatic and is seldom seen far from water (NT Govt. Department of Environment, Parks and Water Security, 2021).	**Low potential to occur** No suitable habitat and lack of previous records in study area.

Species Name	EPBC Act Status	TPWC Act Status	IUCN Status	Habitat Preference	Likelihood of Occurrence
Varanus panoptes Yellow-spotted Monitor	Not listed	V	LC	Ground dwelling lizard, feeds mainly on insects and small vertebrates. Can grow to 1.2 metres. Occupies a range of habitats such as coastal beaches, grasslands, floodplains and woodlands (Cogger, 2014).	**High potential to occur** Suitable habitat occurs and previous records 10kms from study area.
Fish					
Amniataba percoides Barred Grunter	Not listed	DD	LC	Occurs in a variety of freshwater habitats ranging from still ponds and rock pools, to fast-flowing rivers and streams. The species tolerates a wide range of environmental conditions, from the clear headwaters of streams to the slightly brackish upper parts of estuaries, and can live in a range of water temperatures (Fishes of Australia, 2023)	**Moderate potential to occur** Suitable habitat occurs (wet season only) and previous records within 10kms of study area.
Craterocephalus stercusmuscarum Flyspecked Hardyhead	Not listed	DD	LC	The Flyspecked Hardyhead forms shoals in still or slow moving sections of tropical rivers, small streams, lakes, ponds and reservoirs and fast-flowing creeks. Usually found in shallow water with sandy, gravel or muddy bottoms and aquatic vegetation (Fishes of Australia, 2023)	**Moderate potential to occur** Suitable habitat occurs (wet season only) and previous records on EP187, within 30kms of study area.
Mogurnda mogurnda Northern Purple Spotted Gudgeon	Not listed	DD	LC	Inhabits freshwater billabongs, swamps, lakes and reservoirs, drainage ditches, and clear, flowing streams. Although often abundant in areas with dense aquatic vegetation, it also occurs in rocky pools with minimal plant life (Fishes of Australia, 2023)	**Low potential to occur** Lack of suitable habitat although previous records within 10km of the study area.
Pristis pristis Largetooth Sawfish	V	V	CE	The name Freshwater Sawfish is a misnomer. It is a marine/estuarine species that spends its first three–four years in freshwater growing to about half its adult size (4 m+) (Allen 2000 pers. comm.). Juveniles and sub-adult Freshwater Sawfish predominantly occur in rivers and estuaries, while large mature animals tend to occur	**Low potential to occur** No suitable habitat, although there are records approximately 30km east of the study area (McArthur River).

Species Name	EPBC Act Status	TPWC Act Status	IUCN Status	Habitat Preference	Likelihood of Occurrence
				more often in coastal and offshore waters up to 25 m depth. Small specimens, mostly less than 150 cm, have been caught in remote ponds where they have been isolated for several years between floods (Department of the Environment, 2023)	

EPBC Act (species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), Aust.): CE = Critically Endangered, E = Endangered, V = Vulnerable, M = Migratory, Ma = Marine
TPWC Act (species listed under the *Territory Parks and Wildlife Conservation Act 1976* (TPWC Act), NT): CE = Critically Endangered, E = Endangered, V = Vulnerable, NT=Near Threatened
IUCN (species listed under the International Union for Conservation of Nature (IUCN) Red List of Threatened Species): EX= Extinct, EW= Extinct in the Wild, CR= Critically Endangered, EN= Endangered, VU= Vulnerable, NT=Near Threatened, LC= Least Concern

Table 9 Likelihood of Occurrence – Migratory Species

Species Name	EPBC Act Status	TPWC Act Status	Habitat Preference	Likelihood of Occurrence
Migratory Marine				
Apus pacificus Fork-tailed swift	Listed marine Listed migratory	SLC	Summer migrant (October – April). Occurs in low to very high airspace over variety of habitats including rainforest and semi-arid areas. Known to be most active in front of summer storm fronts (Morcombe, Field Guide to Australian Birds, 2004). They are almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher. In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas. (Department of the Environment , 2020).	**Moderate potential to occur** Previous records however they are a likely fly-over only (would not land based on behaviour)
Crocodylus porosus Salt-water crocodile	Listed marine Listed migratory	-	In the Northern Territory the Salt-water Crocodile has been found in the following rivers: Mary, Adelaide, Daly, Moyle, Victoria/Baines, Finniss, Wildman, West Alligator, East Alligator, South Alligator,	**Low potential to occur** No suitable habitat and lack of previous records in study area.

Species Name	EPBC Act Status	TPWC Act Status	Habitat Preference	Likelihood of Occurrence
			Liverpool, Blyth, Glyde, Habgood, Baralminar/Gobalpa, Goromuru, Cato and Peter John Rivers (Department of the Environment, 2023)	
Plegadis falcinellus Glossy Ibis	Listed marine Listed migratory	LC	Preferred habitat for foraging and breeding are fresh water marshes at the edges of lakes and rivers, lagoons, flood-plains, wet meadows, swamps, reservoirs, sewage ponds, rice-fields and cultivated areas under irrigation. The species is occasionally found in coastal locations such as estuaries, deltas, saltmarshes and coastal lagoons (Department of the Environment, 2023)	**High potential to occur** Suitable habitat (wet season only) and previous records within 30km of the study area.
Migratory Terrestrial				
Cecropis daurica Red-rumped Swallow	Listed marine Listed migratory	LC	This summer migrant is found in the north of Australia, around Cairns, Gulf of Carpentaria, Darwin and Broome. This species forages mainly over wetlands: e.g. swamps, rivers, dams etc. or open areas such as golf courses or cane fields (Department of the Environment, 2015).	**Moderate potential to occur** Suitable habitat occurs, however no previous records
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo	Listed migratory	LC	The this species is a regular migrant to Australia, where it spends the non-breeding season (Sept- May) in coastal regions across northern and eastern Australia as well as offshore islands. In the NT records are widespread across the Top End, from Darwin, north to Melville and South Goulburn Islands, east to Gove Peninsula, Groote Eylandt and Sir Edward Pellew Group and south to Roper River. The species uses a range of vegetated habitats including monsoon rainforest, wet sclerophyll forest, open woodland (Department of the Environment, 2015).	**Moderate potential to occur** Suitable habitat occurs, however no previous records
Hirundo rustica Barn Swallow	Listed marine Listed migratory	LC	This migratory species usually occurs in northern Australia, on Cocos-Keeling Island, Christmas Island, Ashmore Reef and across the northern coast, from the Pilbara region, through to Fraser Island in Queensland. They have been recorded in open country, coastal lowlands, often near water, towns and cities, often recorded perched on overhead wires, and also in or over freshwater wetlands, paperbark	**Moderate potential to occur** Suitable habitat occurs, however no previous records

Species Name	EPBC Act Status	TPWC Act Status	Habitat Preference	Likelihood of Occurrence
			Melaleuca woodland, mesophyll shrub thickets and tussock grassland (Department of the Environment , 2023).	
Motacilla cinerea Grey Wagtail	Listed marine Listed migratory	LC	This species is a scarce but regular visitor to northern Australia. found across a variety of wetlands, especially water courses, but also on the banks of lakes and marshes, as well as artificial wetlands including sewage farms, reservoirs and fishponds (Department of the Environment, 2015).	**Low potential to occur** Lack of suitable habitat and no previous records
Motacilla flava Yellow Wagtail	Listed marine Listed migratory	LC	The Yellow Wagtail is a regular wet season visitor to northern Australia. Habitat requirements for the Yellow Wagtail are highly variable, but typically include open grassy flats near water. They are found in open areas with low vegetation such as grasslands, airstrips, pastures, sports fields; damp open areas such as muddy or grassy edges of wetlands, rivers, irrigated farmland, dams, waterholes; sewage farms, sometimes utilise tidal mudflats and edges of mangroves (Department of the Environment, 2015).	**Moderate potential to occur** Potential habitat occurs in the wet season. However no previous records
Migratory Wetlands				
Actitis hypoleucos Common Sandpiper	Listed marine Listed migratory	SLC	The species utilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats. The Common Sandpiper has been recorded in estuaries and deltas of streams, as well as on banks farther upstream; around lakes, pools, billabongs, reservoirs, dams and claypans, and occasionally piers and jetties. The muddy margins utilised by the species are often narrow and may be steep. The species is often associated with mangroves, and sometimes found in areas of mud littered with rocks or snags (Department of the Environment, 2020). Found along all coastlines of Australia and in many areas inland, the Common Sandpiper is widespread in small numbers. The population, when in Australia, is concentrated in northern and western Australia	**Moderate potential to occur** Ephemeral (wet season only) suitable habitat and previous records within 50kms of study area.

Species Name	EPBC Act Status	TPWC Act Status	Habitat Preference	Likelihood of Occurrence
			Global population size for Common sandpipers has been estimated at between 2,455,000 – 4,030,000 individuals (Bamford, Watkins, Bancroft, Tischler, & Wahl, 2008) The Sandpiper is listed as Least Concern on the ICUN redlist of Threatened Species. (Department of the Environment, 2020)	
Calidris acuminata Sharp-tailed Sandpiper	Listed marine Listed migratory	SLC	The Sharp-tailed Sandpiper spends the non-breeding season in Australia, with over 90% of the population occurring. (Bamford, Watkins, Bancroft, Tischler, & Wahl, 2008) Records from the NT mostly occur in the north coastal regions, east to Groote Eylandt and Gove Peninsula but also around McArthur River and east of Borroloola. Other inland records occur south to northern Tanami Desert, and in the southern NT, from Alice Springs, north to Napabie Lakes and south to Uluru National Park (Department of the Environment , 2020) All the important sites during the non-breeding period were recorded in Southern Australia. (Bamford, Watkins, Bancroft, Tischler, & Wahl, 2008).	**Low potential to occur** Lack of suitable habitat and no previous records
Calidris ferruginea Curlew sandpiper	CE Listed marine Listed migratory	E	Mainly occur in both fresh and brackish waters on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms but are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand (Higgins & Davies, Handbook of Australian, New Zealand & Antarctic Birds, 1996). Curlew Sandpipers forage on mudflats and nearby shallow water and generally roost on bare dry shingle, shell or sand beaches, sandspits and islets in or around coastal or near-coastal lagoons and other wetlands, occasionally roosting in dunes during very high tides and sometimes in saltmarsh (Higgins & Davies, Handbook of Australian, New Zealand & Antarctic Birds, 1996) In Queensland, scattered records occur in the Gulf of Carpentaria, with widespread records along the coast south of Cairns. The global	**Low potential to occur** Lack of suitable habitat and no previous records

Species Name	EPBC Act Status	TPWC Act Status	Habitat Preference	Likelihood of Occurrence
			population size of the Curlew Sandpiper is 1,350,000 with an estimated 115,000 migrating to Australia during the non-breeding period (Bamford, Watkins, Bancroft, Tischler, & Wahl, 2008).	
Calidris melanotos Pectoral sandpiper	Listed marine Listed migratory	LC	In Queensland, most records for the Pectoral Sandpiper occur around Cairns. They prefer shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. The Pectoral Sandpiper is omnivorous, consuming algae, seeds, crustaceans, arachnids and insects (Department of the Environment , 2020). The species is listed as Least Concern on the IUCN redlist,	**Low potential to occur** Lack of suitable habitat and no previous records
Charadrius veredus *Oriental Plover*	Listed marine Listed migratory	LC	The Oriental Plover is a non-breeding visitor to Australia. The species occurs in both coastal and inland areas, mostly in northern Australia. They can be found in coastal habitats such as estuarine mudflats and sandbanks, on sandy or rocky ocean beaches or nearby reefs, or in near-coastal grasslands, before dispersing further inland, where they usually inhabit flat, open, semi-arid or arid grasslands, Most records of this species are along the north-western coast, between Exmouth Gulf and Derby in Western Australia, as well as scattered sites elsewhere, mainly along the northern coast, the Top End, the Gulf of Carpentaria and Cape York Peninsula. The species also often occurs further inland on the 'blacksoil' plains of northern Western Australia, the Northern Territory and north-western Queensland (Department of the Environment , 2023).	**Low potential to occur** Lack of suitable habitat and no previous records
Glareola maldivarum *Oriental Pratincole*	Listed marine Listed migratory	LC	When in Australia this species can be found in northern areas, especially along the coasts of the Pilbara Region and the Kimberley Division in Western Australia, the Top End of the Northern Territory and the Gulf of Carpentaria. They usually inhabit open plains, floodplains or short grassland and often occur near terrestrial wetlands, such as billabongs, lakes or creeks, and artificial wetlands such as reservoirs, saltworks and sewage farms, especially around the margins They have also been recorded along the coast, including	**Low potential to occur** Lack of suitable habitat and no previous records

Species Name	EPBC Act Status	TPWC Act Status	Habitat Preference	Likelihood of Occurrence
			beaches, mudflats, islands and coastal lagoons (Department of the Environment , 2023).	
Pandion haliaetus Osprey	Listed marine Listed migratory	LC	Eastern Ospreys occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. They are mostly found in coastal areas but occasionally travel inland along major rivers, particularly in northern Australia (Department of the Environment, 2023)	**Low potential to occur** Lack of suitable habitat and no previous records
Listed Marine				
Ardea alba Great Egret	Listed marine	LC	Prefer shallow water, particularly when flowing, but may be seen on any watered area, including damp grasslands. Great Egrets can be seen alone or in small flocks, often with other egret species, and roost at night in groups (Australian Museum, 2023)	**High potential to occur** Suitable habitat (wet season only) and previous records within 30km of the study area.
Bulbulcus ibis Syn, *Ardea ibis* Cattle Egret	Listed marine	LC	Cattle Egret occurs in tropical and temperate grasslands, wooded lands and terrestrial wetlands. High numbers have been observed in moist, low-lying poorly drained pastures with an abundance of high grass; it avoids low grass pastures (Department of the Environment, 2023)	**High potential to occur** Suitable habitat (wet season only) and previous records within 30km of the study area.
Merops ornatus Rainbow Bee-eater	Listed marine	LC	Rainbow Bee-eater occurs mainly in open forests and woodlands, shrublands, and in various cleared or semi-cleared habitats, including farmland and areas of human habitation (Department of the Environment, 2023)	**High potential to occur** Suitable habitat and previous records within 1km of the study area

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NC Act (species listed under the Nature Conservation (Wildlife) Regulation 2006 Act (NC Act), QLD):PE: Extinct in the Wild CE: Critically Endangered E = Endangered, V = Vulnerable, NT = Near Threatened, SLC = Special Least Concern, C = Least Concern

Table 1 Likelihood of Occurrence - Flora

Species Name	EPBC Act Status	TPWC Act Status	IUCN Status	Habitat Preference	Likelihood of Occurrence
Acacia hyaloneura	Not listed	NT	LC	Grows in Acacia or eucalypt communities, on ridges and slopes, in clayey, sandy or rocky soils, on laterite and sandstone (Acacia's of Australia, 2023)	**High potential to occur** Suitable habitat occurs and previously recorded within 40km of the study area.
Acrachne racemosa Acrachne	Not listed	DD	LC	This species is known from records from the Pilbara and Kimberley Regions of W.A., the Darwin area and Barkly Tableland of the N.T., and central eastern Qld. It occurs in brown, sandy loam over loamy clay on coastal flats in association with low, deciduous, vine thickets in the Kimberley Region of W.A, In other regions it is found in monsoonal areas usually along creek lines on sandy or skeletal soils, with Eucalyptus, Acacia or Atalaya species (AusGrass2, 2023).	**High potential to occur** Suitable habitat occurs and previously recorded within 20km of the study area.
Ammannia crinipes	Not listed	DD	LC	A small annual, endemic herb found in Northern Australia (Atlas of Living Australia, 2023).	**High potential to occur** Suitable habitat occurs and previously recorded within 30km of the study area.
Amyema herbertiana	Not listed	DD	LC	A species of mistletoe that is found on melaleuca species in the Northern Territory (Atlas of Living Australia, 2023).	**High potential to occur** Suitable habitat occurs and previously recorded within 30km of the study area.
Celtis paniculata Investigator tree	Not listed	NT	LC	It will grow in a variety of forest types including sandy beach forests, rainforests, monsoon forests and sclerophyll forests, and on a variety of soil types including soils derived from basalt, granite and limestone. It is often seen in coastal areas (Atlas of Living Australia, 2023)	**Moderate potential to occur** Lack of suitable habitat occurs although previously recorded within 40km of the study area.

Species Name	EPBC Act Status	TPWC Act Status	IUCN Status	Habitat Preference	Likelihood of Occurrence
Chamaecrista deserti	Not listed	DD	LC	Tufted perennial, herb, to 0.2 m high, leaflets 6-11 pairs; petiolar gland with stout stipe; sepals twice as long as petals. Flowers cream-yellow. Sandy soils. Semi-arid areas (WA Department of Biodiversity, Conservation adn Attractions, 2023)	**High potential to occur** Suitable habitat occurs and previously recorded within the study area.
Digitaria hystrichoides	Not listed	NT	LC	A native grass up to 0.8 m high. In tropical and subtropical sub-humid woodlands, semi-arid shrub woodlands, and acacia shrublands. An important forage grass in drier areas. Flowers November–June (AusGrass2, 2023)	**High potential to occur** Suitable habitat occurs and previously recorded within 5km of the study area.
Eriachne basalis	Not listed	DD	LC	Endemic native grass. Near 16°S in Northern Territory. Seasonally wet depressions, pools and damp places, often in heavy-textured soils, in association with open forests of Eucalyptus and Melaleuca spp. Flowers and fruits April–June (AusGrass2, 2023)	**High potential to occur** Suitable habitat occurs and previously recorded within 10km of the study area.
Eriocaulon carpentariae	Not listed	DD	LC	A pipewort species typically found in wetland areas as is typical of the *Eriocaulon* genus (Atlas of Living Australia, 2023).	**Moderate potential to occur** Marginal suitable habitat, although previously recorded within 30km of the study area.
Goodenia malvina	Not listed	DD	LC	Erect or spreading to prostrate annual (ephemeral), herb, 0.07-0.8 m high. Flowers blue-purple-yellow, January to May. Cracking black clay. Seasonally wet areas (WA Department of Biodiversity, Conservation and Attractions, 2023)	**High potential to occur** Suitable habitat occurs and previously recorded within 15km of the study area.
Goodenia minutiflora Goodenia	Not listed	DD	-	*Goodenia minutiflora* is an annual herb that typically grows to a height of up to 20 cm with linear to lance-shaped leaves, and loose groups of tiny white or purplish flowers. It is known from records across the north of the NT across to far north-western QLD. In the NT it is found in the Einasleigh Uplands, Gulf Coastal, Gulf Fall and Uplands,	**High potential to occur** Suitable habitat occurs and previously recorded within 45km of the study area.

Species Name	EPBC Act Status	TPWC Act Status	IUCN Status	Habitat Preference	Likelihood of Occurrence
				Gulf Plains, Sturt Plateau and Tanami bioregions (Atlas of Living Australia, 2023) (Northern Territory Government, 2013).	
Ipomoea argillicola	Not listed	NT	LC	Native vine / climber with purple flowers (Atlas of Living Australia, 2023).	**Moderate potential to occur** Suitable habitat occurs and previously recorded within 45km of the study area.
Ischaemum australe var. villosum Large bluegrass	Not listed	DD	LC	Native grass. Generally found in coastal districts, usually in wet situations (AusGrass2, 2023)	**Moderate potential to occur** Marginal suitable habitat occurs and previously recorded within 20km of the study area.
Phyllanthus sp.	Not listed	DD	LC	*Phyllanthus* genus are shrubs or herbs, mostly monoecious. The Northern Territory *Phyllanthus sp.* that is DD has narrow tuberculate seeds.	**High potential to occur** Suitable habitat occurs and previously recorded within 10km of the study area.
Rutidosis helichrysoides subsp.. Acutiglumis	Not listed	DD	LC	Erect branched perennial herb 25–50 cm high, woody at base; branches cottony to woolly, sometimes hairs sparse. Grows primarily in desert and dry shrubland (Royal Botanic Gardens Kew, 2023).	**Moderate potential to occur** Marginal suitable habitat occurs and previously recorded within 45km of the study area.
Schizachyrium perplexum	Not listed	DD	LC	Uncommon annual grass which grows on sandy soils and sandstone hills from a few localities in northern Qld and Northern Territory. Flowers March-May (AusGrass2, 2023)	**Moderate potential to occur** Lack of suitable habitat occurs, although previously recorded within 50km of the study area.
Sida sp. excedentifolia *Sida*	Not listed	DD	-	This herbacious species is known from scattered records throughout central Australia (Atlas of Living Australia, 2023).	**Moderate potential to occur**

Species Name	EPBC Act Status	TPWC Act Status	IUCN Status	Habitat Preference	Likelihood of Occurrence
					Suitable habitat occurs and previously recorded within 25km of the study area.
Sporobolus lenticularis	Not listed	DD	-	Endemic grass up to 60cm tall. Mainly coastal tropical Qld and Northern Territory. Collections indicate that it is found mainly on sand dune coastal woodland, but also in the highlands on red-brown earths; flowers February – Aug (AusGrass2, 2023)	**Moderate potential to occur** Lack of suitable habitat occurs, although previously recorded within 40km of the study area.
Synostemon trachyspermus	Not listed	DD	-	A small glaucous low subshrub from a woody tap root, occasionally annual. In sandy-loam over limestone or sandy plains in mulga communities, on alluvial flood plains, in paddocks and around walls of farm buildings (SA Department for Environment and Water, 2023).	**High potential to occur** Suitable habitat occurs and previously recorded within the study area.

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TPWC Act (species listed under the *Territory Parks and Wildlife Conservation Act 1976* (TPWC Act), NT): CE = Critically Endangered, E = Endangered, V = Vulnerable, NT=Near Threatened
IUCN (species listed under the International Union for Conservation of Nature (IUCN) Red List of Threatened Species): EX= Extinct, EW= Extinct in the Wild, CR= Critically Endangered, EN= Endangered, VU= Vulnerable, NT=Near Threatened, LC= Least Concern

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APPENDIX C - MNES SIA

CARPENTARIA PILOT PROJECT SIGNIFICANT IMPACT ASSESSMENT

MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

CLIENT: Imperial Oil & Gas

STATUS: Final

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FOX & CO ENVIRONMENTAL

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List of Abbreviations

Abbreviation	Definition
Biodiversity Status:	
E	Endangered
OC	Of Concern
NC	No Concern at Present
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
EH	Essential Habitat
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
EVNT	Endangered, Vulnerable or Near Threatened (conservation status listing of species under the EPBC Act)
FTS	Fork Tail Swift
GPS	Global Positioning System
ha	Hectare
km	Kilometre
LM	Listed marine species
MNES	Matter of National Environmental Significance
MT	Migratory terrestrial species
MW	Migratory wetland species
NSW	New South Wales
RE	Regional Ecosystem
SIA	Significant Impact Assessment
TEC	Threatened Ecological Community

1. INTRODUCTION

Imperial Oil and Gas proposes to undertake an exploration program on Exploration Permit (EP) 187, located approximately 200km east-southeast of Daly Waters, Northern Territory. The proposed program is located north and south of the Carpentaria Highway, located in the Gulf Fall and Uplands (GFU) and Sturt Plateau (STU) geographical bioregions.

An ecological assessment has been undertaken to describe the existing environment and to assess the potential impacts that the project may have on flora and fauna, particularly species of Northern Territory conservation significance and Matters of National Environmental Significance (MNES). Refer to Fox & Co Environmental (November 2023), EP187 Ecological Assessment Report, Report IOG-07 for further details on the ecological assessments for the study area.

This report provides a Significant Impact Assessment for MNES under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

1.1 LOCATION AND STUDY AREA

EP187 is situated in the upper reaches of the McArthur River in proximity to the Barkly Tablelands. The tenement lies to the west of the Tablelands Highway and is crossed east to west by the Carpentaria Highway. Figure 1 displays the location of the tenement area.

Figure 1 Regional Location

Figure 2 Previous Records

2. SIGNIFICANT IMPACT ASSESSMENT

2.1 AVOIDANCE, MANAGEMENT AND MITIGATION

Avoidance is the guiding principle to avoiding impacts on all flora and fauna, particularly MNES within the study area. Avoidance measures utilised in the Project to minimize impacts on flora and fauna include:

- Well pads have been sited to avoid significant habitat trees (e.g., large landscape trees with significant hollows).
- Waterways and riparian vegetation is avoided which offer the most likely habitat for potential roost sites should they occur.

2.2 THREATENED ECOLOGICAL COMMUNITIES

There are no mapped Threatened Ecological Communities (TEC) within the study area.

2.3 BIRDS

No threatened bird species were recorded during avifauna surveys. One (1) species of conservation significance under the EPBC Act was recorded:

1. Whistling Kite (*Haliastur sphenurus*) – EPBC – Listed Marine

Three (3) threatened bird species (Grey Falcon *Falco hypoleucos*, Gouldian Finch *Erythrura gouldiae* and Painted Honeyeater *Grantiella picta*) are considered moderately to highly likely to occur based on suitable habitat and previous records either within the study area or proximate to it.

Table 1 identifies the bird species listed as threatened under the EPBC Act either known to occur or considered to have a moderate to high potential to occur within the study area. Migratory species are discussed in Section 2.4

Table 1 Threatened Bird Species Known or having moderate potential to occur in Study Area

Scientific Name	Common Name	EPBC Act[1]	Likelihood of Occurrence
Falco hypoleucos	Grey falcon	V	Previous record within study area
Erythrura gouldiae	Gouldian Finch	E	Previous record 7km from study area
Grantiella picta	Painted Honeyeater	V	Previous record from EP187, 40km from study area Moderate potential to occur

[1] – EPBC Act: CE – Critically endangered, E – Endangered, V – Vulnerable

A description of each of the species is provided below.

2.3.1 Grey Falcon (*Falco hypoleucos*) (EPBC Act – V)

2.3.1.1 Habitat and Populations

Found in woodland and scrub types in arid zones (Simpson & Day, 2004). The species occurs in arid and semi-arid Australia, including the Murray-Darling Basin, Eyre Basin, central Australia and Western Australia and is mainly found where annual rainfall is less than 500 mm (NSW Office of Environment & Heritage, 2017). The Grey Falcon occurs at low densities across inland Australia where they frequent timbered lowland plains, particularly acacia shrublands that are crossed by tree-lined water courses. Grey Falcons have been observed hunting in treeless areas and tussock grassland and open woodland, especially in winter (Threatened Species Scientific Committee, 2023).

No grey falcons were observed within the study area during field surveys undertaken over a 2-year period between 2021-2023.

Table 2 provides a Significant Impact Assessment (SIA) for Grey Falcon undertaken in accordance with the *Matters of National Environmental Significance, Significant Impact Guidelines (1.1), Department of Environment* (Department of the Environment, Water, Heritage and the Arts, 2013).

Table 2 Significant Impact Assessment for Grey Falcon (EPBC – V)

Impact Criteria	Assessment
An action is LIKELY to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
Lead to a long-term decrease in the size of an important population of a species	Bird surveys have not reported grey falcons in the study area. Considering the lack of records and avoidance of any potential available nesting habitat, the Project is not expected to lead to a long-term decrease in the size of an important population. **Will not have a Significant Impact.**
Reduce the area of occupancy of an important population	Given the widespread nature of this species and limited records in the study area, the Project is not expected to reduce the area of occupancy of an important population. **Will not have a Significant Impact.**
Fragment an existing important population into two or more populations	Given the widespread nature of this species and limited records in the study area, the Project is not expected to fragment an existing important population into two or more populations. **Will not have a Significant Impact.**
Adversely affect habitat critical to the survival of a species	Given the lack of records, avoidance of riparian vegetation, clearing of other remnant vegetation for the Project is not expected to impact grey falcon roosting or foraging habitat. **Will not have a Significant Impact.**
Disrupt the breeding cycle of an important population	Given the limited records, avoidance of riparian vegetation, clearing of other remnant vegetation for the Project is not expected to impact grey falcon nesting habitat. **Will not have a Significant Impact.**

Impact Criteria	Assessment
An action is LIKELY to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Given the limited number of records, avoidance of riparian vegetation, clearing of other remnant vegetation for the Project to the extent that the Project may modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline is not considered significant. **Will not have a Significant Impact.**
Result in invasive species that are harmful to vulnerable species becoming established in the vulnerable species' habitat	In the absence of specific studies on grey falcons, it is generally considered the threat of predation by feral cats to be the highest threat. The Project will not result in an invasive species that are harmful to grey falcons becoming established. **Will not have a Significant Impact.**
Introduce disease that may cause the species to decline	No diseases are listed as a current threat to grey falcons. **Will not have a Significant Impact.**
Interfere substantially with the recovery of the species	The Project is not expected to interfere substantially with the recovery of the species. **Will not have a Significant Impact.**

Given their widespread distribution, limited number of records in the study area and minimal records in the region and avoidance of riparian vegetation within the study area, the Project will not have a Significant Impact on the grey falcons.

2.3.2 Gouldian Finch (*Erythrura gouldiae*) (EPBC Act – E)

2.3.2.1 Habitat and Population

The species is found in northern Australia from Cape York Peninsula through NW Queensland and the north of the NT to the Kimberley Region of WA. They inhabit open woodlands that are dominated by Eucalyptus trees and support a ground cover of Sorghum and other grasses. Often found in vegetation along watercourses and mangrove edges. Critical components of suitable core habitat for the Gouldian Finch include the presence of favoured annual and perennial grasses (especially Sorghum), a nearby source of surface water and, in the breeding season, unburnt hollow-bearing Eucalyptus trees (especially *E. tintinnans, E. brevifolia* and *E. leucophloia*) Its breeding habitat is usually confined to ridges and rocky foothills, probably due to the presence of Sorghum grasses. Gouldian finches feed almost exclusively on grass seed and depend on a relatively small number of grass species which seed at different times throughout the year (Department of the Environment, 2021) (Morcombe, 2004).

No Gouldian Finches were observed within the study area during field surveys undertaken over a 2-year period between 2021-2023. Eight (8) Gouldian Finches were observed (-16.7031, 135.3667) in March 2021. This location is approximately 22kms east of the study area.

Table 3 provides a SIA for Gouldian Finches undertaken in accordance with the Matters of National Environmental Significance, Significant Impact Guidelines (1.1), Department of Environment (Department of the Environment, Water, Heritage and the Arts, 2013).

Table 3 Significant Impact Assessment for Gouldian Finches (EPBC – E)

Impact Criteria	Assessment
An action is LIKELY to have a significant impact on an endangered species if there is a real chance or possibility that it will:	
Lead to a long-term decrease in the size of a population	The proposed Carpentaria Pilot Project construction and operation will not lead to a long-term decrease in the size of the Gouldian Finch population given the absence of records from the study area and avoidance of typical Gouldian Finch habitat. **Will not have a Significant Impact.**
Reduce the area of occupancy of the species	Given the absence of records from the study area and avoidance of typical Gouldian Finch habitat, it is not expected that the Project will significantly reduce the area of the occupancy of this species. **Will not have a Significant Impact.**
Fragment an existing population into two or more populations	The project clearing is localised and/or narrow linear in nature and therefore the Project would not fragment an existing population into two or more populations. **Will not have a Significant Impact.**
Adversely affect habitat critical to the survival of a species	Potential breeding habitat within the study area is avoided (riparian snappy gum woodland with hollows) and therefore the Project will not significantly affect habitat critical to the survival of this species. **Will not have a Significant Impact.**
Disrupt the breeding cycle of a population	Potential breeding habitat within the study area is avoided (riparian snappy gum woodland with hollows) and therefore the Project will not disrupt the breeding cycle of a population. **Will not have a Significant Impact.**
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The project layout has been designed to minimise impacts to potential habitat (snappy gum woodland) in the landscape. The project will therefore not modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. **Will not have a Significant Impact.**
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Historically an air-sac mite was investigated for its role in causing population declines, but although the mite was often identified in sick birds, its role in causing the poor condition (rather than being a secondary consequence of birds being in poor condition because of other factors) remained unclear (Department of the Environment, 2021). The Project will not increase the extent of these known invasive species. The Project is not expected to result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically

Impact Criteria	Assessment
An action is LIKELY to have a significant impact on an endangered species if there is a real chance or possibility that it will:	
	endangered species' habitat. **Will not have a Significant Impact.**
Introduce disease that may cause the species to decline	No diseases are listed as a current threat to Gouldian Finch. The Project is not expected to introduce a disease that may cause the species to decline. **Will not have a Significant Impact.**
Interfere with the recovery of the species	Vegetation change through altered fire regimes and grazing by introduced herbivores are the factors most likely to have caused past declines, and to be preventing recovery, in Gouldian finch populations (Department of the Environment, 2021). The Project is unlikely to interfere with the recovery of the species. **Will not have a Significant Impact.**

2.3.3 Painted Honeyeater (*Grantiella picta*) (EPBC Act – V)

2.3.3.1 Habitat and Population

The species inhabits mistletoes in eucalypt forests/woodlands, riparian woodlands of black box and river red gum, box-ironbark-yellow gum woodlands, acacia-dominated woodlands, paperbarks, casuarinas, callitris, and trees on farmland or gardens. Their diet consists mainly of mistletoe fruits and they prefer woodlands which contain a higher number of mature trees, as these host more mistletoes. They are sparsely from SE Australia to NW Queensland and eastern Northern Territory. (Department of the Environment, 2020).

No painted honeyeaters were observed within the study area during field surveys undertaken over a 2-year period between 2021-2023.

Table 4 provides a SIA for Painted Honeyeater undertaken in accordance with the Matters of National Environmental Significance, Significant Impact Guidelines (1.1), Department of Environment (Department of the Environment, Water, Heritage and the Arts, 2013).

Table 4 Significant Impact Assessment for Painted Honeyeater (EPBC – V)

Impact Criteria	Assessment
An action is LIKELY to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
Lead to a long-term decrease in the size of a population	The proposed Carpentaria Pilot Project farm construction and operation will not lead to a long-term decrease in the size of the painted honeyeater population given the absence of records from the study area and overall moderate potential of a population within the study area. **Will not have a Significant Impact.**

Impact Criteria	Assessment
An action is LIKELY to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
Reduce the area of occupancy of the species	Given the absence of records from the study area and overall moderate potential of a population within the study area, it is not expected that the Project will significantly reduce the area of the occupancy of this species. **Will not have a Significant Impact.**
Fragment an existing population into two or more populations	No known populations are within the study area and therefore the Project is not fragmenting an existing population into two or more populations. **Will not have a Significant Impact.**
Adversely affect habitat critical to the survival of a species	No known populations are within the study area. Therefore, the Project will not significantly affect habitat critical to the survival of this species. **Will not have a Significant Impact.**
Disrupt the breeding cycle of a population	No known populations are within the study area and therefore the Project will not disrupt the breeding cycle of a population. **Will not have a Significant Impact.**
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The project will therefore not modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. **Will not have a Significant Impact.**
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The Project is not expected to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat. **Will not have a Significant Impact.**
Introduce disease that may cause the species to decline	No diseases are listed as a current threat to the Painted honeyeater. The Project is not expected to introduce a disease that may cause the species to decline. **Will not have a Significant Impact.**
Interfere with the recovery of the species	No known populations are within the study area and therefore the Project is unlikely to interfere with the recovery of the species. **Will not have a Significant Impact.**

2.4 MIGRATORY & LISTED MARINE BIRD SPECIES

There are no migratory shorebird species impacted by the project.

Other migratory (excluding shorebirds) or listed marine bird species either known to occur or with a moderate likelihood of occurrence are included in Table 5.

Table 5 **Migratory (non-shorebird) or Listed Marine Species Potentially Occurring and Known to Occur in the study area**

Scientific Name	Common Name	EPBC Act[1]	Likelihood of Occurrence
Listed Migratory Species			
Apus pacificus	Fork-tailed Swift	Listed marine Listed migratory	Previous record within 1km of Study area. *Wouldn't land based on behaviour. SIA not required.*
Plegadis falcinellus	Glossy Ibis	Listed marine Listed migratory	Previous record within 30km of Study area.
Listed Marine Species			
Ardea alba	Great Egret	Listed Marine	Previous record within 25km of Study area.
Bulbulcus ibis	Cattle Egret	Listed Marine	Previous record within 30km of Study area.
Haliastur sphenurus	Whistling Kite	Listed Marine	Known to Occur
Merops ornatus	Rainbow Bee-eater	Listed Marine	Previous record within 1km of Study area.

[1] – EPBC Act: CE – Critically endangered, E – Endangered, V – Vulnerable, MM – Migratory Marine, MT – Migratory Terrestrial Species, MW – Migratory Wetland Species, LM – Listed Marine Species

The SIA is undertaken for migratory (non-shorebird) and listed marine species below. The SIA has been undertaken in accordance with the *Matters of National Environmental Significance, Significant Impact Guidelines (1.1), Department of Environment* (Department of the Environment, Water, Heritage and the Arts, 2013).

2.4.1 Glossy Ibis (*Plegadis falcinellus*) (EPBC Act – Listed Migratory and Listed Marine)

Preferred habitat for Glossy Ibis for foraging and breeding are freshwater marshes at the edges of lakes and rivers, lagoons, floodplains, wet meadows, swamps, reservoirs, sewage ponds, rice-fields and cultivated areas under irrigation. The species is occasionally found in coastal locations such as estuaries, deltas, salt marshes and coastal lagoons. They are

found in all states of Australia, with widespread distribution except for the arid centre. (Department of the Environment, 2023) (Atlas of Living Australia, 2023).

No Glossy Ibis were recorded during avifauna surveys, however a SIA has been undertaken as they are considered to have a high potential to occur (wet season only).

Table 6 Significant Impact Assessment for Glossy Ibis

Impact Criteria	Assessment
An action is LIKELY to have a significant impact on a migratory species if there is a real chance or possibility that it will:	
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	The project is not expected to substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for Glossy Ibis. **Will not have a Significant Impact.**
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	The Project is not expected to result in an invasive species that is harmful to the migratory species becoming introduced and established in an area of important habitat for the migratory species. **Will not have a Significant Impact.**
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	The project is considered unlikely to seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of Glossy Ibis. **Will not have a Significant Impact.**

As a result of the SIA process, it is concluded that the Project will not have a Significant Impact on Glossy Ibis.

2.4.2 Great Egret (*Ardea alba*) (EPBC Act – Listed Marine)

Great Egrets prefer shallow water, particularly when flowing, but may be seen on any watered area, including damp grasslands. Great Egrets can be seen alone or in small flocks, often with other egret species, and roost at night in groups (Australian Museum, 2023). They are found in all states of Australia, except in the central arid areas of WA and NE South Australia (Atlas of LIving Australia, 2023).

No Great Egrets were recorded during avifauna surveys, however a SIA has been undertaken as they are considered to have a high potential to occur (wet season only).

Table 7 Significant Impact Assessment for Great Egret

Impact Criteria	Assessment
An action is LIKELY to have a significant impact on a migratory species if there is a real chance or possibility that it will:	

Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	The project is not expected to substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for Great Egret. **Will not have a Significant Impact.**
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	The Project is not expected to result in an invasive species that is harmful to the migratory species becoming introduced and established in an area of important habitat for the migratory species. **Will not have a Significant Impact.**
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	The project is considered unlikely to seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of Great Egret. **Will not have a Significant Impact.**

As a result of the SIA process, it is concluded that the Project will not have a Significant Impact on Great Egret.

2.4.3 Cattle Egret (*Bulbulcus ibis*) (EPBC Act – Listed Marine)

Cattle Egret occurs in tropical and temperate grasslands, wooded lands and terrestrial wetlands. High numbers have been observed in moist, low-lying poorly drained pastures with an abundance of high grass; it avoids low grass pastures (Department of the Environment, 2023). They are found in all states of Australia, particularly in coastal regions (Atlas of Living Australia, 2023).

No Cattle Egrets were recorded during avifauna surveys, however a SIA has been undertaken as they are considered to have a high potential to occur (wet season only).

Table 8 Significant Impact Assessment for Cattle Egret

Impact Criteria	Assessment
An action is LIKELY to have a significant impact on a migratory species if there is a real chance or possibility that it will:	
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	The project is not expected to substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for Cattle Egret **Will not have a Significant Impact.**
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat	The Project is not expected to result in an invasive species that is harmful to the migratory species becoming introduced and established in an area of important habitat for the migratory species.

for the migratory species	**Will not have a Significant Impact.**
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	The project is considered unlikely to seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of Cattle Egret. **Will not have a Significant Impact.**

As a result of the SIA process, it is concluded that the Project will not have a Significant Impact on Cattle Egret.

2.4.4 Whistling Kite (*Haliastur sphenurus*) (EPBC Act – Listed Marine)

One (1) Whistling Kite was recorded during avifauna surveys in October 2023.

Whistling kites are listed marine species under section 248 of the *Environmental Protection and Biodiversity Conservation Act 1999* (Department of the Environment, 2023).

Whistling Kites are found across Australia, usually near water sources on open woodlands and plains. This species has few natural predators in the wild. Potential threats to Whistling Kites include habitat destruction of wetlands, hunting and vehicle accidents (Northern Territory Government of Australia, 2023) (Birdfact, 2023).

Table 9 Significant Impact Assessment for Whistling Kites

Impact Criteria	Assessment
An action is LIKELY to have a significant impact on a migratory species if there is a real chance or possibility that it will:	
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	The project is not expected to substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for Whistling Kites. **Will not have a Significant Impact.**
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	The Project is not expected to result in an invasive species that is harmful to the migratory species becoming introduced and established in an area of important habitat for the migratory species. **Will not have a Significant Impact.**
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	The project is considered unlikely to seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of Whistling Kites. **Will not have a Significant Impact.**

As a result of the SIA process, it is concluded that the Project will not have a Significant Impact on Whistling Kites.

2.4.5 Rainbow Bee-eater (*Merops ornatus*) (EPBC Act – Listed Marine)

Rainbow Bee-eater occurs mainly in open forests and woodlands, shrublands, and in various cleared or semi-cleared habitats, including farmland and areas of human habitation. They occur in open, cleared or lightly-timbered areas that are often, but not always, located in close proximity to permanent water. Rainbow Bee-eaters also occur in inland and coastal sand dune systems, and in mangroves in northern Australia, and have been recorded in various other habitat types including heathland, sedgeland, vine forest and vine thicket, and on beaches They are distributed across much of mainland Australia. (Department of the Environment, 2023)

No Rainbow Bee-eaters were recorded during avifauna surveys, however a SIA has been undertaken as they are considered to have a moderate potential to occur (fly-over species only).

Table 10 Significant Impact Assessment for Rainbow Bee-eater

Impact Criteria	Assessment
An action is LIKELY to have a significant impact on a migratory species if there is a real chance or possibility that it will:	
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	The project is not expected to substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for Rainbow Bee-eaters. **Will not have a Significant Impact.**
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	The only actual, identified threat to the Rainbow Bee-eater is the introduced Cane Toad (Department of the Environment, 2023). The Project is not expected to result in an invasive species that is harmful to the migratory species becoming introduced and established in an area of important habitat for the migratory species. **Will not have a Significant Impact.**
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	The total population size of the Rainbow Bee-eater in Australia has not been estimated. However, the population size is assumed to be reasonably large based on reporting rates for the species (Department of the Environment, 2023). The project is considered unlikely to seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of Rainbow Bee-eaters. **Will not have a Significant Impact.**

As a result of the SIA process, it is concluded that the Project will not have a Significant Impact on Rainbow Bee-eaters.

2.5 MAMMALS

No MNES threatened mammal species were found during desktop searches or field surveys within or adjacent to the study area.

2.6 REPTILES

No MNES threatened reptile species were found during desktop searches or field surveys within or adjacent to the study area..

2.7 THREATENED INVERTEBRATES

No MNES threatened invertebrate species were desktop searches or field surveys within or adjacent to the study area.

2.8 THREATENED FLORA

No MNES threatened flora species were found during desktop searches desktop searches or field surveys within or adjacent to the study area.

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Addendum to Appendix 01

Significant Impact Assessment for Two EPBC Listed Reptiles

IMP 5-3

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1 Overview

Following the initial assessment of Matters of National Environmental Significance (MNES) for this EMP and Referral, two reptiles that occur in the Project Area of EP 187 were uplisted under the *Environment Protection and Biodiversity Conservation Act* (EPBC Act), to occur in a higher threat category. These were the Northern blue-tongue skink (*Tiliqua scincoides intermedia*) and Mertens' Water Monitor (*Varanus mertensi*). The Northern blue-tongue skink was uplisted to Critically Endangered, while the Mertens' Water Monitor was listed as Endangered, both species previously had no threat listing under the EPBC. The Environmental Assessment Report (**Appendix 01**) associated with the EMP and Referral was completed in October 2023, the EPBC changes came into effect on the 21st December 2023, and hence these two species were not included in the original report (**Appendix 01**). Imperial have conducted a separate Significant Impact Assessment (SIA), required for MNES for these species. This was carried out by Damian Ogburn who holds a PhD in Environmental Science and has practiced for 47 years. This addendum is to be considered alongside the initial Fox & Co Environmental Assessment (**Appendix 01**).

2 Significant Impact Assessment

2.1 Reptiles

Table 2—1 Reptiles to be Assessed

Scientific Name	Common Name	EPBC Act[1]	Likelihood of Occurrence
Tiliqua scincoides intermedia	Northern blue-tongue skink	CE	**High potential to occur.** Suitable habitat occurs and previous records within the study area.
Varanus mertensi	Mertens' Water Monitor	E	**Low potential to occur.** No suitable habitat and lack of previous records in study area.

[1] EPBC Act: CE – Critically endangered, E – Endangered, V – Vulnerable

2.1.1 Northern Blue-tongue Skink (Tiliqua scincoides intermedia)

The Northern blue-tongue skink (Tiliqua scincoides intermedia) is listed as Critically Endangered under the *EPBC Act* (DCEEW, 2023)[1]. Northern blue-tongue skinks are regularly encountered, abundant, and occur in a wide variety of geomorphologies and habitats in the absence of cane toads across northern Australia. They have been detected in the CPP Area. The greatest threat to the long-term persistence of the Northern blue-tongue skink is the invasive and toxic cane toad. No Critical Habitat as defined under section 207A of the *EPBC Act* has been identified or included in the Register of Critical Habitat for the Northern blue-tongue skink.

Table 2—2 Significant Impact Assessment for Northern blue-tongue skink (EPBC – CE)

Impact Criteria	Assessment
An action is LIKELY to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
Lead to a long-term decrease in the size of a population	The proposed Carpentaria Pilot Project construction and operation will not lead to a long-term decrease in the size of the Northern blue-tongue skink population given the small disturbance footprint (is ~0.05% of the 442,700-ha area of EP 187) in the broad savannah tussock grass landscape. **Will not have a Significant Impact.**
Reduce the area of occupancy of the species	The proposed Carpentaria Pilot Project construction and operation will not lead to a long-term decrease in the size of the Northern blue-tongue skink population given the small disturbance footprint (is ~0.05% of the 442,700-ha area of EP 187) in the broad savannah tussock grass landscape. **Will not have a Significant Impact.**
Adversely affect habitat critical to the survival of a species	The CPP Area does not contain key habitat for the Northern blue-tongue skink population including: • Rainforests and vine thickets. • Riparian forests. • Well-vegetated creeks, gorges, and drainage lines. • Well-vegetated swamps, soaks, and springs.

1 https://environment.gov.au/biodiversity/threatened/species/pubs/89838-conservation-advice-21122023.pdf

Impact Criteria	Assessment
An action is LIKELY to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
	• Dense thickets within floodplains, grasslands, shrublands, savannas and woodlands. • Shady thickets in rocky ranges and gorges. **Will not have a Significant Impact.**
Disrupt the breeding cycle of a population	The Project will not disrupt the breeding cycle of a population. **Will not have a Significant Impact.**
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The Project will not modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. **Will not have a Significant Impact.**
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The Project is not expected to result in the introduction of cane toads to the area due to biosecurity controls. **Will not have a Significant Impact.**
Interfere with the recovery of the species	Cane Toads, a key threat to the northern blue-tongue skink, cannot survive for more than three days during periods of dry conditions that normally prevail in CPP Area without access to water. Cane Toads were detected patchily at dams, leaking cattle troughs and tanks along the southern transects of the Beetaloo Basin but not along the long northern transect in Beetaloo SREBA study. Cane toads have not been identified to date in the CPP Area. The extended Dry Season, high aridity and temperature, and absence of permanent surface water in the CPP Area will significantly limit Cane toad invasive success in the CPP Area. **Will not have a Significant Impact.**

2.1.2 Mertens' Water Monitor (Varanus mertensi)

The Mertens' Water Monitor (Varanus mertensi) is listed as Endangered under the EPBC Act. The greatest threat to the long-term persistence of the Mertens' Water Monitor is the invasive and toxic cane toad. Mertens' Water Monitor has a broad distribution across coastal and inland waters in the far north of Australia, from the Kimberley to the western side of Cape York Peninsula. Mertens' Water Monitor is semi-aquatic and is seldom seen far from water. The preferred habitat of Mertens' Water Monitor overlaps with that of the cane toad. Following initial significant declines of Mertens Monitor in areas where the cane toad has invaded during the last decade, there are reports that there is "very clear evidence" of recovery where the species apparently declined following toad invasion. There have been reports that the species persists in "healthy numbers" in the Daly Waters and Barkley regions in the west of the Beetaloo, suggesting that the species may not have been subject to significant declines in southern parts of its range (DCCEEW, 2021)[2]

Mertens' Water Monitor has low potential to occur in the CPP Area because there is no permanent surface water to provide suitable habitat and confirmed by lack of previous records of detection across the study area.

Table 2—3 Significant Impact Assessment for Mertens' Water Monitor (EPBC – E)

Impact Criteria	Assessment
An action is LIKELY to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
Lead to a long-term decrease in the size of a population	Environmental surveys have not reported Mertens water monitor in the study area. Considering the lack of suitable habitat in the CPP Area, the Project is not expected to lead to a long-term decrease in the size of an important population. **Will not have a Significant Impact.**
Adversely affect habitat critical to the survival of a species	There are no permanent surface water features necessary for Mertens monitor existence in the CPP Area. **Will not have a Significant Impact.**

[2] Consultation Document on Listing Eligibility and Conservation Actions Varanus mertensi (Mertens' Water Monitor) (dcceew.gov.au).

Impact Criteria	Assessment
An action is LIKELY to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
Interfere with the recovery of the species	Cane Toads, a key threat to the Mertens monitor, were detected patchily at dams, leaking cattle troughs and tanks along the southern transects but not along the long northern transect in Beetaloo SREBA study (DEPWS, 2022). Cane toads have not yet been identified in the CPP Area. The extended Dry Season, high aridity and temperature, and absence of permanent surface water in the CPP Area will significantly limit Cane toad invasive success in the CPP Area. **Will not have a Significant Impact.**

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Appendix 02

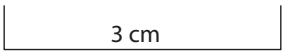
Cultural Heritage Assessment

IMP 5-3

ARCHAEOLOGICAL SURVEY REPORT:

EP 187 PILOT - REFERRAL AND EMP - BASELINE SURVEYS

[redacted]



A report for Empire Energy, Sydney NSW

Dr. Silvano Jung
Principal
Ellengowan Enterprises – archaeological consultant
ABN: 47 208 214 348

July 2024

[redacted]

EXECUTIVE SUMMARY

This report combines the results of three archaeological surveys at Empire Energy's (Empire) EP 187 lease in the Beetaloo sub-basin, approximately 800km from Darwin and 160km east of Borroloola on the Carpentaria Highway. Ellengowan Enterprises was contracted by Empire to conduct the surveys. Four additional areas were surveyed in EP 187 in September and October 2023, two north of the highway and a further two south of the highway. The survey areas were essentially an expansion of seismic line surveys from 2020, from the width of a vehicle track to two kilometre wide areas to facilitate the location on an additional five gas well pads.

The third survey, in December 2023 was to examine proposed expansion areas for the Carpentaria 2, Carpentaria 3 and Carpentaria 4 well pads. The survey also determined the context of a site found on Relief Creek, adjacent to Carpentaria 4, in 2022 by inGauge staff and Traditional Owners.

The survey crew for the second survey included three Traditional Owners and was conducted in conjunction with an environmental ecologist over a three-day period utilizing aviation resources. The results of the initial two surveys found no archaeological sites or objects. It was, however, reported that the artefacts found in 2022 represented isolated finds. The survey results from December indicate that the cultural heritage artefacts found in 2022 are, conversely, from a medium density archaeological site, [redacted]

This report documents the survey procedures and outcomes. The following surmises the report's recommendations.

Summary of recommendations:

- No further action is required by Empire on EP 187 in respect to the additional survey areas, access tracks and well sites. The proposed works are cleared and comply with the requirements of the Northern Territory *Heritage Act* (2011), as no archaeological material was found in the four survey areas and well pads north and south of the Carpentaria Highway.
- [redacted]
- Carpentaria 2 and 3 are cleared for expansion works to the south and east. Carpentaria 4 is cleared for expansion work to the south into the lancewood forest.
- [redacted]

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1.0 INTRODUCTION

1.1 Background and consultancy brief

Empire contracted Ellengowan Enterprises to conduct an archaeological survey for their Exploration Permit 187 (EP 187), approximately 60km west of Cape Crawford, on the Favenc Range in the Beetaloo sub-basin. Five proposed gas-well pads were to be surveyed, two of which are north of the Carpentaria Highway with connecting existing access tracks. The two survey areas north of the highway are: 2.8 x 2km^2 and 3 x 2km^2 respectively in size. Another two survey areas measuring 17 x 2km^2 and 10 x 2km^2 occur south of the highway, again with access tracks mainly along existing fence lines. The survey programme included an infrastructure area measuring 2.5km^2 in size, near the McArthur River Pipeline. Two additional expansion areas were to be assessed at the Carpentaria 2/3 (Carp 2 /3) and 4 (Carp 4) gas pads. The specific brief of the programme was to:

- Identify any prescribed archaeological objects or places as defined under the Northern Territory *Heritage Act* (2011*)*, and any archaeological sites located within the entire survey areas.

- Assess the nature, distribution and significance of these objects or places and discuss possible constraints to the works posed by the presence of archaeological and historic sites and an indication of what sites are likely to be the most sensitive in this respect.

- Present a final report including a summary of survey results, determination of significance of sites and the likely impact of the proposed development, and recommendations regarding management strategies or mitigation procedures as appropriate under the Northern Territory *Heritage Act* (2011).

A three-day survey was planned with mobilisation and field survey starting on 26 September 2023, but was cancelled after one day of operations and recommenced on 26 and 27 October 2023. The survey team in October consisted of Traditional Owners (TOs): Cain O'Keefe, Peggy Mawson, William John and ecologist Paul Fox.

A pedestrian survey was conducted on 20 December 2023 by Silvano Jung and inGauge staff to assay the expansion areas for Carps 2, 3 and 4. Traditional Owners were organised by inGauge to participate in this survey, but they did not present for work on the day of the survey.

No archaeological sites or objects were recorded in during the September and October 2023 surveys. The survey in December, however, recorded an archaeological site, [redacted] The following documents the survey procedures, results and provides recommendations on how best to mitigate the impact on the archaeology.

1.2 Location of the study areas and brief environmental description

The survey area within EP 187 is 800km south of Darwin and approximately 60km west of Cape Crawford, or the Heartbreak Hotel. The nearest township is Borroloola, 100km east of Cape Crawford (Fig. 1). The Carpentaria Highway intersects the survey areas. The survey area north of the Carpentaria Highway is characterised by open woodland and savannah. This section is heavily dissected across the Favenc Range, levelling out across black soil plain. North of the highway, quartzite outcrops occur. None of these stone resources occur south of the highway.

In the southern section of the survey area, it is floodplain and open woodland with only one major waterway, Relief Creek, which was dry at the time of the survey, although it was flowing during the December survey. Soil types are typically alluvial and lateritic deposits south of the highway. The vegetation communities are open woodland dry sclerophyll forests *of E. miniata* (Darwin Wooly Butt), *E. tetrodonta* (Stringybark) and *E. bleeseri* (Smooth-stemmed Bloodwood), extensively covered by an understory of tussock and spinifex grasses. *E. pruinosa* (Silverleaf Box) occurs extensively in the survey area, south of the Carpentaria Highway.

Figure 2 details the survey areas and well pads (BA, BB, BC, BD and BD central). [redacted] Virtually the remainder of the survey areas are in low archaeological potential (LAP) areas, apart from some of the braided creeks [redacted] that are more likely to have a higher archaeological potential.

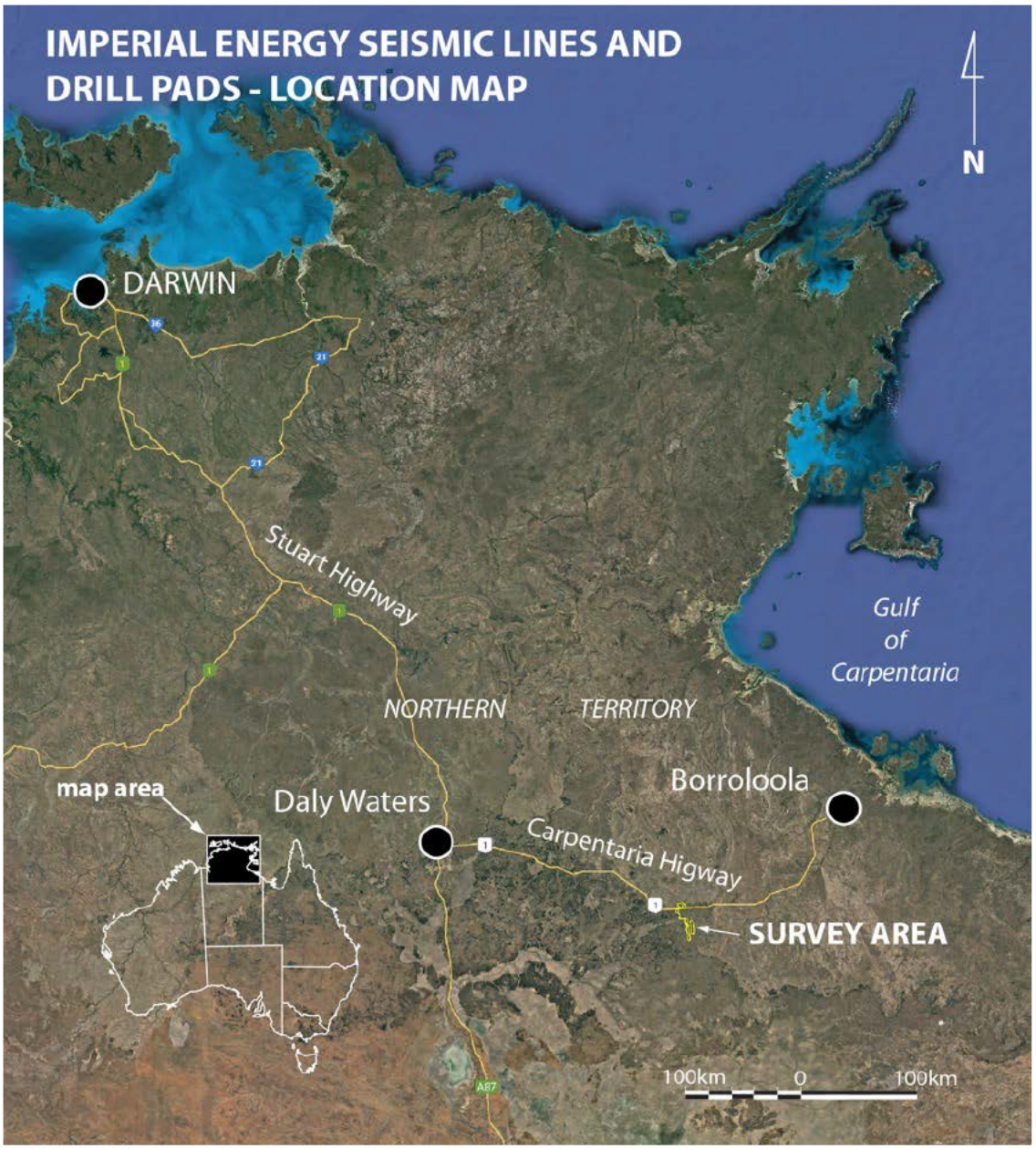


Figure 1. Empire EP 187 2023 survey area – location map.

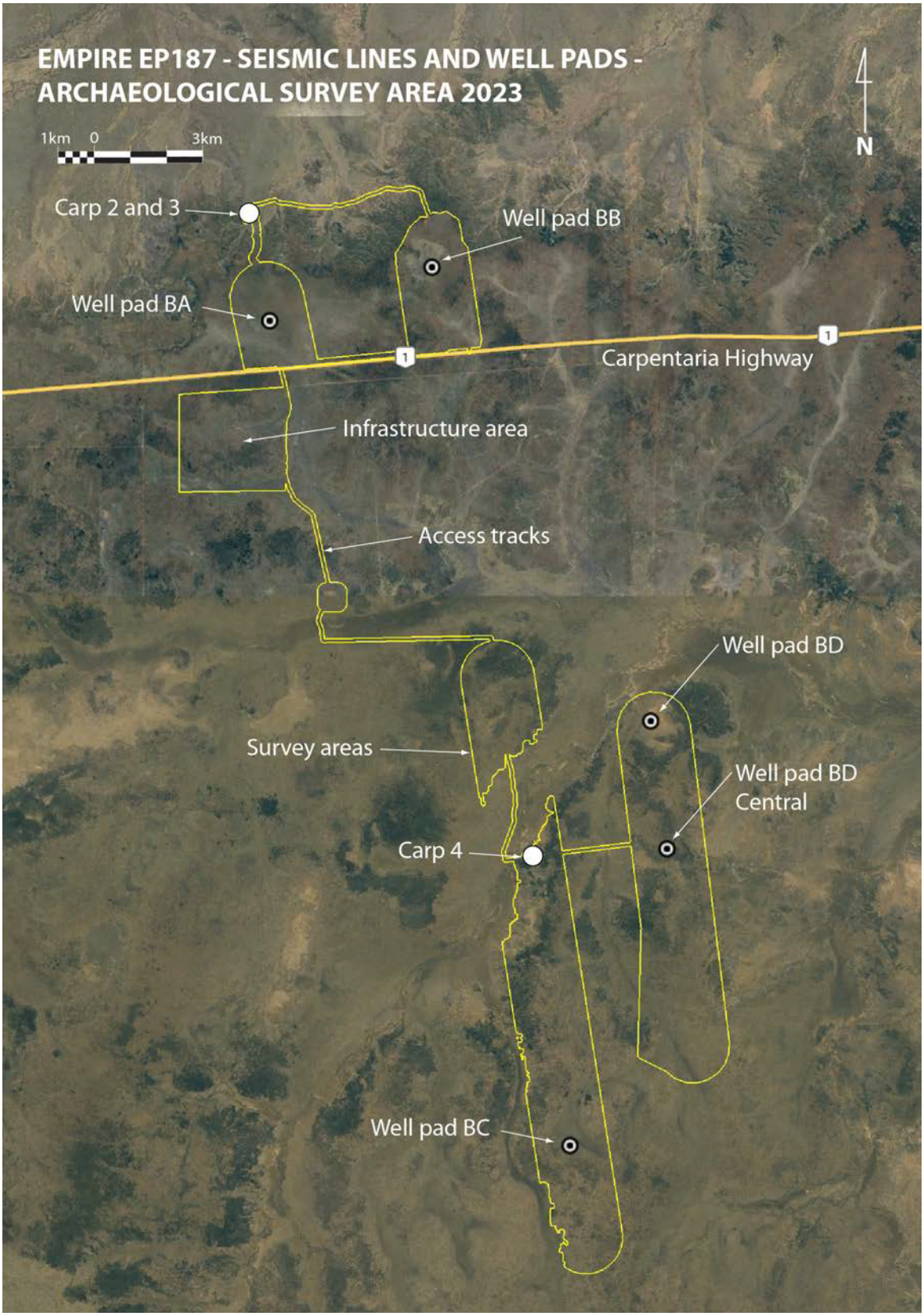


Figure 2. Empire EP 187 – seismic line areas and well pads, archaeological survey areas 2023, including location data for Carp 2, 3 and 4 (After Google Earth).

2.0 HERITAGE LEGISLATIVE FRAMEWORK

2.1 Statutory framework

Within the Northern Territory, several Commonwealth and Northern Territory statutory frameworks are relevant to the protection and management of Aboriginal and Non-Aboriginal cultural heritage.

2.2 Northern Territory legislation

There are two kinds of heritage sites protected under the Northern Territory *Heritage Act* (2011), hereafter referred to as the *Act*, declared and prescribed places and objects. The *Act* places legal constraints on owners of private property, local government and the Crown:

- Places or objects listed on the Northern Territory Heritage Register are declared heritage places and objects that are protected under section 33 of the *Act*, and

- Prescribed archaeological places and objects, which may or may not be declared, are protected under sections 29 and 39 of the *Act*.

It is an offence under the *Act* to damage, destroy, alter or carry out work of any sort on declared or prescribed sites without the written consent of the Minister or Minister's delegate.

2.2.1 *Northern Territory Aboriginal Sacred Sites Act* 1989

Protects sites that are 'sacred and otherwise of significance in the Aboriginal Tradition'. Sacred Sites are protected whether the location of the sites are known or not by any person or company seeking to do work on lands. The Aboriginal Areas Protection Authority (AAPA) administers the Act. The AAPA can issue a Certificate indemnifying a proponent for an area upon application and payment of a fee. The Certificate may contain conditions limiting or preventing works in and around registered and recorded Sacred Sites. The Authority Certificate will contain maps outlining any restricted work areas in application.

The Sacred Sites Act also makes provision for penalties related to offences including entry onto sacred sites, work on sacred sites, desecration, contravention of sites avoidance conditions, of secrecy. The maximum penalty for offences under this Act is a fine of up to $62,800 for an individual (or imprisonment for 2 years), or up to $314,000 for a body corporate.

2.2.2 *Heritage Act* 2011

The *Act* provides for Aboriginal and Non-Aboriginal archaeological places and objects in the Northern Territory. The Heritage Council and the Heritage Register, protects significant heritage places and objects, and sets penalties for offences against the *Act*. The *Act* provides protection for Aboriginal and Macassan archaeological places and objects, which are automatically declared heritage places and objects. The *Act* also sets the process by which other significant places or objects may be added to the Heritage Register, and afforded protection under the *Act*. The *Act* allows for processes to approve works, research and maintenance on a declared heritage place or object. There are penalties for accidental or deliberate destruction, amongst other offences.

The *Act* makes provision for penalties related to offences including causing damage to or removing a part of a heritage place or object. The maximum penalty is up to $62,000 (or imprisonment for 2 years). This penalty may also be applied to an executive officer of a body corporate, if criminal liability is proven. In deciding whether the executive officer took reasonable steps to prevent the

contravention of the *Act*, the court will consider any action the executive officer took towards ensuring:

- regular professional assessments of the company's/organisation's compliance with the *Act*,
- implementation of any appropriate recommendations from the above assessments, and
- the company's/organisation's representatives and contractors having a reasonable knowledge and understanding of the requirement to comply with the terms of the Heritage *Act*.

The court must also consider any action the executive officer took when they became aware that a contravention was, or could be, about to happen.

2.3 Commonwealth Legislation

2.3.1 *Aboriginal Land Rights Act* 1976 (ALRA) - Northern Territory

The Land Rights Act establishes the role and functions of Aboriginal Land Councils in the Northern Territory and contains provisions to protect Sacred Sites. The Project is within the NLC administrative boundary.

- Under s 23(1)(ba) the NLC has the function to 'assist Aboriginals in the taking of measures likely to assist in the protection of sacred sites on land (whether or not Aboriginal land) in the area of the Land Council.'
- The definition of a Sacred Site (s 3) is 'a site that is sacred to Aboriginals or is otherwise of significance according to Aboriginal tradition, and includes any land that, under a law of the Northern Territory, is declared to be sacred to Aboriginals or of significance according to Aboriginal tradition.'

The ALRA describes numerous offences and penalties, including unauthorised entry onto Aboriginal land or sacred sites. The penalty for unauthorised entry or remaining in a sacred site is up to $44,400 for an individual (or imprisonment for 12 months), or up to $220,000 for a body corporate.

2.3.2 *Native Title Act* 1993

The *Native Title Act* 1993 provides for the recognition of rights and interests of Aboriginal or Torres Strait Islander peoples in relation to traditional lands and waters. In some instances, if Native Title has been determined, provisions can include the ability to access and use these traditional lands and waters, including the right to protect and use cultural heritage resources.

2.3.3 *Aboriginal and Torres Strait Islander Heritage Protection Act* 1984

The *Aboriginal and Torres Strait Islander Heritage Protection* (ATSIHP) *Act* 1984 enables requests to protect traditionally important Aboriginal Places and Objects that are under threat, injury, desecration or destruction when State or Territory legislation have no / ineffective protections. A declaration is used as a last resort when the relevant State or Territory processes have been exhausted. The ATSIHP Act can protect cultural heritage through Emergency (s 18, s 9) and Longer-Term Declarations (s 10 and s 12).

2.3.4 *Environment Protection and Biodiversity Conservation Act* 1999

The EPBC Act is the Commonwealth Government's main piece of environmental legislation. It provides a legal framework to manage significant natural and cultural heritage places. Regarding cultural heritage, the Act proscribes the criteria for listing National Heritage places and Commonwealth heritage places, and management principles for same.

The introduction of the EPBC Act created two new heritage registers, the National Heritage List, and the Commonwealth Heritage List. These registers replaced the Register of the National Estate.

- The National Heritage List is a list of natural, historic and Indigenous places that are of outstanding significance to the nation.
- The Commonwealth Heritage List is a list of natural, historic and Indigenous heritage places that are owned or controlled by the Australian Government.
- The Register of the National Estate is no longer a statutory list. It is being maintained as an archive of information regarding more than 13,000 places throughout Australia.

2.4 Declared heritage places and objects

Categories, which describe the status of each site on the Northern Territory Heritage Register database, are listed in Table 1.

Table 1. Site status on the Northern Territory Heritage Register database

Status	Description
D	Declared heritage place.
NR	Not recommended. HC* determined that the place did not meet heritage assessment criteria and did not hold sufficient value to warrant declaration under the *Act*.
RF	Refused by the Minister. HC* recommended for declaration and Minister refused to do so.
P	Proposed. HC* has determined that the place warrants declaration under the *Act* but has not yet made its recommendations to the minister.
RV	Revoked. Declaration as a heritage place pursuant to Section 26(1) of the *Act* is revoked.
N	Nominated. HC* has yet to complete its assessment of the heritage value of the place.

*Heritage Council

2.5 Prescribed archaeological places and objects

No places listed on the National Heritage List, nor the Commonwealth Heritage list occurs within EP 187, nor any places under ATSIHP (1984).

2.6 Constraints

2.6.1 Ground Integrity (GI)

Assessing ground surface integrity provides an indicator of whether the landscape under study has been modified, and if so the degree of disturbance encountered. It then becomes possible to gauge the degree to which modification has influenced the environmental context within which artefacts and/or places of cultural and/or scientific interest are located. Ground surface integrity must also be assessed from the perspective of the current legislation.

The *Aboriginal Cultural Heritage Act 2003* (in Queensland, but equally applicable to the Northern Territory) provides a definition for GI that includes the removal of native vegetation as inferring the ground has been subjected to 'significant ground disturbance'. Under these criteria of modification, therefore, the *Act* assumes that archaeological integrity and significance is greatly reduced, is negligible, or even extinguished completely.

Contrary to this however, archaeologists are continually finding evidence that important cultural heritage material and/or places regularly survive not only land clearing activities but also invasive farming techniques such as ploughing.

Combined with this is the fact that, regardless of levels of GI, significant Aboriginal objects and/or significant Aboriginal areas can be defined on entirely cultural grounds, by Traditional Owners, not requiring any assessment of ground surface integrity.

Levels of GI are determined using a percentage range between 0-100% where 0% indicates all GI is gone, and 100% represents excellent preservation of the original context. Zero – 0%; Poor – 1-25%; Moderate- 26-50 %; Fair – 51-75 %; Good – 76-85%; Excellent 86-100%.

2.6.2 Ground Surface Visibility (GSV)

Assessments of ground surface visibility provide an indication of how much of the ground surface can be seen.

Ground surface visibility (GSV) is most inhibited by vegetation, but other inhibitors may include concrete, gravel and bitumen. Levels are determined using a percentage scale like that used for the calculation of Ground Integrity (GI), in that 0% represents zero visibility and 100% represents maximum visibility (bare ground). Zero – 0%; Poor – 1-25%; Moderate – 26-50 %; Fair – 51-75 %; Good – 76-85%; Excellent – 86-100%. The better the visibility, the more potential there is for locating cultural/archaeological material.

3.0 PREVIOUS RESEARCH

3.1 Literature review

Two previous studies were conducted over EP 187 by Jung (2019 and 2020) that recorded an archaeological site [redacted]. Only isolated finds were previously made [redacted] and these were recorded as [redacted] and [redacted] The only archaeological site previously found on EP 187 was [redacted] which is a [redacted] on [redacted] (Jung, 2019:7).

The first archaeological site found [redacted] is referred to in this report as [redacted] The site, thought to have been [redacted], was found [redacted] during a monitoring programme on 4 August 2022 by inGauge staff and Traditional Owners. Despite being outside of [redacted] on EP 187 was not inspected in September and October, as the grid references for the finds were not available at the time of the surveys. Table 2 lists the previously recorded [redacted] on EP 187. [redacted] as no archaeological surveys were conducted in 2022.

Table 2. Previously recorded archaeological sites

No.	Name	Site Type	Number	[redacted]		Date	Description	Significance
				Easting	Northing			
[redacted]								

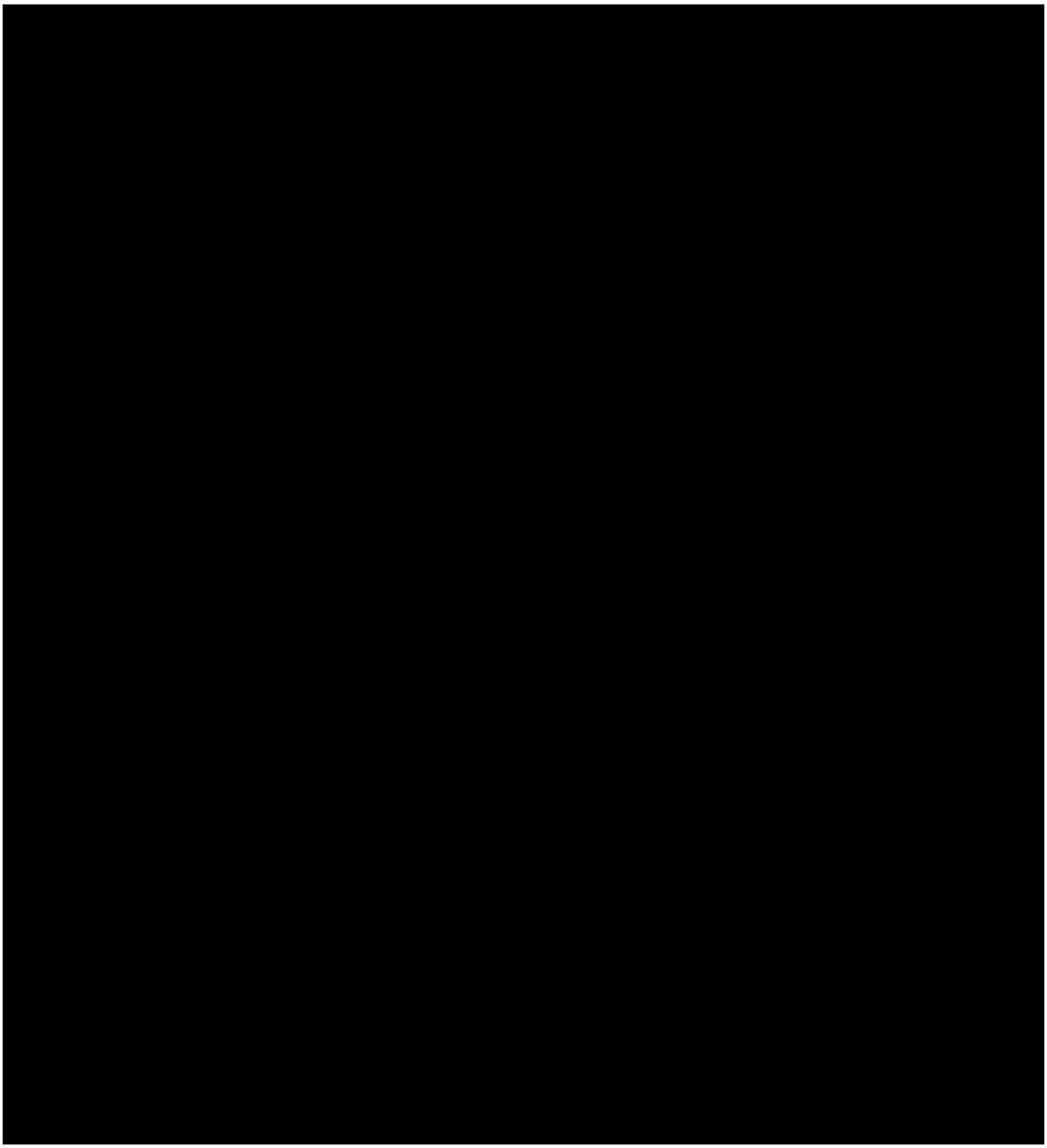




Figure 4. [redacted] *in August 2022 (Photo: inGauge).*

[redacted]

4.0 METHODS

4.1 Survey method

Archaeological survey methods are often based on sampling strategies. These strategies can be 'purposive', where specific areas are targeted, or 'probabilistic', where decisions are made to survey without any prior knowledge or predictive model of what heritage resources might exist in the landscape to be surveyed. Cultural heritage survey strategies generally involve transects across project areas chosen at random (probabilistic) to avoid possible bias in the results or transects within areas (purposive) known to potentially contain Indigenous cultural heritage or contain sites that were identified in previous research or surveys.

Water is a key determinate as to where people were in the environment. Waterways and bodies, hence, were targeted as well as stony outcrops that may have been utilised for stone tool production. Waterholes and ephemeral billabongs were a specific target site as these were extensively used by Aboriginal people in the past (Fig. 6). [redacted].

The survey utilised aerial resources in September and October to access the survey areas. There were no access tracks and the two main terrain units were uniform, consisting of floodplains (Cresswell) and riparian areas (Abner) along Relief Creek (EMP, 2021:17). The former has very low GSV and could be assayed from the air in reasonable time, given the limited frames for the survey. It was not warranted to undertake a systematic pedestrian survey of the floodplains, as it would have taken a large team of people many months to complete, with low prospects of finding archaeological material.

Landing zones (LZs) were also chosen that had a low probability of finds, or low archaeological potential (LAP), as a control measure to determine if any archaeological material survived in those areas. These control measure transects often coincided in areas requiring inspection by the ecologist. As another control, the survey team was inserted by aircraft at nearby LZs to access target sites. The team then undertook pedestrian surveys, as it was often not possible to land directly at HAPs due to thick tree cover, in instance. Occasionally, an aircraft was used to leap-frog the survey team along transect lines to enable more time on the ground.

The seismic line areas are approximately 2km in width. The aerial survey method to cover these areas involved a circuit around their perimeters, with turns to the left for maximum visibility, as vision to the right is obscured by the pilot. A central transect north to south was also flown to ensure ground coverage was less than 500m to either side of the aircraft, sufficient for ground visibility from a height of between 500 to 1000ft @40knts approx. A pedestrian survey was conducted in December 2024 at the Carp 2, Carp 3 and Carp 4 expansion areas. An aircraft was not needed for those surveys as tracks had been established to the well pads.

Formal tool types are to be photographed and a GPS grid reference recorded for each find greater than three metres apart i.e., the accuracy reading of the GPS unit. Artefact type and raw material type were the only attributes recorded. An unmanned aerial vehicle (UAV) was utilised in the December survey to gain aerial perspectives of archaeological sites.



Figure 6. Typical ephemeral waterhole, a target site for HAP areas. No archaeological material was found at this site.

4.1.1 Identification of archaeological material

Stone artefacts, including tools and debitage, the by-product of manufacture, are identified on the following criteria after McCarthy (1976), Holdaway and Stern (2004):

- Bulb of percussion
- Erailure scar (on the ventral surface)
- Waves of force
- Point of force application (PFA) and associated ring crack
- Termination types (e.g., feathered, stepped, hinged, plunge, bending initiation)
- Flake scars (dorsal scars and ridges)
- Cores (identified by the presence of negative flake scars)
- Hammer stones (identified by the presence of end-crushing on pebble stones)
- Retouch (reworking of flake margins)
- Raw material type
- Grinding stones (very smooth wear on upper surface)

List of artefact type abbreviations:

- Ad – Adze (Burrens, Tulas etc.)
- An – Anvil
- B – Blade
- C – core
- Cp– Core piece
- Ct – Core tool
- F – flake
- Fp – flake piece
- Gs – Grindstone/Grinding plate
- Gh – Grinding hollow

- Hs – Hammer stone
- M – Manuport
- Mp – Multi platform core
- Rtf – retouched flake
- S – Scraper
- Sp – Single platform core
- Ts – Top stone
- X – Axe/wasted cobble
- Z – Other e.g., ceremonial

List of artefact raw material abbreviations:

- B – Basalt
- C – Chert
- D – Dolerite
- Ch – Chalcedony
- G – Greywacke
- Gr – Granite
- Hs – Hornsfel
- Im – Indurated mudstone
- J – Jasper
- SS – Sandstone
- S – Silcrete
- Q – Quartz
- Qz – Quartzite

4.1.2 Definition of archaeological sites

4.1.2.1 Historical Sites

Historical sites in north Australia are those that have physical evidence of European and non-European activities. These range from Macassan sites to military sites of WWII. These sites may overlap with Aboriginal heritage sites.

4.1.2.2 Prescribed Archaeological Sites

Aboriginal archaeological sites can be classified by seven main types: 1) stone knapping sites, including quarries, 2) background scatters, including isoliths, 3) stone arrangements, such as mounds, walls, fish traps or stone motifs, 4) shell middens, 5) burials, 6) scarred trees and 7) rock art sites.

Burke and Smith (2004:63) define an archaeological site as ‘any place that contains the physical evidence of past human activity. Australia, however, has what has been referred to as a background scatter of stone artefacts, which refers to low-density artefact scatters that either represent singular knapping events (‘dinnertime’ camps or ‘hunting camps’), or larger sites that have been buried or disturbed. To differentiate this site type from larger sites that may contain thousands of artefacts, the term Archaeological Site (AS) is used to describe home-camps or quarries i.e., places where people have been returning to for millennia, as opposed to sites that have very low artefact densities that represent sporadic visits i.e., background scatters (BS). Others have called these sites persistent occupation sites, whereby people have return to frequently, or visit sporadically over a long period of time (Schlanger, 1992).

4.2 Assessment of archaeological significance

From personal observations, Aboriginal people regard all material cultural heritages as significant. They are, after all, the tangible reminders of their culture and represent a finite resource. It is a

western construct to assess sites and objects as a hierarchy. Significance assessment in archaeology, therefore, is complex, dependent on a range of factors. These can be classified as low, moderate, or high significance, following the International Council on Sites and Monuments (ICOMOS) Charter for the Conservation of Places of Cultural Significance, or the Burra Charter (Maquis-Kyle and Walker, 1992).

Archaeological significance, however, very much depends on the research questions being posed (see Sullivan and Bowdler, 1984; Moratto and Kelly, 1981; Sullivan, 1983). Generally low significance finds have poor diversity of artefact types and in very low densities. Sites that are likely to be particularly valuable in answering archaeological research questions are given moderate archaeological significance. High archaeological significance sites have very high artefact densities per metre squared, with rare and unique finds that is well preserved and has high ground integrity. The concept of significance in cultural heritage assessments is often irrelevant, whereby the client merely seeks to determine absence or presence of cultural material on their proposed works area and how best to mitigate their impact on those finds to comply with the *Act*.

4.3 Consultation with Registered Aboriginal Parties (RAPs)

The Heritage Branch policy is that Registered Aboriginal Parties (RAPs), or Traditional Owners, be involved if possible, during archaeological survey work. The information has been updated on their website:

https://nt.gov.au/leisure/arts-culture-heritage/visit-a-cultural-or-heritage-site/aboriginal-heritage-information (Accessed 9/7/2024).

[redacted] was asked to participate in the December 2024 survey and it was arranged by inGauge [redacted] to attend. [redacted] did not present for work on the day of the survey. There was no time to approach other Traditional Owners to participate in the survey. Empire coordinates stakeholder consultation with the traditional owners.

5.0 RESULTS

5.1 Archaeology

Seventeen landings in total were made in the September and October surveys. Appendix 1 documents them, providing descriptions, grid references and photographs. No archaeological material was found. Figure 7 maps the survey tracklog and landing zones.

No archaeological material was found in the Carp 2 and Carp 3 expansion areas. Figure 8 maps the area and the survey tracklog for Carp 2 and Carp 3.

5.1.1 [redacted]

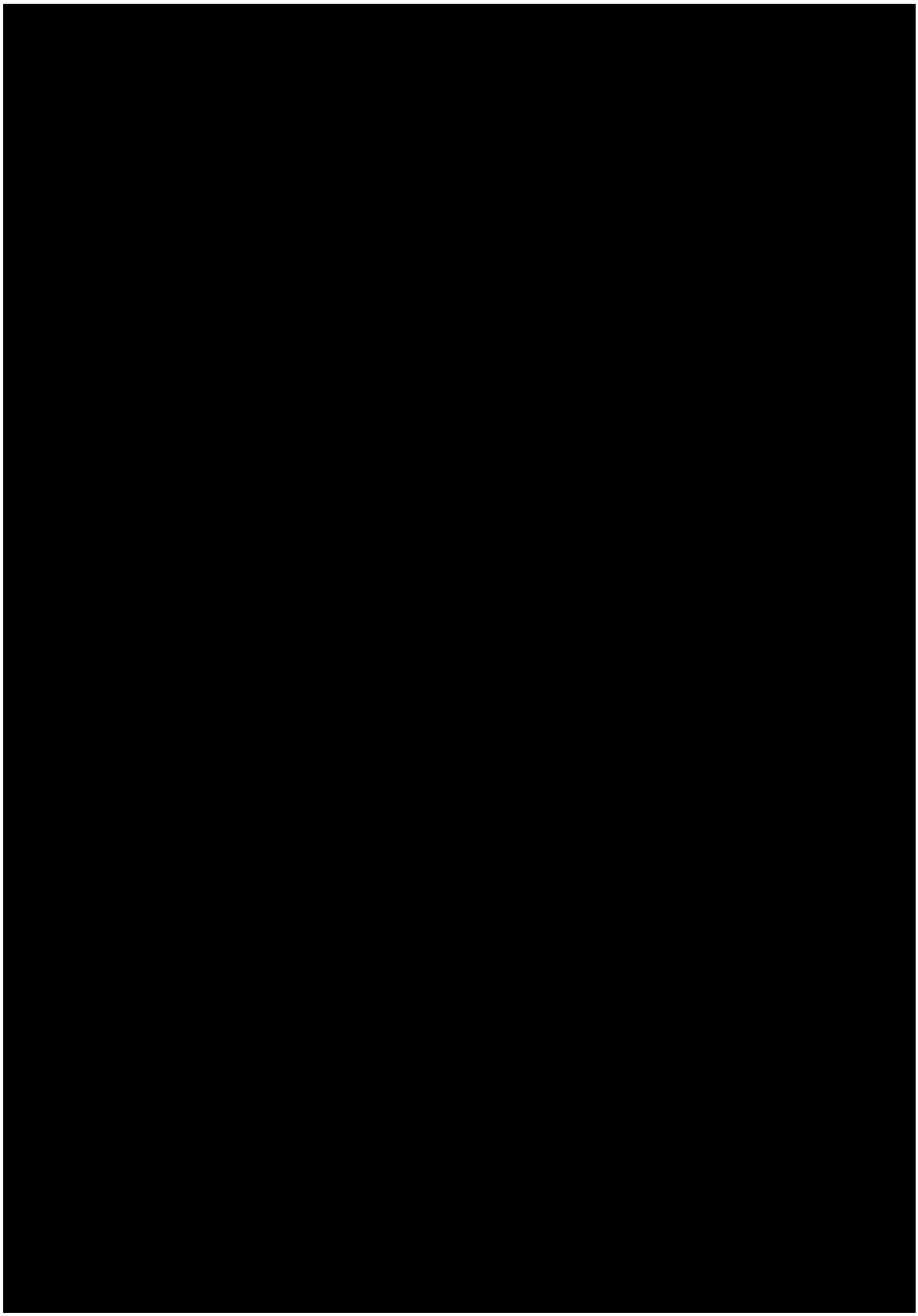
The site of the reported [redacted] from 2022 was inspected, which revealed more archaeological material. The site measures approximately 300m x 240m in area. It is a [redacted], referred to as [redacted]. The main artefact concentrations at the site occur on exposed laterite and in erosion areas. The site is on a gentil rise [redacted] which intersects a broadening flood area to the east. [redacted] is vegetated by a dense stand of lancewood. The artefact density dropped out in this area as no further finds were made. [redacted]. Some isolated artefacts were found in the 2020 survey to the [redacted], but these are unlikely to be part of [redacted]

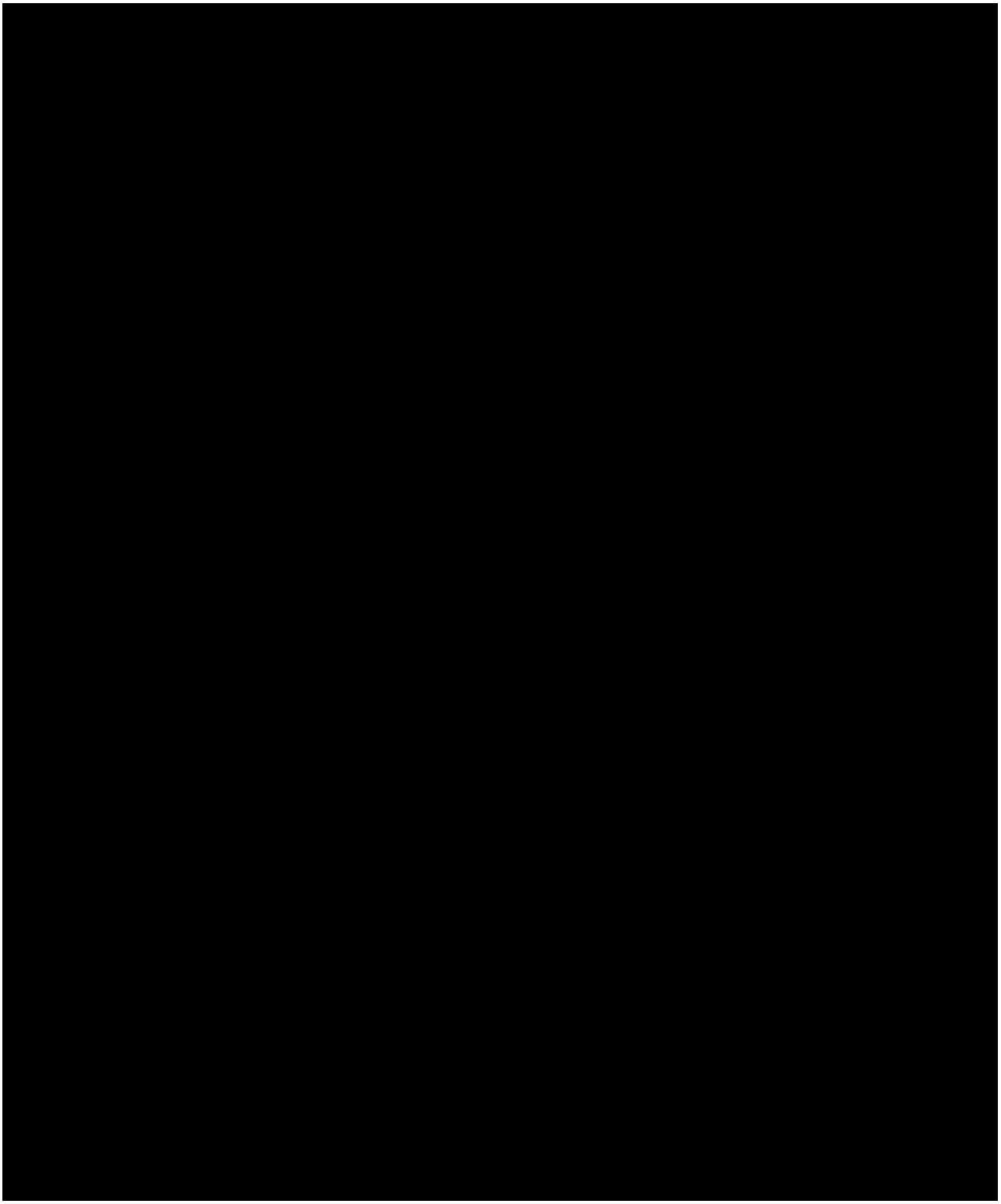
Figure 9 maps the site. The site polygon incorporates the buffer zone around the finds. The site consists of [redacted] (Fig. 10) and [redacted] (Fig. 11), with material mainly of [redacted] (Fig. 12). The finds are listed in Table 3. Figures 13 to 15 show context views and Figures 16 to 18 are of UAV aerial perspectives. The site is subject to flooding.

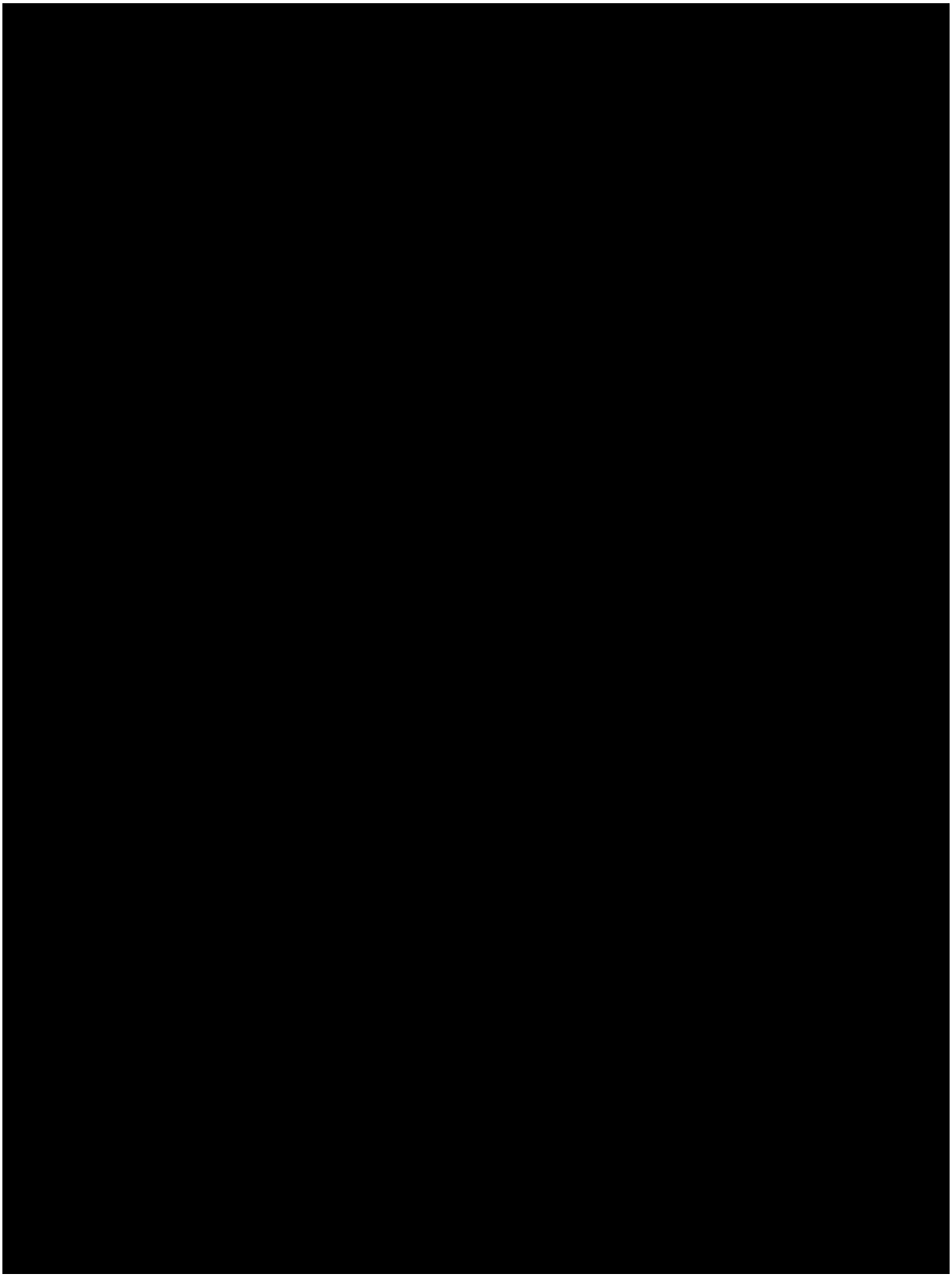
Table 3. [redacted] - all finds location data

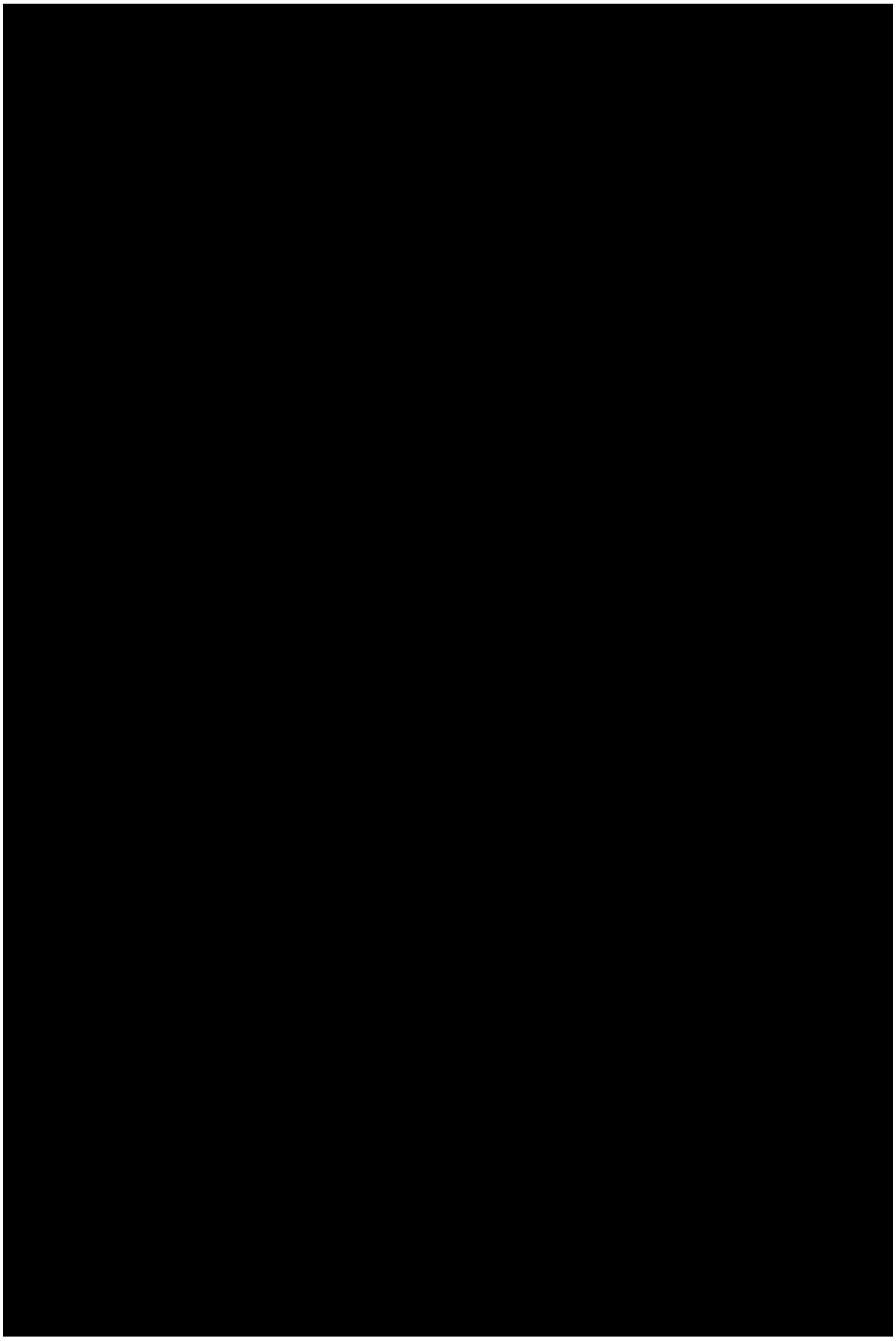
Format: [redacted]						
Site Name	**Abreviation**	**Comment**	**Zone**	**Zone**	**Easting**	**Northing**
[redacted]						
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
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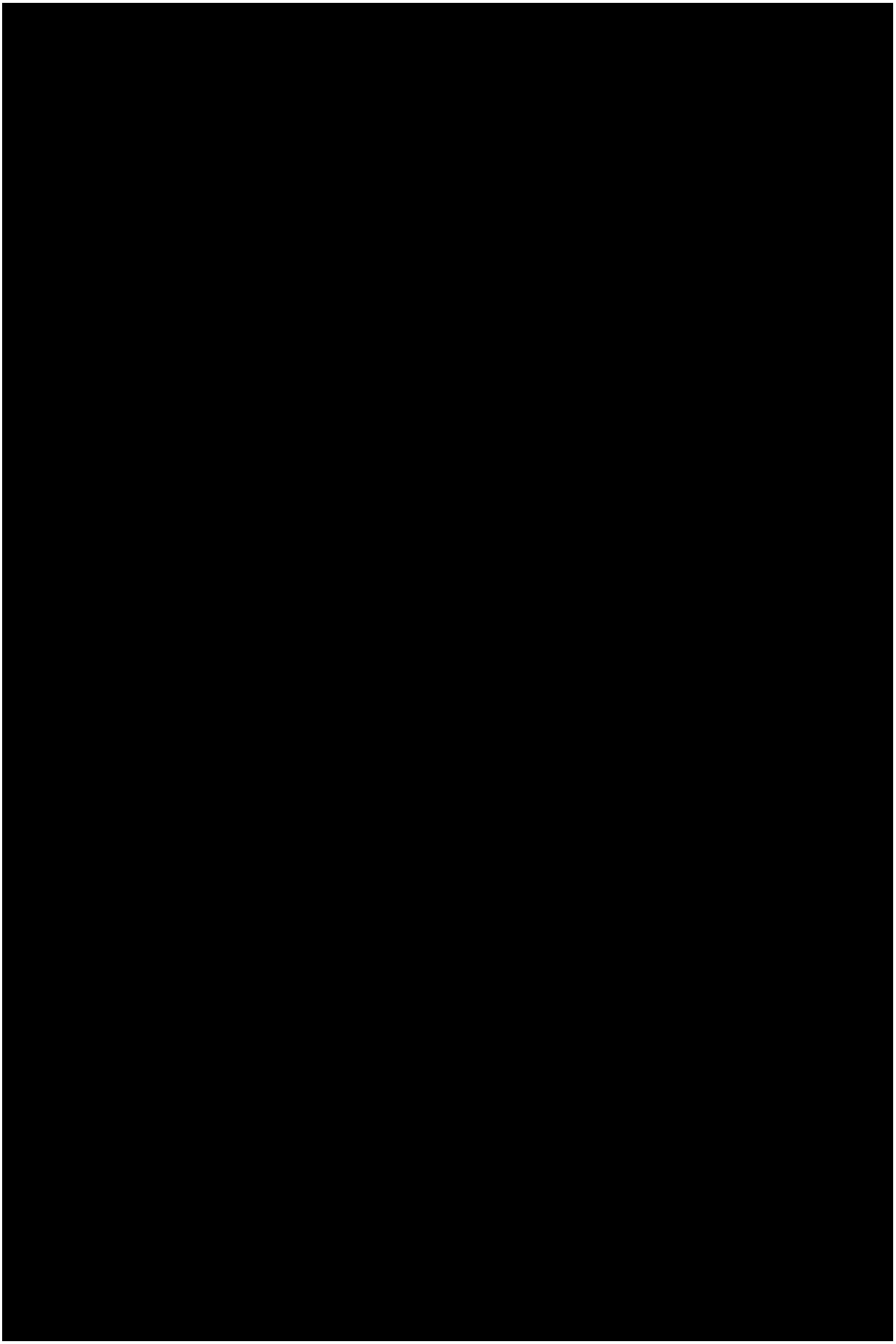
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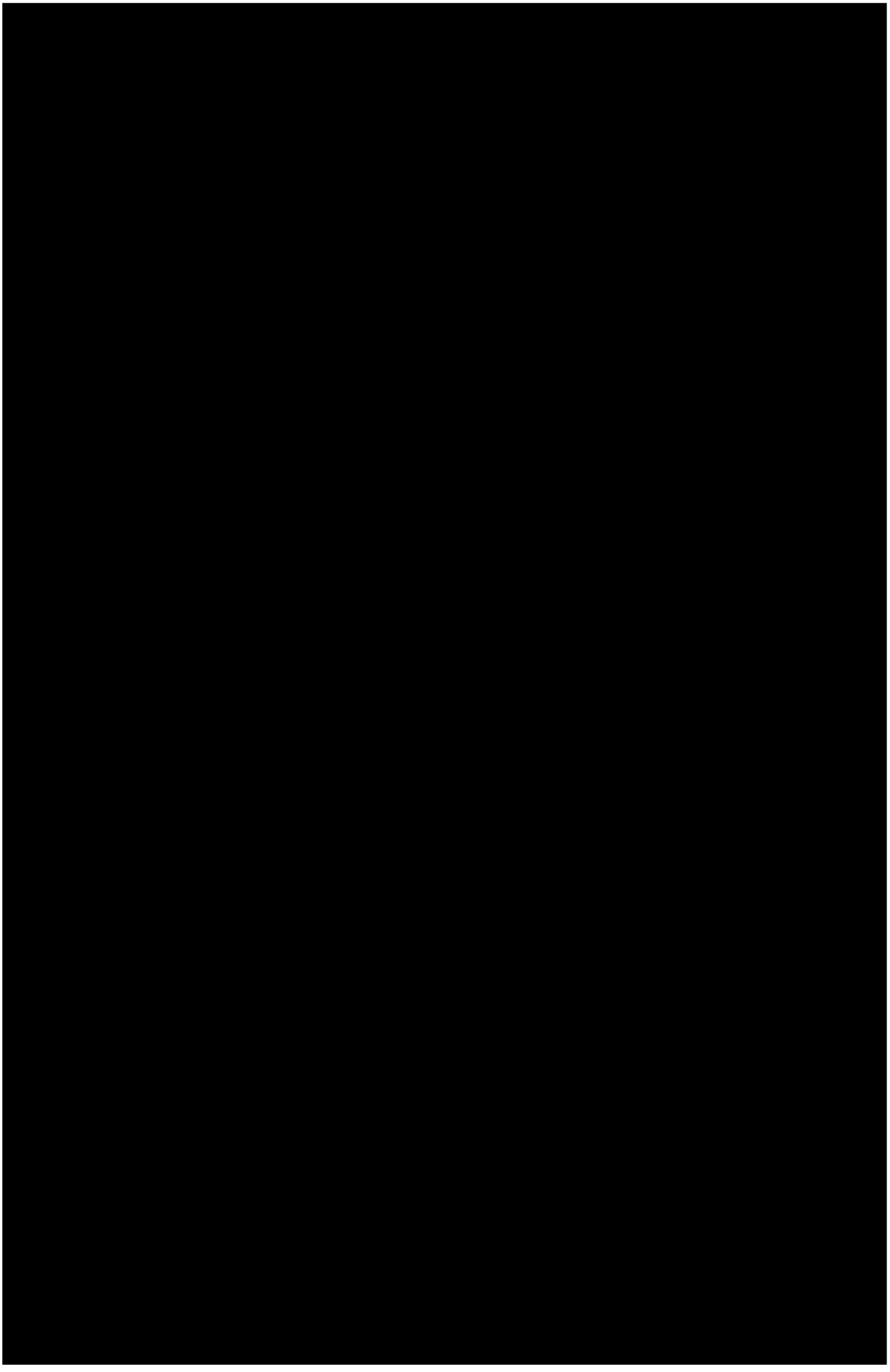


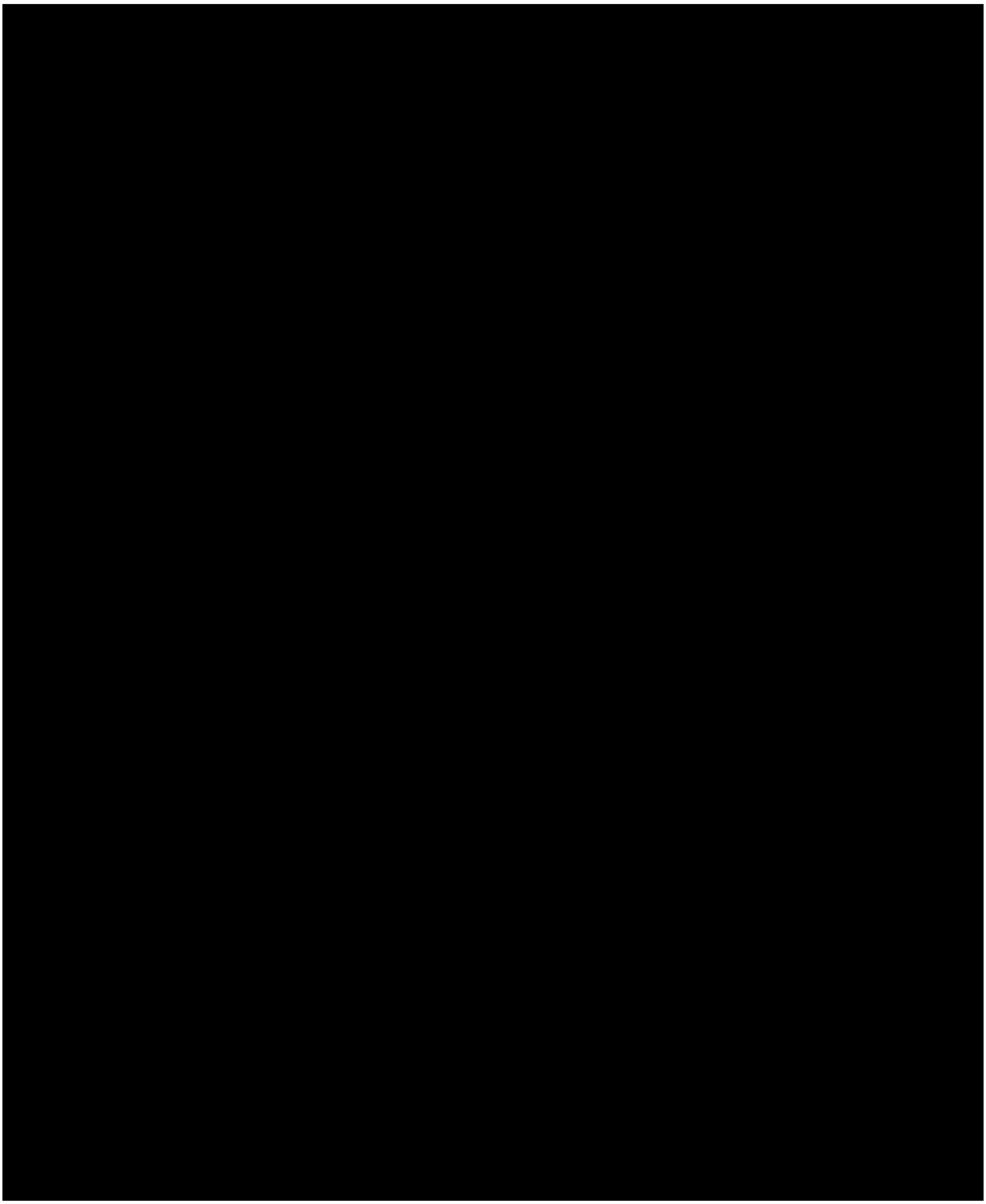














6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The September and October archaeological survey of Empire's EP 187 was to assess four areas along previously surveyed seismic lines. These were expanded to approximately 2km wide sections, including the sites for five well pads. Two helicopters were utilised to conduct the surveys in September and October 2023, particularly of the areas south of the highway that have no access tracks. GSV was poor throughout the survey at roughly 20% due to extensive grass cover, but GI was acceptable at roughly 80% on account of cattle.

The survey, which was conducted specifically on 26 September, 26 and 27 October 2023 effected 17 landings to assay possible ground targets for HAP sites, particularly targeting [redacted]. The results of the survey found no archaeological sites or artefacts.

Further expansion areas were proposed for Carp 2, Carp 3 and Carp 4. Although no finds were made [redacted], the December outcomes [redacted]

[redacted] The site is impacted by flood events. Subsurface finds should be expected, as they may have been buried by previous flood events. This may have aided the preservation of archaeological material, in that they may have been buried in situ, rather than begin deposited from elsewhere by floodwaters. Further surveys [redacted] may help to answer the question of site formation processes and environmental impacts at [redacted] The following recommendation arises from this report.

6.2 Recommendations

6.2.1 Recommendation 1: Work clearance

- The proposed works at EP 187 for the 2023 field season is cleared to proceed as no cultural heritage material was found. The proponent requires no further action under the *Act* (2011).
- Proposed expansion areas [redacted] are cleared for works as no archaeological material was found.
- Proposed expansion areas [redacted] A systematic archaeological survey should be instigated to clear the [redacted] for expansion works.

6.2.2 Recommendation 2: Site avoidance

- The archaeological site [redacted], should be avoided. No works should occur within the site polygon. No [redacted] and hence the site, is planned. The site centroid follows:

GPS Grid Reference (Site Centroid) [redacted]	
Easting	**Northing**
[redacted]	[redacted]

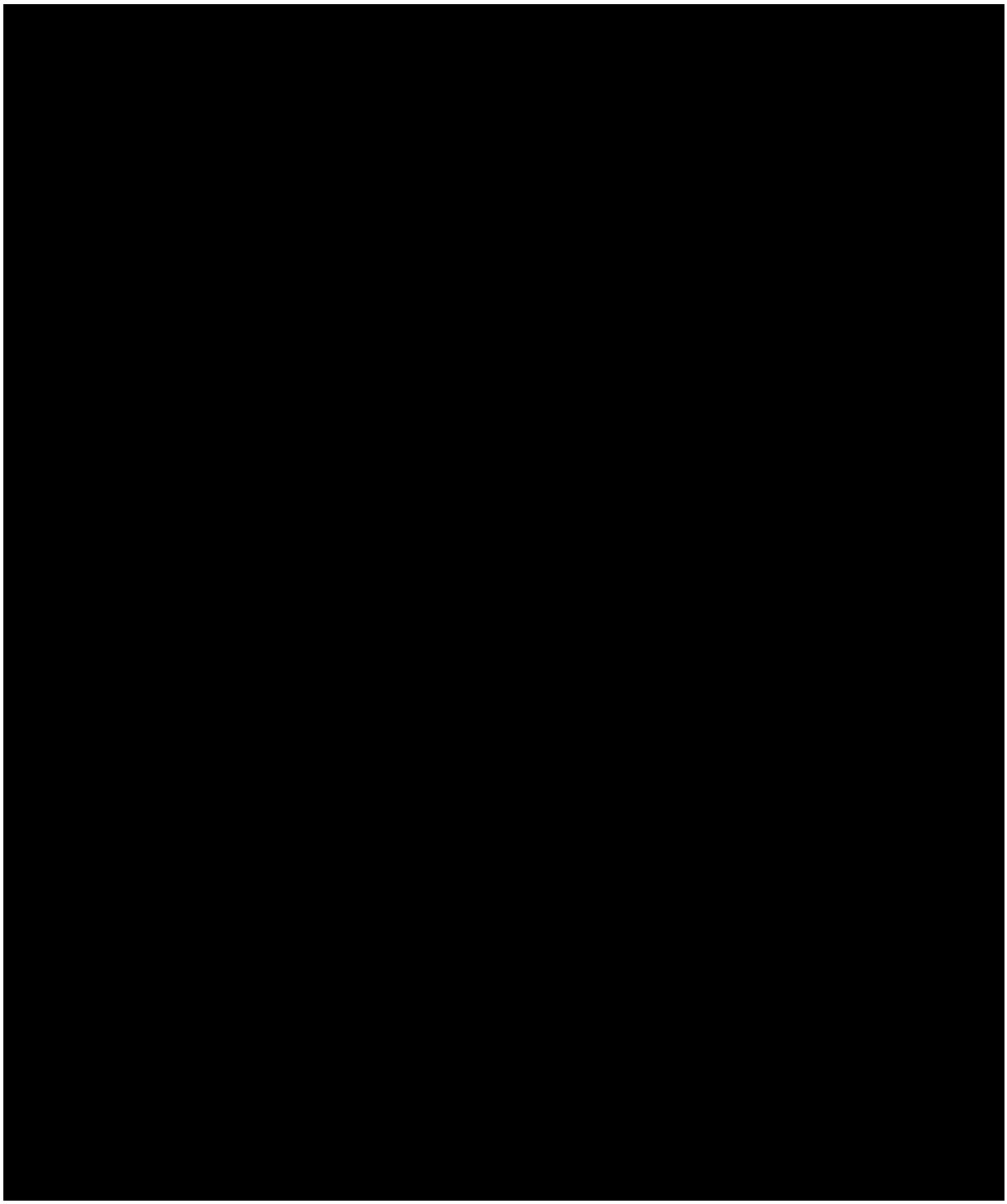
Site polygon coordinates (see Fig. 9 for polygon map):

GPS Grid Reference Datum: GDA 94, Zone: 53 K		
Boundary Point	**Easting**	**Northing**
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
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6.2.3 Recommendation 3: [redacted]

- Mitigation measures should be instigated for expansion to the [redacted] as more artefacts may be found. A systematic archaeological survey would be required within the cultural heritage exclusion zone, with artefact relocation to a possible keeping place elsewhere within [redacted] The boundary points for the systematic survey area (0.02km^2) are listed below and mapped in Figure 19:

GPS Grid Reference Datum: GDA 94, Zone: 53 K		
Boundary Point	**Easting**	**Northing**
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]



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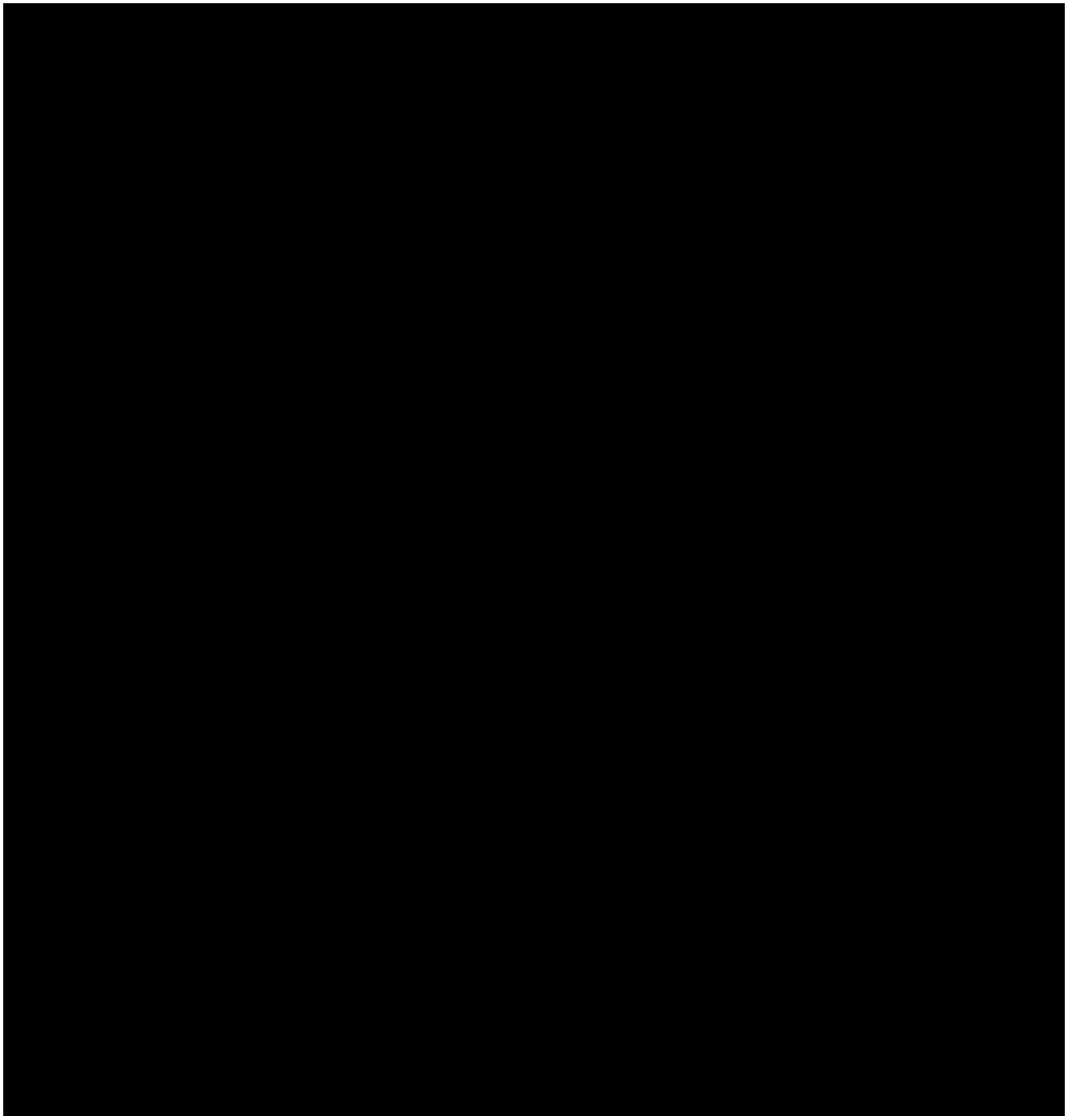
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APPENDIX 1: Landing zone descriptions and photographs



LANDING ZONE PHOTOGRAPHS



LZ1. 26/9/23. IMG_7580.



LZ2. IMG_7582.



LZ3. IMG_7583.



LZ4. IMG_7584.



LZ1. 26/10/23. DSCN8079.



LZ2. DSCN8080 – Drill Pad.



LZ3. DSCN8081. Landing zone.



LZ4. DSCN8082.



LZ5. DSCN8093.



LZ6. DSCN8094.



LZ7. DSCN8096.



LZ8. DSCN8101.



LZ9. DSCN8102.



LZ10. DSCN8104.



LZ11. DSCN8111.



LZ12. DSCN8118.



LZ13. DSCN8119.