NOTICE OF INTENT

Roper Valley Iron Ore Project

March 2017

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Document Control Record

Document Code:	EZ16141
Catalogue Number:	D157680
Project Manager:	Kylie Welch
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Approved by:	Kylie Welch
	

Version	Issue Date	Document history	Reviewer/Approver
1.0	18 Jan 2017	Issue to client as preliminary draft	K. Welch
2.0	6 Mar 2017	Reissue to NTIO	K. Welch
3.0	15 Mar 2017	Compiled – Final for issue	K. Welch
4.0	10 Oct 2017	Reissue to NTEPA with minor edits	K. Welch

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1 Introduction

This Notice of Intent (NOI) has been prepared to inform the Northern Territory Environment Protection Authority (NT EPA) of Northern Territory Iron Ore's (NTIO) proposal to develop the Roper Valley Iron Ore Project (the project). The NOI has been prepared with reference to the *Guidelines for the preparation of a Notice of Intent* (NT EPA 2015) and is being submitted to the NT EPA directly by the proponent, NTIO.

NTIO owns the following interests pursuant to the *Mineral Titles Act* (NT):

- **Exploration Licences** - EL24101, EL24102, EL26412, EL28497, EL30618.
- **Exploration License (Application)** - EL(A)27411.
- **Mineral Lease** - ML29584.
- **Mineral Lease (Application)** - ML(A)29070, ML(A)29071, ML(A)29072, ML(A)29437, ML(A)30317.

The tenements are located within the Roper Valley Region as shown in Figure 1.

The project will involve the production of saleable iron ore, specifically from Deposits C (EL24101), W and X (EL24102). Mined iron ore will be transported to a purpose-built Barge Loading Facility (BLF) located near the mouth of the Roper River, from where the iron ore products will be transhipped by barges to Ocean Going Vessels (OGV) moored offshore in the Gulf of Carpentaria.

This NOI describes the proposed project activities, potential environmental impacts, and measures proposed to avoid or mitigate such impacts. The purpose of this NOI is to enable the NT EPA to consider the proposed project and decide if assessment of the proposed project is required pursuant to the *Environmental Assessment Act* (EA Act).

It should be noted that a number of environmental (and other) approvals were obtained by the previous tenement holders that relate to activities associated with mining at Deposit C only, with transport of ore by road to the Port of Darwin (refer section 3.1). Although valid, the existing approvals do not encompass all elements of the project proposed in this NOI, specifically: the increased production rate, the proposed product logistics solution via Port Roper, the inclusion of ore processing, the expansion of the mining areas to include Deposit W and Deposit X, and the increased project water requirements.

The preferred project configuration described in this NOI has been selected by NTIO to reduce or eliminate some environmental impacts by:

- Exploiting existing infrastructure (e.g. upgrading existing public roads rather than developing a new transport corridor);
- Utilising land vacated by previous developments (e.g. the BLF site); and
- Selecting equipment and techniques that preclude some impacts (e.g. use of shallow draft vessels to obviate the requirement for marine or estuarine dredging).

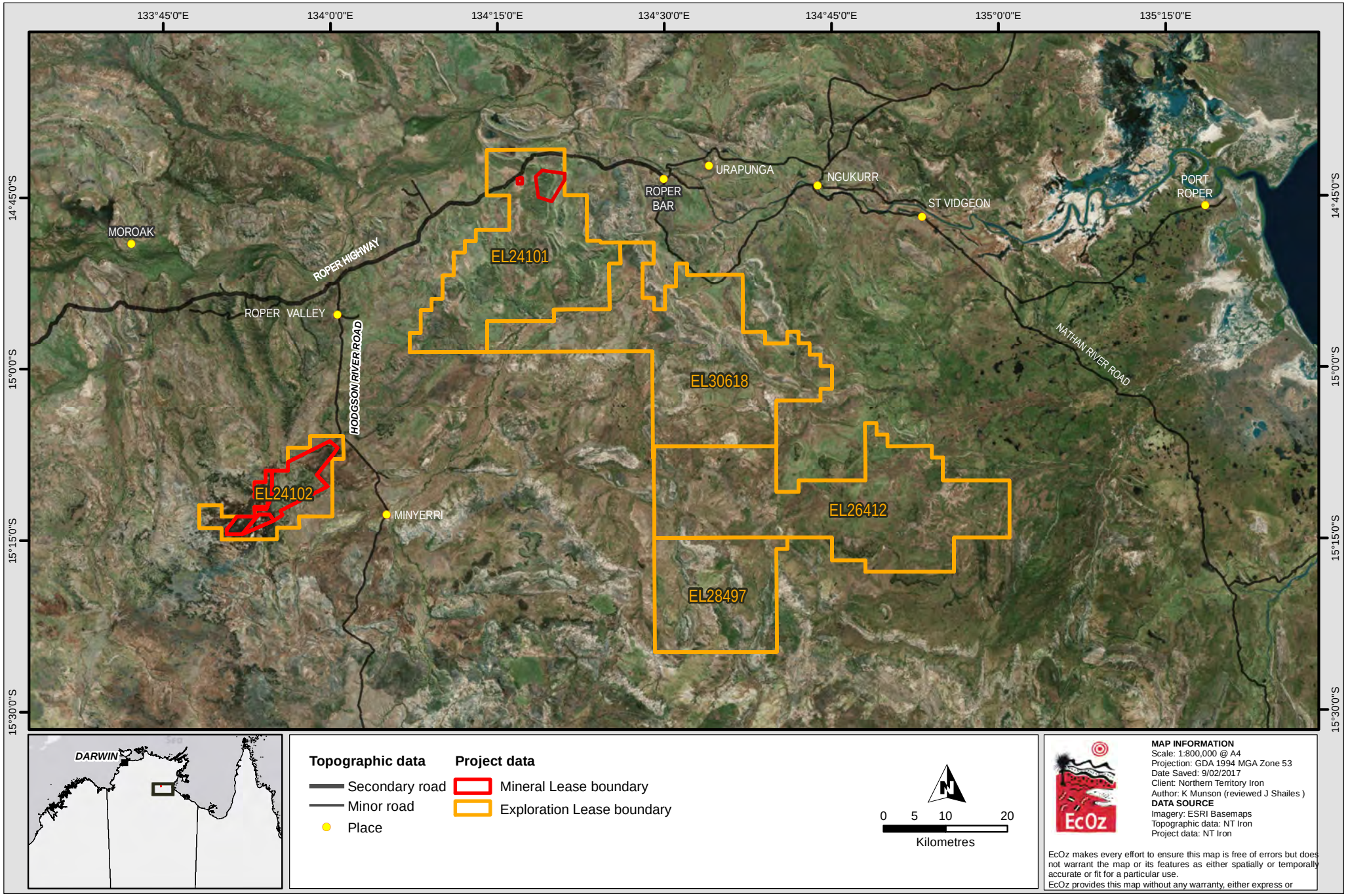

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Figure 1. NTIO tenements in the Roper Valley region

2 Project details

2.1 Project title

Roper Valley Iron Ore Project

2.2 Proponent

Operator Name:	Northern Territory Iron Ore Pty Ltd ACN 609 206 706	
Key Contacts:	Managing Director Bill Mackenzie 0409 689 022 0409 689 022 bill.mackenzie@ntio.com.au	Site Manager Colin Jardine 08 7908 4006 0417 594 458 colin.jardine@ntio.com.au
Registered Address:	68 Excelsior Street SHENTON PARK WA 6008	

The NTIO tenements are currently in Care and Maintenance whilst approvals are being sought for development of the project. The organisation structure of NTIO during this stage comprises the Managing Director and Site Manager. The Managing Director reports directly to the Board of Directors of NTIO.

2.3 Location

The project is located in the Northern Territory (NT) approximately 420 km south-east of Darwin and 150 km east of Mataranka. The location is shown in Figure 2.

Access is via the Roper Highway, which intersects the Stuart Highway 10 km south of Mataranka. Existing infrastructure within the tenements includes a trial pit and accommodation village. The infrastructure is located adjacent to the Roper Highway within EL24101; approximately 11 km east of Fizzer Creek, which is the current eastern limit of the bitumen seal.

Iron ore will be transported from the mining areas via existing (upgraded) roads to a purpose-built BLF located near the mouth of the Roper River. Iron ore will be loaded onto barges at the BLF and transhipped to OGV moored approximately 40 km offshore in the Gulf of Carpentaria (in >15 m deep water).

The locations of the project components are shown in Figure 3. The term project area is used throughout this document to refer to the broader area that encompasses the mining areas, transport routes, BLF and off-shore transhipment site.

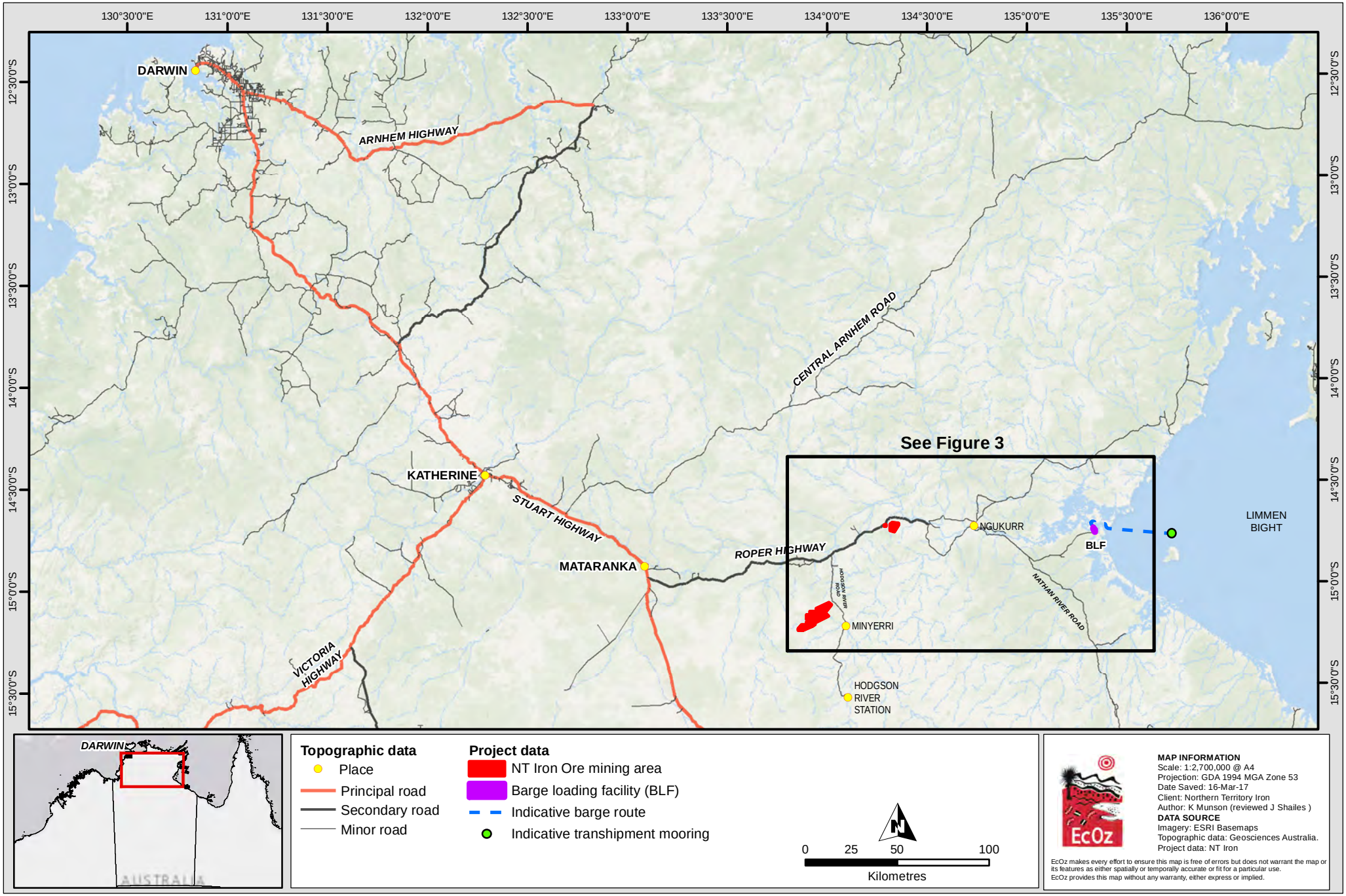

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Figure 2. Location of project area

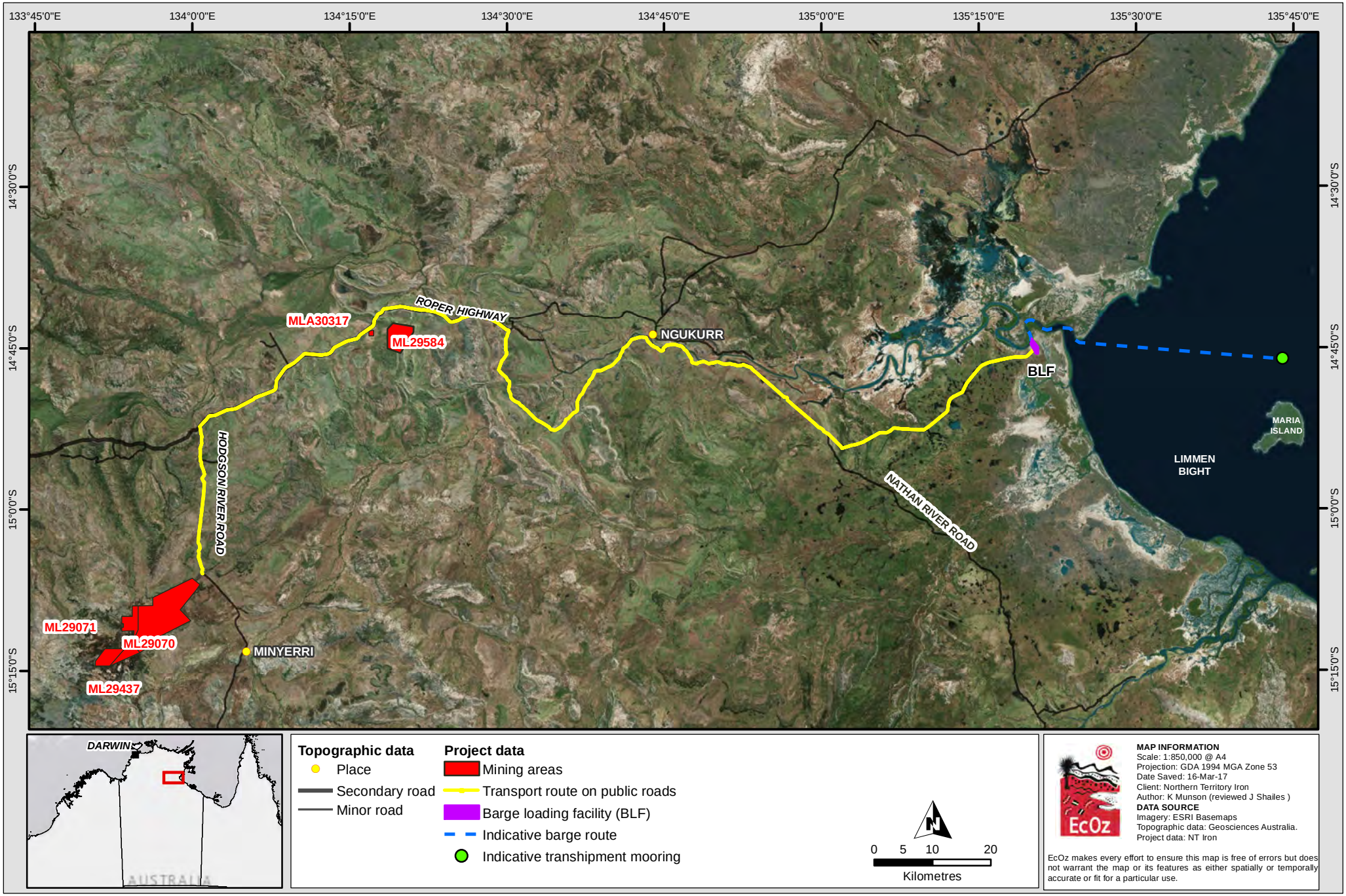

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Figure 3. Location of project components

2.4 Land tenure

The mining areas are located on EL24101 (Deposit C) and EL24102 (Deposits W and X). The underlying tenure of the Exploration Licences is as follows:

Tenement	Land tenure
EL24101 - Sherwin Creek	Mt. McMinn, Big River and Namul Namul Pastoral Stations
EL24102 - Hodgson Downs	Aboriginal Freehold Land (Alawa Trust)

The associated Mineral Leases are:

- ML29584
- ML(A)29070
- ML(A)29071
- ML(A)29072
- ML(A)29437
- ML(A)30317.

The BLF will be established on NT Portion 1184, a Special Purpose Lease (SPL) under the *Special Purposes Leases Act* (NT), located approximately 15 km upstream from the Roper River mouth. NTIO has a contract to acquire this SPL.

2.5 Regional context

The closest settlements to the project area are Minyerri (15 km south east of Deposits X and W), Urapunga (30 km east of Deposit C) and Ngukurr (approximately 50 km east of Deposit C). Ngukurr is the largest settlement in the region with just over 1,500 residents.

Land uses surrounding the project area include cattle grazing, conservation, tourism, Aboriginal living and recreational areas, recreational and commercial fishing and horticulture. Currently, mining makes up a very small percentage of the region's land use.

2.6 Site history

The Roper River region has historically attracted exploration for a range of commodities. The first significant iron ore find in the NT was made in 1911 at Murphy's Prospect, near Roper Bar. This small discovery attracted BHP to the area in 1955. Exploration conducted between 1956 and 1961 identified 26 separate deposits named from A to Z within a stratigraphic unit called the Sherwin Iron Formation. BHP estimated a total potential of at least 400 Mt of variable grade (35%-62% Fe) iron ore from within the Sherwin Iron Formation; however, the company did not develop the deposits.

From 2004 until late 2009, North Australian Iron Ore Pty Ltd explored a number of tenements within and adjacent to EL24101 and EL24102 for iron, uranium and heavy minerals. They identified heavy mineral potential from erosion of dolerite sills in the area and recognised the regional prospectivity for diamonds and uranium.

In December 2009, Batavia Mining Ltd (Batavia) acquired an option over EL24101 and other adjacent licences and applications. Batavia later became known as Sherwin Iron. Exploration activity completed by Sherwin Iron for the 2010-2011 reporting period included geological mapping and sampling at Sherwin Creek (Deposit C) and Mt Scott (9 localities within Deposits G, H, I, J, K, and L).

Sherwin Iron determined that highest grades and thickest iron oxide mineralisation amenable to shallow open pit mining appeared confined to the Lower Ironstone Unit at Deposit C. In early 2012 Sherwin Iron aimed to

achieve early cash flow from initial mining of high grade Direct Shipping Ore (DSO) material from Deposit C to support the first of two stages of a project development strategy.

In March 2013, Sherwin Iron announced approval of a Mining Management Plan (MMP) for the extraction of a 200,000 tonnes bulk sample from the Deposit C area in EL24101. Bulk sample mining commenced in June 2013 and the ore was trucked to Darwin for export through the Port of Darwin. The first ore shipment left Darwin in September 2013.

After further approvals for a larger bulk sample were obtained, Sherwin Iron mined, trucked and exported four shipments of ore totalling 273,000 tonnes at 58.5% Fe. In July 2014, the company encountered financial difficulties and the directors appointed voluntary administrators. Sherwin Iron conducted site remediation actions to address issues raised by the Department of Mines and Energy (now the Department of Primary Industry and Resources) during site inspections in February and October 2015.

The bulk sample mining undertaken by Sherwin Iron was authorised prior to full environmental approvals being obtained. Approvals processes under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) and the EA Act were still underway when the administrator was appointed. Subsequent to the appointment of voluntary administrators, Sherwin Iron was granted approval under sections 130(1) and 133 of the *EPBC Act* to develop the Sherwin Creek project (EPBC 2013/6726).

NTIO acquired Sherwin Iron's assets in September 2016. As part of the sale process, the existing EPBC approval (ref 2013/6726) was transferred to NTIO pursuant to section 145(B) of the Act.

The site is currently in Care and Maintenance. An MMP for the care and maintenance activities is approved by the Department of Primary Industry and Resources (DPIR).

As NTIO is proposing some changes to the project scope, it intends to build upon the extensive historical work that informed previous approval processes.

3 Regulation

This section provides an overview of the key Commonwealth and NT environmental and heritage legislation applicable to the project, and key approvals, licences or permits received and/or required to proceed.

3.1 Previous approvals and investigations

Following preparation of an Environmental Impact Statement (EIS) in 2013, Sherwin Iron received approval under the *EPBC Act* for mining at Deposit C (reference EPBC 2013/6726). The EIS was also assessed under the *Environmental Assessment Act (NT)* as detailed in the Assessment Report 75 (NT EPA 2014). The proposed activities were authorised to proceed under the *Mining Management Act* in May 2014.

Due to the long-term interest in the region and Sherwin Iron's preparation of an EIS, there have been many environmental studies performed. Those relevant to the current proposal are listed below:

- Fauna Survey (Deposits B & C) – May 2011
- Fauna Survey (Dam and Process Plant) – June 2011
- Flora Survey (Dam and Process Plant) – June 2011
- Flora Survey (Hodgson River) – June 2011
- Fauna Survey (Hodgson River) – June 2011
- Aquatic Survey (Dam - Blackwater Creek) – June 2011
- Aquatic Survey (Hodgson River & Billabongs) – June 2011
- Fauna Surveys for Deposit C – June 2012
- Flora Survey (Deposit C) – June 2012
- Fish Survey within Sherwin Creek (Deposit C) – June 2012
- Macro-invertebrate sampling (Deposit C) – June 2012
- Survey at Mt Scott for potential endemic invertebrate species – May 2013
- Groundwater Investigation - Deposit C – Nov 2013
- Acid mine/metalliferous drainage assessment – Deposit C – Nov 2013
- Desktop fauna assessment – Deposit C – 2013
- Dust Monitoring at Deposit C and Haul Road – Sept 2013
- 12-month baseline adult mosquito monitoring program at Deposit C – Aug 2013
- Baseline noise assessment – Deposit C – Sept 2013
- Soil Survey – Deposit C – 2013
- Archaeological survey – Deposit C – July 2013
- Macroinvertebrate survey – Deposit C – 2014
- Assessment for occurrence of Freshwater Sawfish (*Pristis pristis*) – Deposit C – 2014

Information from these studies has been reviewed in preparing this NOI.

3.2 Commonwealth

Environment Protection and Biodiversity Conservation Act 1999

The *EPBC Act* is the Australian Government's key environmental legislation. Approval under the EPBC Act may be required for any proposed action likely to have a significant impact on a matter protected by that Act. The environment assessment and approvals process of the *EPBC Act* aims to protect Matters of National Environmental Significance (MNES), which include:

- World Heritage properties
- National Heritage Places
- wetlands of international importance
- nationally threatened animal and plant species and ecological communities
- internationally protected migratory species
- Commonwealth marine areas
- Great Barrier Reef Marine Park
- nuclear actions (including uranium mines)
- a water resource, in relation to coal seam gas development and large coal mining development.

The *EPBC Act* also aims to protect:

- the environment, where actions proposed are on, or will affect Commonwealth land
- the environment, where Commonwealth agencies are proposing to take an action.

An *EPBC Act* Protected Matters Report has been generated for the areas within and around the mining areas, BLF site, barge route and transhipment site in the Gulf of Carpentaria (refer Appendix A). The report indicates that a number of nationally listed threatened species and migratory species are known or likely to occur within the project area (refer to Section 5.7.3). The barge route and transhipment site are also located within Commonwealth waters that are part of the Northern Region Commonwealth Marine Area.

Further consideration of potential impacts to MNES is provided in Section 7 of this NOI. NTIO anticipates that the project will require assessment and approval under the *EPBC Act*.

The EPBC Act is currently administered by the Commonwealth Department of the Environment and Energy (DEE). To determine whether or not the proposed activities trigger the requirement for assessment, NTIO will submit a referral.

Native Title Act 1993 and Aboriginal Land Rights (Northern Territory) Act 1976

The *Native Title Act 1993* provides legal recognition of the rights and interests of Aboriginal people over land and water. The Act sets out basic principles regarding native title in Australia, including the processes by which native title rights are established, protected and administered.

The *Aboriginal Land Rights (Northern Territory) Act 1976* (*ALRA*) regulates exploration and mining on Aboriginal land and sets out the processes to be followed when negotiating with Traditional Owners for access to Aboriginal land and the grant of mineral titles over that land.

Native title rights exist over most of the project area and parts of the project area (EL24102) are on Aboriginal land. Prior to acquiring its tenements, NTIO undertook consultation with Native Title Claimants and Traditional Owners through the Northern Land Council (NLC). The NLC arranged meetings between NTIO representatives, Native Title Claimants and Traditional Owners in August 2016 at Minyerri and Mataranka. At those meetings, approval was sought and obtained to assign existing NLC native title and ALRA agreements from Sherwin Iron to NTIO.

3.3 Northern Territory

Mineral Titles Act and Mining Management Act

The *Mineral Titles Act* (*MT Act*) and the *Mining Management Act* (*MM Act*) are the principal legislation for the regulation of mining activities in the Northern Territory. Both are administered by DPIR.

The *MT Act* establishes the framework within which activities to explore for and mine mineral resources can occur. It sets out the administrative processes for authorising these activities through the granting of a title.

Prior to any activities taking place on a granted Mineral Lease, an authorisation to carry out mining activities under the MM Act must be obtained. Under the MMA, an application for an authorisation to carry out mining activities must be accompanied by a MMP.

There is currently an approved MMP in place for care and maintenance of the project tenements. NTIO anticipates that, prior to being authorised under the MM Act, the proposed mining activities will require assessment under the *EA Act* (refer below) and approval under the *EPBC Act*.

Environmental Assessment Act

The *Environmental Assessment Act* (*EA Act*) and associated Environmental Assessment Administrative Procedures (EAAP) establish the environmental impact assessment process in the Northern Territory.

The NT EPA will review this NOI and make a determination as to whether or not formal assessment is required pursuant to the *Environmental Assessment Act* (*EA Act*), and if so the level of assessment to be applied in accordance with the *Environmental Assessment Administrative Procedures*.

NTIO anticipates that the project will require assessment by EIS. The reasons for this opinion are provided in Section 8.

Water Act

The *Water Act* is administered by the Water Resources Division of the Department of Environment and Natural Resources (DENR). The Act provides for the investigation, allocation, use, control, protection and management of surface water and groundwater resources, as well as the administrative process for licensing these activities.

The project area occurs within the Daly Roper Water Control District. Water extraction licences are required for extraction greater than 5ML/year within a Water Control District; however, mining activities are exempt from this requirement.

Water required for the project will primarily be sourced by harvesting surface water and water demand will be reduced by recycling water to the extent reasonably practicable (refer Section 4.9). Groundwater may also be investigated as a water source if additional water sources are required to meet the project water demand at maximum production. Further hydrological assessments are required to establish the water sources available to the project, and the volumes of water that may be feasibly and sustainably harvested from those sources.

Current planning indicates that the project will not require a Waste Discharge Licence (WDL) under the *Water Act*. If more detailed planning identifies the need for off-lease discharge, a WDL will be sought.

Territory Parks and Wildlife Conservation Act

The *Territory Parks and Wildlife Conservation Act* (*TPWCA*) applies statutory obligations in relation to the protection of flora and fauna. This Act allows the listing of threatened species with special conservation status, and requires a permit to be obtained prior to interference with these species.

Review of the likely occurrence of listed threatened species within and surrounding the project area is provided in Section 5.7.3. NTIO will further consider potential impacts on threatened species through the environmental impact assessment process, and permits required under the *TPWCA* will be obtained as required.

Northern Territory Aboriginal Sacred Sites Act

The *Northern Territory Aboriginal Sacred Sites Act* provides for the protection and registration of sacred sites by the traditional owners or the custodians who have the responsibility for protecting a sacred site in accordance with Aboriginal tradition.

The Aboriginal Areas Protection Authority (AAPA) is responsible for administering the Act and records and maintains a sacred sites register. A search of the AAPA register (refer Appendix B) shows both registered sacred sites and recorded scared sites within the proposed project area with associated Restricted Works Areas.

NTIO complies with an AAPA Certificate (originally granted to the previous mineral title holders) issued for the area covered by EL24101 and EL24102. The known and potential occurrence of Aboriginal sacred sites within the project area is discussed in Section 5.10. NTIO will obtain Authority Certificates for all parts of the project area in due course, but will in the meantime abide by the conditions set out in Authority Certificate number 2011/14619 issued to the previous mineral title holders.

Heritage Act

The *Heritage Act* provides for the protection and registration of heritage places and objects. Places or objects listed on the Northern Territory Heritage Register are 'declared' and are protected under the Act. Aboriginal and Macassan archaeological sites are also protected. It is an offence under the Act to damage, destroy, alter or carry out work of any sort on sites without the written consent of the Minister or Minister's delegate.

There are no sites on the NT Heritage Register in proximity to the project area. However, previous archaeological surveys undertaken around Deposit C identified some Aboriginal archaeological sites that are protected under the Act. Further heritage assessments of the expanded project area will inform heritage management requirements. Where project activities may impact on heritage sites, Works Approvals will be sought through the NT Heritage Branch.

Further consideration of potential impacts to heritage values is documented in Section 5.10.

Weeds Management Act

The *Weeds Management Act* declares certain plants to be weeds, classifies weeds according to management requirements, and places obligations on landowners and occupiers to manage weeds. Section 9 of the Act establishes the responsibilities of landowners and occupiers for managing 'declared weeds'.

Desktop assessments indicate that there are 29 declared weed species that have potential to occur within the project area - 10 are declared A class weeds and 19 are class B (refer to Section 5.7.3). Further on-ground weed surveys will inform the development of a Weed Management Plan for the project.

Other Relevant Legislation

Other Northern Territory legislation relevant to the project includes the following acts and their associated amendments and regulations:

- *Bushfires Act*
- *Control of Roads Act*
- *Dangerous Goods Act*
- *Public and Environmental Health Act*
- *Soil Conservation and Land Utilisation Act*
- *Traffic Act*
- *Waste Management and Pollution Control Act*
- *Work Health and Safety (National Uniform Legislation) Act.*

4 Project Description

This section provides a detailed description of the activities proposed as part of the project.

4.1 Project overview

The project will involve the following main elements:

- open pit mining at Deposits C, W and X
- ore processing
- road transport to a BLF
- barge loading and transhipment to OGV
- supporting infrastructure and services.

An overview of key project components is provided in Table 4-1. Additional feasibility studies have commenced, the results of which will inform more detailed project planning.

Table 4-1. Project components and associated detail

Component	Overview
Proposed Construction Commencement	Q2 2018 (constrained by timely receipt of approvals)
Proposed Operation Commencement	Q2 2019
Life of Mine	>20 years
Mineral Resource (Direct Shipping Ore)	>40 Mt @ 58% Fe
Mineral Resource (In Situ)	>490 Mt @ 42% Fe
Marketable Iron Ore	150 – 300 Mt @ 56 – 58 % Fe
Production Rate (Direct Shipping Ore)	2 – 6 Mtpa
Production Rate (Low Grade Ore)	2 – 6 Mtpa
Beneficiation Process	Crushing ± grinding ± size separation ± gravity separation ± magnetic separation
Process mass yield	40% – 70%
Combined DSO + Concentrate Output	2 – 10 Mtpa
Project Water Demand	300 ML/pa to produce 2 Mtpa Direct Shipping Ore Only (minimum water demand) 2,000 ML/pa to produce 6 Mtpa of Iron Ore Concentrate (maximum water demand)
Project Water Supply	Harvested surface water flows and recycled water ± groundwater bores
Mining Method	Open Pit with some waste backfill
Strip Ratio	2:1 Waste : Direct Shipping Ore (DSO) + Low Grade Ore (LGO)
Number of Open Pits	3 – 10
Depth of Open Pits	10m to 40m below surface
Crushing Rate	2 – 12 Mtpa
Product Quality	56 – 58 % Fe

Component	Overview
Product Logistics (land)	Road train on upgraded public roads to BLF
Product Logistics (marine)	Shallow draft (<4m) barges loaded from stockpiles at the BLF towed by shallow draft tugs to OGV loading point ± 40km offshore from Roper River mouth
Mine Area disturbance footprint	± 2,400 ha
BLF footprint	± 100 ha
Barge route seabed disturbance footprint	nil
OGV sea bed disturbance footprint	Single point mooring
Public road upgrade	± 160 km for Area C plus a further ± 75 km for Area X&W
Workforce Accommodation	Demountable buildings at mine area(s) and BLF
Workforce (construction)	200 – 400 direct, + indirect
Workforce (operations)	150 – 300 direct, + indirect

Each of these components, together with the proven mineral resources, are more fully described in the sections below.

4.2 Project footprint

The disturbance footprint for the project will involve the following components:

- Mining Areas
    - Internal access and haul roads
    - Pits
    - Topsoil stockpiles
    - Waste rock stockpiles
    - LGO stockpiles
    - DSO stockpiles
    - Product stockpiles (mine)
    - Crushing, screening and ore processing hardstands
    - Process reject storage facilities
    - Workshop, warehouse and vehicle parking hardstands
    - Office hardstands
    - Accommodation
- Water storage dams and pipelines[1]
- Public road upgrades
- BLF
    - Berthing and loading facilities
    - Product stockpiles

[1] Requirements to be determined following further development of water sourcing strategy

  - Hardstand, roads and drainage
  - Dust suppression and control
  - Accommodation, power supply, water supply, workshop, refuelling, helipad and other supporting infrastructure.
- Barge transport route
- Transhipment mooring in Gulf of Carpentaria.

The overall direct disturbance footprint is estimated as follows:

• Mining areas:	
o Pits	300 ha
o Mine / Process Infrastructure	140 ha
o Road, Dams, Camp Infrastructure	360 ha
o Total footprint per mining area	800 ha
o Total footprint of all mining areas (Deposits C, W, X)	2,400 ha
• BLF:	
o Jetty, loading infrastructure, stockpiles, roads and camp	100 ha
• **TOTAL PROJECT DISTURBANCE FOOTPRINT (DIRECT)**	**2,500 ha**[2]

There will also be a marine disturbance footprint associated with the barge route and OGV transhipment site in the Gulf of Carpentaria, however, this is related solely to vessel movements and will not involve direct disturbance of the river bed or sea floor.

A reconnaissance depth survey undertaken on the Roper River (see Appendix C) indicates that the section of river between the BLF and the river mouth has a minimum water depth of 4 m, which is sufficient for the operation of shallow draft tugs and barges. Accordingly, NTIO is not proposing to conduct dredging activities along the barge route.

The main disturbance within the Roper River and near-shore marine environment will be associated with vessel movements. A mooring will be established in deep water approximately 40 km offshore at the transhipment site, which will involve some minor seabed disturbance to establish the mooring.

[2] Disturbance footprint (direct) = land clearing required for construction of facilities and mining operations. Excludes any land clearing required for upgrade of public roads

4.3 Mineral resource

Previous owners of the project tenements have reported the following Mineral Resource Estimate (in-situ), classified in accordance with the JORC Code 2004.[3,4]

Deposit	Measured	Indicated	Inferred	Total
A/B/C	Nil	Nil	320Mt 40.1% Fe	320Mt 40.1% Fe
W	Nil	33Mt 47.4% Fe	51Mt 45.5% Fe	84Mt 46.1% Fe
X	Nil	23Mt 49.2% Fe	Nil	23Mt 49.2% Fe
M	Nil	Nil	15Mt 44.0% Fe	15Mt 44.0% Fe
UY	Nil	Nil	46Mt 39.9% Fe	46Mt 39.9% Fe
Total		**56Mt 48.1%Fe**	**432Mt 40.9% Fe**	**488Mt 41.6% Fe**

In addition to these defined deposits, iron ore outcrop has been mapped over large areas of the project tenements. However, these occurrences have not been sufficiently well explored to enable additional Mineral Resource estimates to be prepared at this time.

The iron ore mineralisation generally occurs as continuous layers in a series of iron rich, but low grade bands of ferruginous ironstone typically between 2 m and 7 m thick (see Figure 4 and Figure 5 below). Within these bands, zones of higher grade DSO occur and these can be effectively separated from lower grade ore by utilising intensive grade control and selective mining techniques. Previous owners of the project tenements have reported a DSO Mineral Resource Estimate of 41.2Mt 57.8% Fe for Deposits A/B/C, W and X[5].

In addition to the production of DSO, preliminary metallurgical testing indicates that some of the lower grade ores can be upgraded to marketable quality by simple physical separation processes (sizing, gravity or magnetics) to produce a saleable iron ore concentrate. The target tonnage of combined DSO and concentrate to be produced from within the project titles is estimated to be 150 Mt to 300 Mt grading 56% Fe to 58% Fe.[6]

[3] The Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves ('the JORC Code') is a professional code of practice that sets minimum standards for Public Reporting of minerals Exploration Results, Mineral Resources and Ore Reserves prepared by the Joint Ore Reserves Committee of The Australasian Institute of Mining and Metallurgy, Australian Institute of Geoscientists and Minerals Council of Australia (JORC)

[4] Sherwin Iron Limited, 2011; ASX Announcement - 10 November 2011

[5] Sherwin Iron Limited, 2012; ASX Announcement – 21 September 2012

[6] The Target Tonnage states potential quantity and grade and is conceptual in nature. There has been insufficient exploration or metallurgical test work to define a Mineral Resource and it is uncertain if further exploration or test work will result in the determination of a Mineral Resource

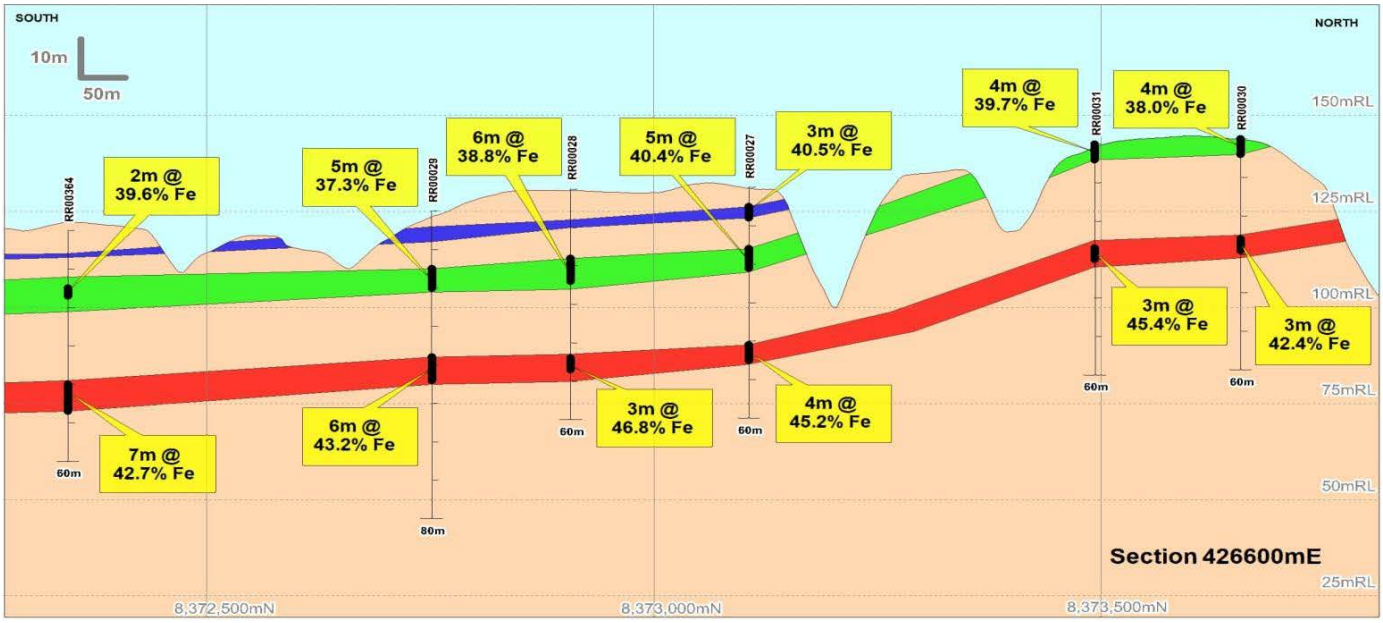


Figure 4. Typical Cross Section through Deposit C

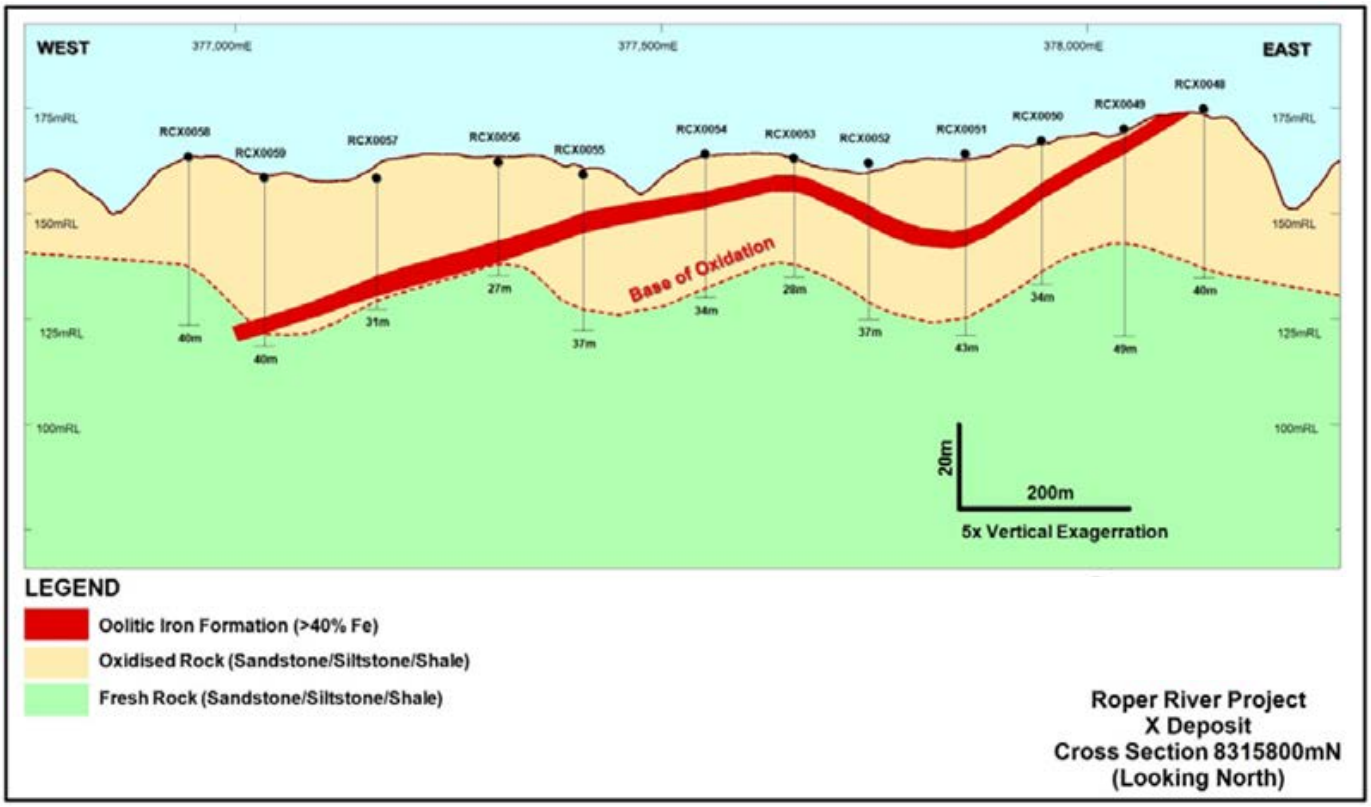


Figure 5. Typical Cross Section through Deposit X

4.4 Open pit mining

The project will employ conventional open cut mining techniques that will involve the following:

- clearing vegetation and removal of topsoil from areas to be disturbed
- construction of roads, hardstands and drainage structures
- loosening of overburden by drill and blast, or ripping
- removal of overburden by loader and truck to waste rock dumps
- selective mining of differing ore types (DSO and LGO) by excavator and truck to ore stockpiles
- reshaping and revegetation of disturbed areas to create stable, vegetated landforms.

Multiple mining areas will be developed over time with Deposit C, where a trial pit has previously been mined, likely to be the initial mining area. In each mining area, mining will generally progress down-dip from areas of thinner overburden to areas of thicker overburden.

The ultimate mining depth reached will be determined by economics in each area, but is likely to be less than 30 m to 50 m below original ground surface. Conceptual mine plans and layouts have been developed for Deposits C, W and X (refer Figures 6, 7 and 8).

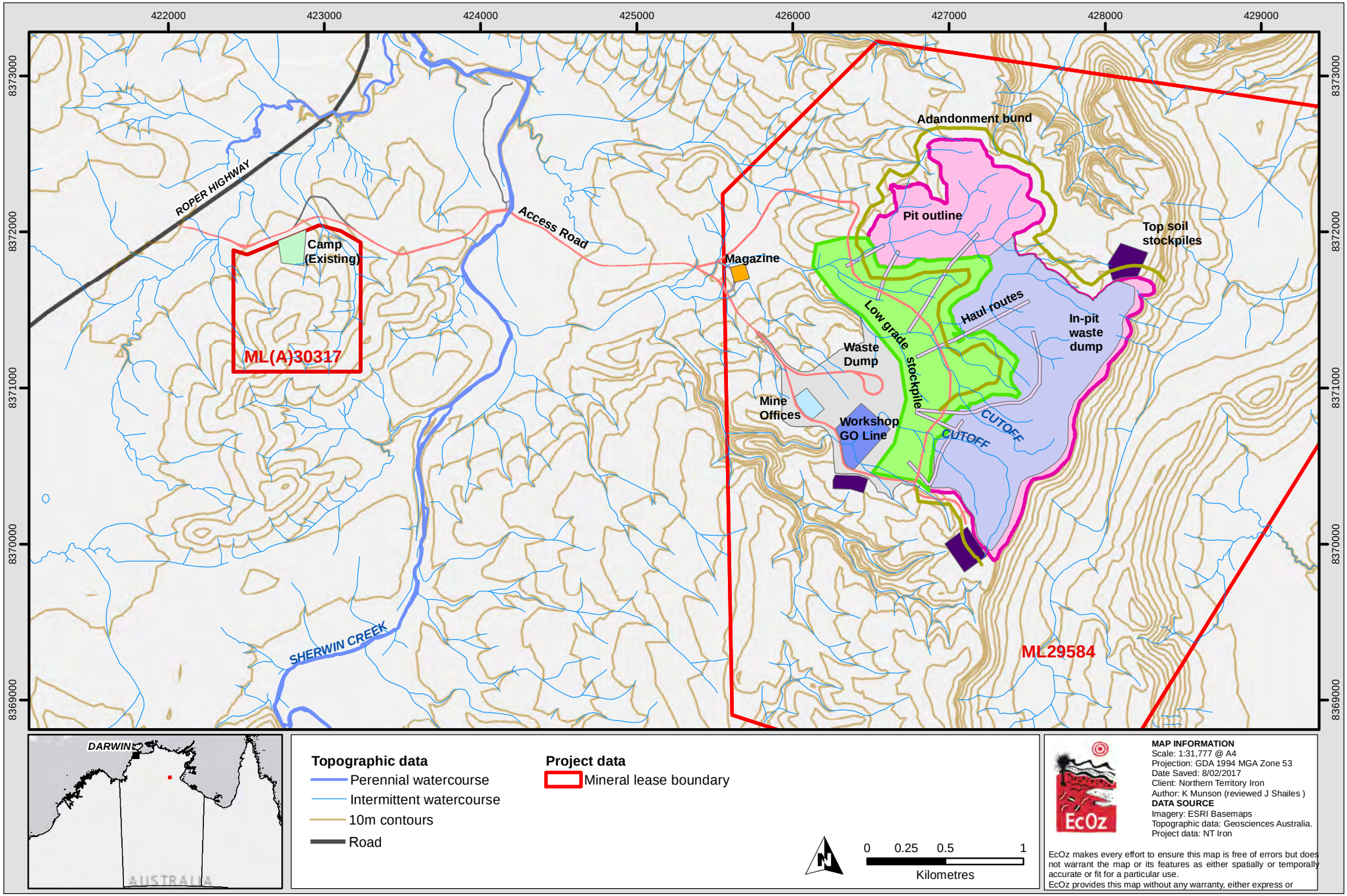
Detailed planning and design of all mining areas will be undertaken as part of Feasibility Studies, which will refine the mining methods, mine designs, mining equipment and infrastructure layouts within each mining area. A conceptual mining sequence is provided in Figure 9.

A characteristic of the project is that as mining progresses, there will be an opportunity to place a substantial proportion of overburden into adjacent mined out areas. This approach will reduce the area required for waste rock dumps. Figure 9 presents a conceptual layout of the Deposit C mining area illustrating the proposed approach to mining .

It is also noteworthy that previous assessments of the acid mine drainage (AMD) and metal leaching potential of waste rock and ore have concluded that at Deposit C (GHD 2015a):

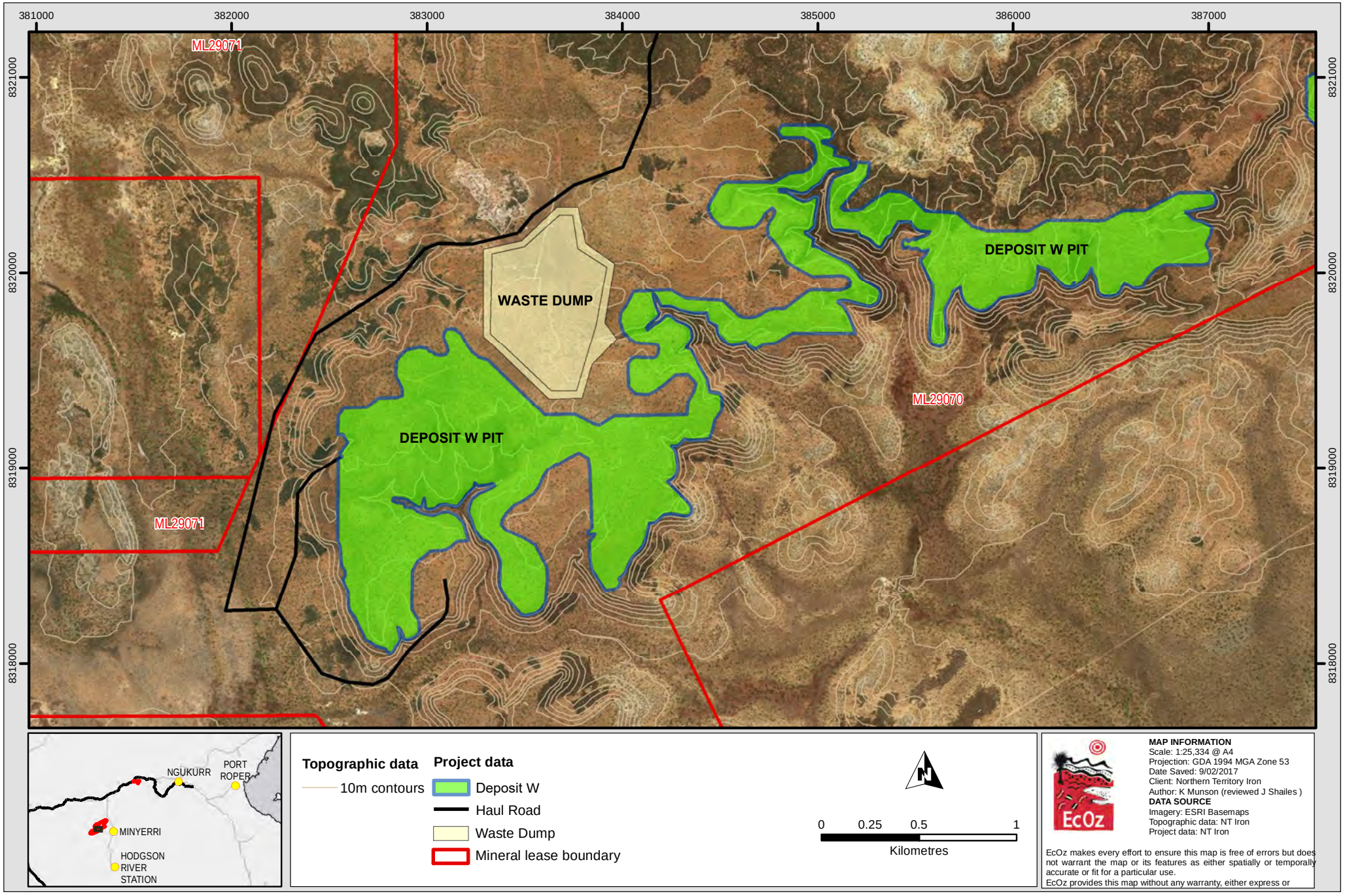
"Based on the geology, geochemistry and overall environment, the primary risk of environmental damage from AMD is deemed moderate. With the inclusion of the nominated mining and waste management process set out in the mine management plan and this document, the key component of which is on-going assessment and in-pit encapsulation of any PAF material, the residual risk is deemed to be low."

Similar assessments will be required, and carried out, for Deposits W and X.



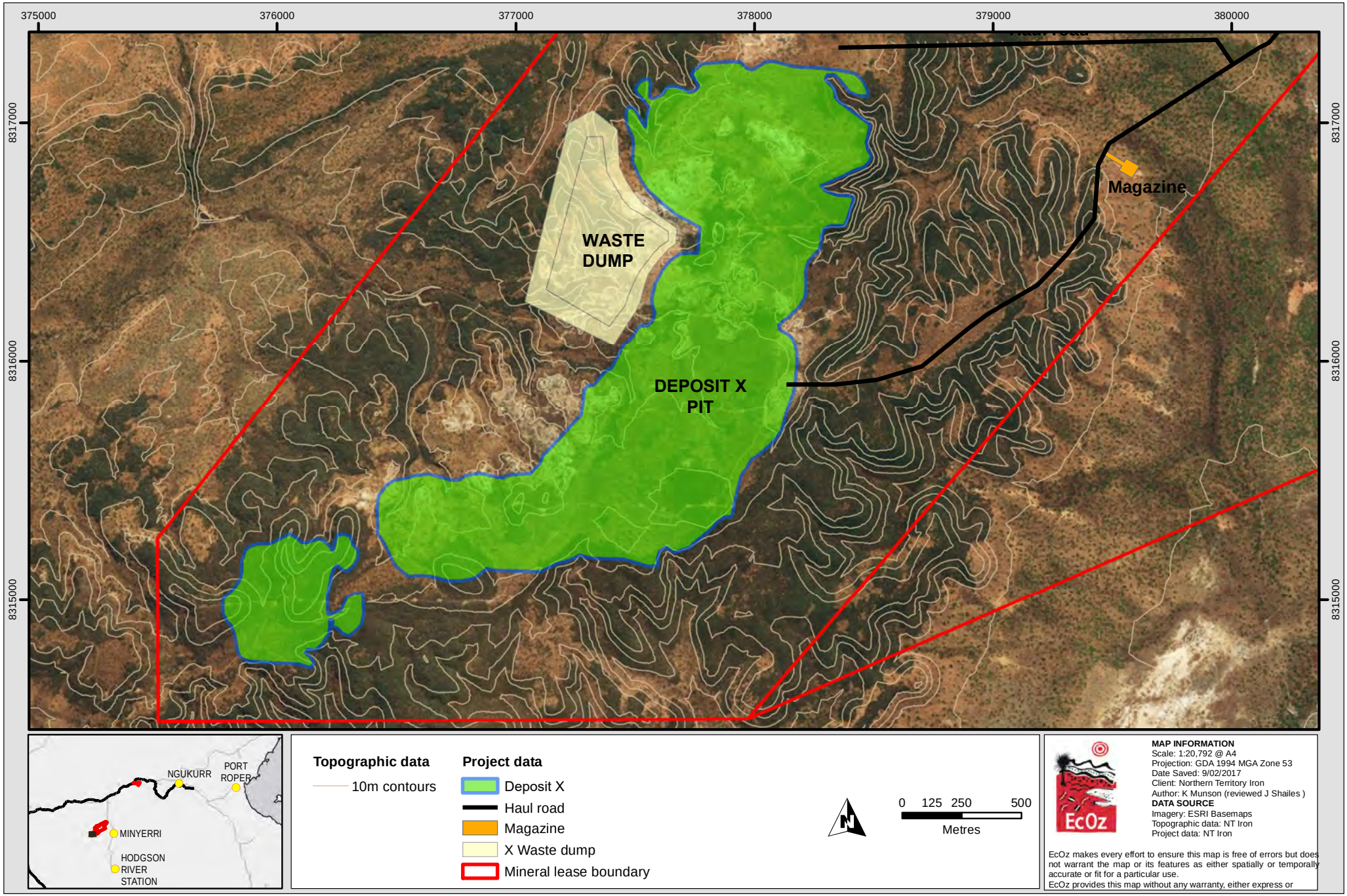
Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\Nt Iron Ore\EZ16141\01 Project Files\Figure 6. Deposit C conceptual layout.mxd

Figure 6. Deposit C conceptual layout



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\Nt Iron Ore\EZ16141\01 Project Files\Figure 7. Deposit W conceptual layout.mxd

Figure 7. Deposit W conceptual layout



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\Nt Iron Ore\EZ16141\01 Project Files\Figure8. Deposit X conceptual layout.mxd

Figure 8. Deposit X conceptual layout

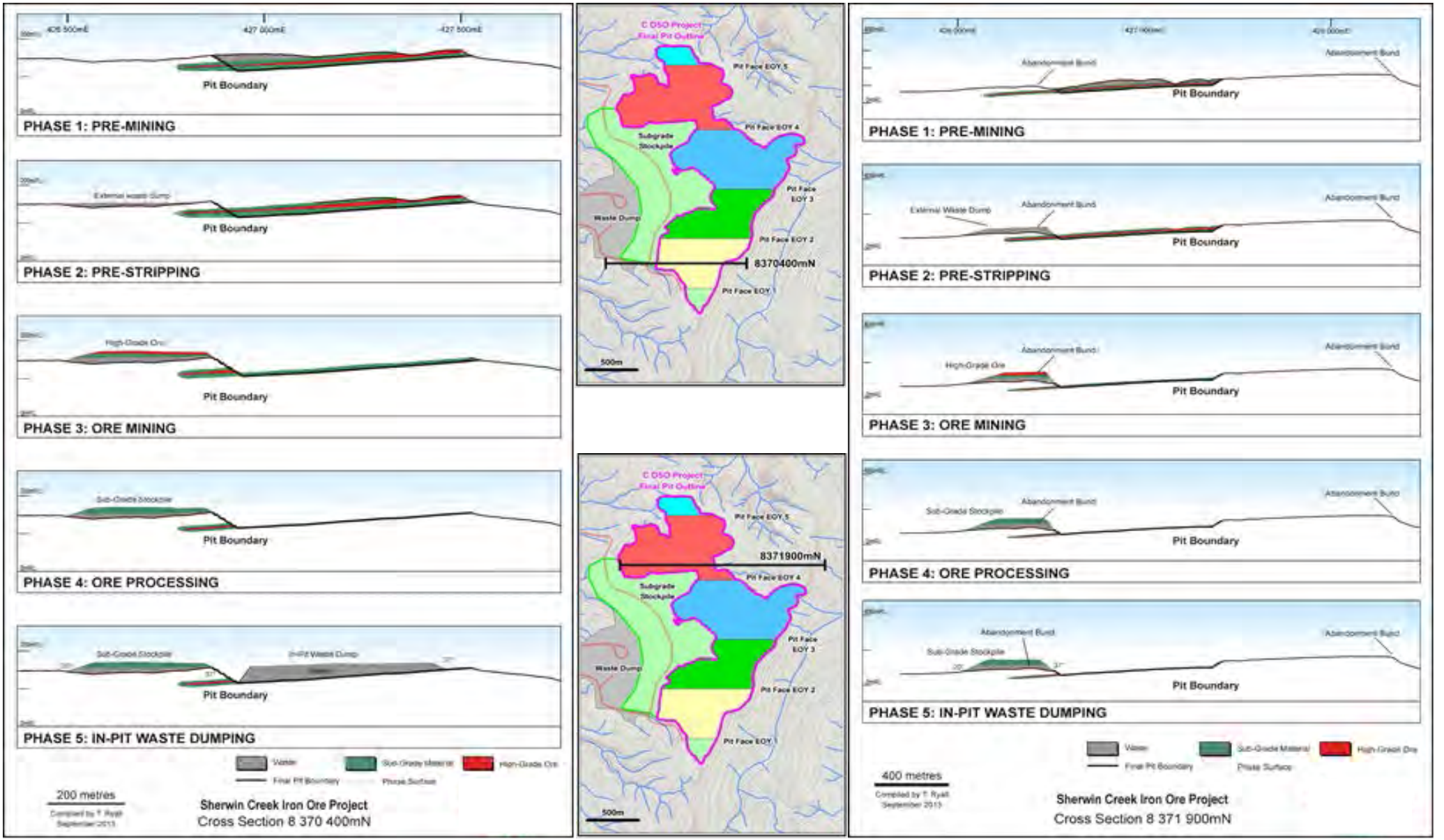


Figure 9. Conceptual mining sequence

4.5 Ore processing

Ore will be processed using conventional crushing and screening equipment to produce a granular product. DSO will be crushed, screened and blended to produce a granular product to suit customer requirements, which is typically up to 10 mm for up to 90 % of a cargo. Lower grade crushed and screened ore will be fed into a beneficiation plant to produce a saleable iron ore concentrate that will be mixed with DSO or sold separately to suit customer requirements.

Test work indicates that the ore is soft and friable with favourable crushing and screening characteristics. Therefore, the ore will be crushed utilising semi-mobile crushing and screening equipment located on hardstands adjacent to active mining areas. The equipment will be relocated from time to time to 'follow' the active mining areas.

The type and quality of ore will be determined before it is mined and on exiting the pit. Ore trucks will dump ore either directly into the crushing and screening plant or into DSO stockpiles. Stockpiles will be fed into the crushing and screening plant using front-end loaders on an 'as required' basis.

Testing of low grade ore mined from the trial pit at Deposit C indicates that acceptable quality concentrate can be produced from crushed low grade ore by simple wet scrubbing and screening. The iron ore concentrate (typically <0.5 to 1.0 mm) will be filtered to recover water for re-use in processing and to reduce the moisture content of the product. The coarse reject (typically >0.5 to 1.0 mm) will be dewatered and stored in each mined out area, with water recovered also re-used in processing.

The coarse reject is derived from ferruginous ironstone material classified as "mineralised waste" in previous studies (GHD 2015b). The rejects are expected to be free draining, geo-chemically benign and non-acid-forming, enabling the material to be safely stored in mined out areas.

4.6 Product transport and stockpiling

Access to the mining areas for personnel, equipment, consumables and supplies will be by private road connections from the Roper Highway (for Deposit C) and the Hodgson River Road (for Deposits W and X). Product will be transported to the BLF via the Roper Highway, Nathan River Road and Port Roper Road. Deposit C is located on the Roper Highway. Product from deposits X and W will be hauled to the Roper Highway via the Hodgson Downs Road.

Public roads are proposed to be upgraded to a suitable standard for use by the project after consultation and agreement with the Department of Infrastructure, Planning and Logistics (DIPL). Upgrades may include widening and sealing sections of the haulage route, and works to improve wet season access conditions. Borrow pits will be required at regular intervals of approximately 10 km to 20 km along the public roads to provide suitable road construction material.

The distance by road from the initial mining area at Deposit C to the BLF is 165 km. From Deposits W and X, the distance would involve an additional 75 km of haulage along the Hodgson Downs Road. This represents the shortest land transport distance (and is likely to be the lowest cost) of all of the product logistics solutions available to the project.

Haulage trucks using public roads will be designed to maximise payload within the constraints of applicable licensing requirements. They are anticipated to be road trains up to 53.5 m long with net payloads in excess of 100 tonnes. Product would be delivered in road trains and stockpiled at the BLF.

4.7 Barge loading and transhipment

A BLF will be constructed on NT Portion 1184. Facilities to be developed at the site will comprise:

- Berthing piles driven into the river bed adjacent to the riverbank
- A barge loading conveyor
- Hardstand, roads and drainage
- Product stockpile areas
- Dust suppression and control
- Accommodation, power supply, water supply, workshop, refuelling, helipad and other supporting infrastructure.

It is proposed to utilise a fleet of 5,000 to 8,000 deadweight tonne (DWT) towed or pushed shallow draft barges to transport product out to an OGV moored approximately 40 km offshore in the Gulf of Carpentaria. The loading and transhipment process is summarised as follows:

- Barges moor alongside the berthing piles.
- Stockpiles are reclaimed and fed onto the barge loading conveyor.
- Barges are winched along the berth as loading takes place.
- Barges are towed to sea in strings of two to three using ocean-going shallow draft tugs
- On arrival at the transhipping location, grabs on-board the transhipper unload the barges and transfer the ore via conveyors to a shiploader, then into a 75,000-150,000 tonne OGV moored on the opposite side of the transhipper.
- Empty barges are towed back to the barge loading facilities and the cycle recommenced.
- When not in use, the tugs and barges will be moored to cyclone-rated mooring piles inside the Roper River. The moorings will be clear of other river traffic.

A preliminary water depth survey (Appendix C) indicates there is a minimum 3-4 metres water depth available between the proposed BLF and transhipment site. This depth will be navigable by the tugs and barges without any requirement for dredging.

The number of barge trips that will be required on a daily basis between the BLF and the offshore transhipment site will be variable and dependent on a range of factors, including the rate of production, the barge capacity, the number of barges in each string and the time it takes to transhipment the product. Further feasibility studies will refine the detail in relation to this component of the project.

4.8 Supporting infrastructure and services

Previous exploration and bulk sampling activities have established some basic infrastructure and services, which includes the following located near to the proposed Deposit C mining area:

- Access road between the bulk sample pit site and Roper Highway
- Bulk sample pit, stockpiles, and associated site roads
- Drainage dams and structures necessary to manage erosion and sediment control
- Hardstand area for site office, ROM stockpiles, workshops, magazines etc.

- 64 room accommodation facility, including roads, car parks, power, water, waste water treatment, first aid and communications facilities.
- Various access tracks to drill pads and other sample collection points (generally to dry season 4x4 access standards only).

These facilities will continue to be utilised for project development; however, additional infrastructure and services will also be required as summarised below.

4.8.1 Accommodation village

Accommodation villages will be required to house both the construction and the operational workforces. The initial construction and operational village requirements of ± 150 persons will be met by expanding the existing 64-person accommodation facility at Deposit C. Additional facilities of a similar scale will be required at Deposits W and X when they are developed, and smaller scale facilities to house 20 – 50 persons will be required at the BLF.

4.8.2 Power supply

There is no electrical power generation or transmission infrastructure, within reasonable distance of the site, that is capable of providing an economic power supply for the project.

It is proposed to meet electrical power needs by installing multiple diesel generators at various demand locations across the project area. Diesel fuel for the generators will be appropriately stored and distributed in accordance with relevant Australian Standards.

4.8.3 Wastewater treatment

On-site Wastewater Treatment Plants will be installed for treating sewage and greywater produced at the accommodation village, mine administration area, mine workshop areas and the BLF. Wastewater treatment and disposal systems will be designed and operated in accordance with Department of Health (DoH) and other relevant regulatory requirements.

4.8.4 Communications

Data and voice communication links will be established throughout the project area and these will include:

- Satellite voice and data links at accommodation, office and workshop areas
- Two-way radio networks in mine production areas
- Satellite mobile phones in remote exploration areas.

4.8.5 Laboratory

Laboratory facilities will be required to determine various chemical and physical properties of ore, rock and water samples collected during project operations. Some or all of these services may be provided by third-party offsite laboratories, with on-site facilities limited to basic sample preparation only.

4.8.6 Workshops and maintenance

Workshops and maintenance areas will be required at various locations across the project area. Facilities will generally consist of hardstands (± concrete floor) with sea-tainers connected by shade structures as walls/offices/workspaces.

Washdown facilities (where required) will be designed and constructed to minimise water use and to capture and treat contaminated wastewater.

Workshop areas will have designated areas for storage of hazardous wastes. Storage will be in accordance with relevant Australian Standards including appropriate bunding and segregation of materials as required.

4.8.7 Explosives storage

Dedicated magazine facilities will be required at each mining area. Storage, handling and use of explosives will be in accordance with the NT *Dangerous Goods Act*.

4.8.8 Storage and handling of hazardous substances

The only hazardous wastes generated will be from maintenance activities on mobile and mining equipment, comprising waste oil and filters. All chemicals and hazardous materials will be stored and handled in accordance with Australian Standards (AS1940) to prevent hazards and contamination of land and water resources.

4.8.9 Waste management

Because of the project's remote location, an on-site landfill will be required for domestic and putrescibles waste generated at the accommodation village, the mining / processing support facilities and the barge loading facilities. The landfill will be located in an approved area that will minimise impact to the surrounding environment.

Waste suitable for recycling will be managed by a licensed contractor and removed from site for recycling in an approved facility.

Oil waste and any other hazardous wastes produced will be managed by a licensed contractor and removed from site for disposal at an approved facility.

4.9 Water demand and sources

It is estimated that at peak production the project will require up to 2,000 ML of water per year. This is a conservative upper limit to produce 6 Mtpa of Iron Ore Concentrate, and is subject to further refinement through the design phase.

Identified uses include:

- Potable water
  - Likely to require reverse osmosis treatment and purification of local raw water supply.
- Fresh (non-potable) water
  - Domestic
  - Wash-down
  - Firefighting.
- Dust suppression
  - Earthworks and mining
  - Ore processing
  - Product handling and transport.
- Ore processing.

NTIO is proposing that water will be supplied to the project by harvesting and/or extracting surface water flows and pit water. This water supply may be augmented with recycled water from processing activities. The following options will be subject to further investigation:

- Construction of a dam/dams to harvest and store wet season flows
- Extraction from an approved location on the Roper River and pumping to the mine site
- Pit water harvesting
- Recycling water from the dewatering of concentrate and rejects, and other wastewater streams.

Subject to further assessment of sustainable yields, water quality and engagement with DENR, the project water requirements are expected to be supplied by one, or a combination of, the above options.

4.10 Expected water discharge requirements

Water recovered from ore processing activities will be recycled and reused onsite where possible, with no requirement for off-site discharge. Groundwater studies undertaken around Deposit C indicate that groundwater is not anticipated to be encountered within the pit.

The mining sequence that will be employed will allow for the base of the pit to be inundated during the wet season while mining continues in higher areas above the water line. Mining in lower areas will occur during the dry season.

The in-pit catchment water is proposed to be used as part of the project water supply, with no requirement for off-site discharge. The mined pit voids will also be used to maximum advantage, containing the entire mineralised waste stockpile, a large proportion of the overburden / waste rock, together with an in-pit catchment system and sump to prevent discharge of potentially contaminated runoff to land and watercourses.

Further hydro-geological and site water balance assessments will be required to inform the project water management requirements. If this work indicates that off-lease discharge is required, relevant information will be documented through the environmental assessment process, and a WDL will be sought under the *Water Act*.

4.10.1 Type and volume of contaminants

In-pit water and processing wastewater is not expected to be contaminated. Mined materials from Deposit C (as part of the bulk sample project by Sherwin Iron) were subjected to extensive geochemical testing including total sulphur, calcium, magnesium and various other metals and metalloids with potential for environmental risk (GHD 2015). No statistically significant potentially acid forming material (PAF) was identified within the pit shell. A few samples had a weekly positive NAPP (net acid producing potential) but neutral pH, likely indicating the presence on non-acid producing sulphur (sulfate) (GHD 2015).

Analysis of mined materials from Deposits W and X will be carried out to determine environmental risk of contaminants from those deposits.

4.11 Air emissions

4.11.1 Dust

A wide range of mining activities will generate dust, including:

- removal of vegetation and topsoil
- removal of overburden material
- blasting and drilling operations

- operation of crushing and screening equipment
- loading and unloading of material on-site and subsequent transport off-site
- transport by vehicles on access roads and haul roads
- wind action affecting stockpiles and exposed areas of the site
- combustion of materials such as diesel.

The amount of dust generated will be significantly influenced by climatic factors such as rainfall, temperature, and winds, and because different mining activities generate different amounts of dust. An appropriate Dust Management Plan will be developed and implemented during operations to achieve acceptable discharge levels.

4.11.2 Greenhouse gasses

Operation of generators, vehicles, equipment and plant will produce exhaust emissions. There will also be Greenhouse Gas emissions associated with land clearing. Emissions calculations will be undertaken as required for the environmental assessment and approvals process.

4.12 Rehabilitation

A substantial proportion of overburden will be progressively placed into adjacent mined out areas. This approach will reduce the area required for waste rock dumps.

On completion of the mining activities rehabilitation will involve the reshaping and re-contouring of waste rock dumps and re-establishment of native vegetation and drainage structures.

The fate of infrastructure will be determined in consultation with stakeholders. All surplus infrastructure will be removed or left safe and secure post decommissioning.

4.13 Alternatives

Not proceeding with this project will result in the following:

- Rehabilitation of the existing pit
- The remaining deposits would be left undeveloped
- Loss of economic benefit
- Loss of estimated payroll tax and mineral royalties over the life of the project to the Northern Territory Government, and the loss of company tax to the Federal Government
- Potential financial benefits and training for the local community would not be realised.

The project economics are favourable to NTIO. There are no critical areas of risk identified within the areas to be mined, from either environmental or heritage perspective, that would necessitate the project not proceeding. Relevant negotiations and approvals from the various stakeholders and government authorities will be sought by NTIO so that the project can proceed in a manner that minimises impacts and maximises opportunities.

An economic impact assessment will be commissioned to quantify the lost opportunity should the project not be developed.

4.13.1 Alternative transport options

The site's proximity to the Gulf of Carpentaria means that truck haulage of ore to a purpose built BLF near the mouth of the Roper River, and transport of ore by barges to OGV moored 40 km offshore (in deep water), is the most economically viable option.

Alternative options considered for transportation of mined DSO product to export customers include:

- By road train to a rail siding, and then along rail to Port of Darwin
- By road train to the Port of Darwin.

The railway between Adelaide and Darwin runs roughly parallel to the Stuart Highway. Additional capital would be required for the purchase or lease of rolling stock, as well as unloading facilities in Darwin. Pursuing this option would cause significant delay to commencement of the project, with uncertain timeframes for regulatory approval and the lead time for rolling stock and rail spur construction.

The option to use road trains to take the ore along the Stuart Highway to the Port of Darwin would require a relatively shorter timeframe and less capital to set up. However, it would require the upgrading and sealing of Roper Highway, to allow higher volumes of ore to be transported out of the mine, to be stockpiled at Mataranka for subsequent re-handling and further transport to the Port of Darwin via road trains.

4.13.2 Alternative water sources

Potential water source alternatives for the project include:

- Surface water
  - Collected in dams constructed as part of the project
  - Harvested in-pit
  - Extracted from rivers.
- Ground water
  - Extracted from bore-fields
  - Collected from pit dewatering.
- Recycled water
  - Recovered from process rejects
  - Recovered from process concentrates
  - Treated wastewater streams.

NTIO will focus its water sourcing investigations on a combination of surface water harvesting/extraction, pit water harvesting and recycled water. Further detail in relation to the project water requirements is provided in Section 4.9.

Groundwater extracted from bore fields is not expected to provide a reliable or sustainable source of water for the project as groundwater bores in the area are low yielding. The previous tenement holder proposed to source all water from groundwater bores and identified a conceptual target of a single aquifer within the Bessie Creek Sandstone formation, located within 25 km of Deposit C. This alternative would require multiple bores to supply a proposed pipeline to the mine site, and pumping of water over a long distance.

In the event that surface water investigations fail to prove a sustainable water supply for the project, then the alternative of augmenting with groundwater may be further explored.

NTIO acknowledges that the previous environmental approvals process for Deposit C concluded that the water limitations for the site were unresolved. The NT EPA reported that it was satisfied that "*if appropriate action is taken to identify appropriate sustainable water sources, and regulatory oversight is adequate prior to authorisation, that any impacts can be managed to an acceptable level (refer NTEPA Assessment Report 75,*

page 30)." NTIO notes this recommendation and is committed to undertaking the assessments necessary to identify a reliable and sustainable water supply for the project.

5 Existing Environment

This section provides an overview of the aspects of the existing environment that are relevant to assessing the potential direct and indirect impacts of the project activities.

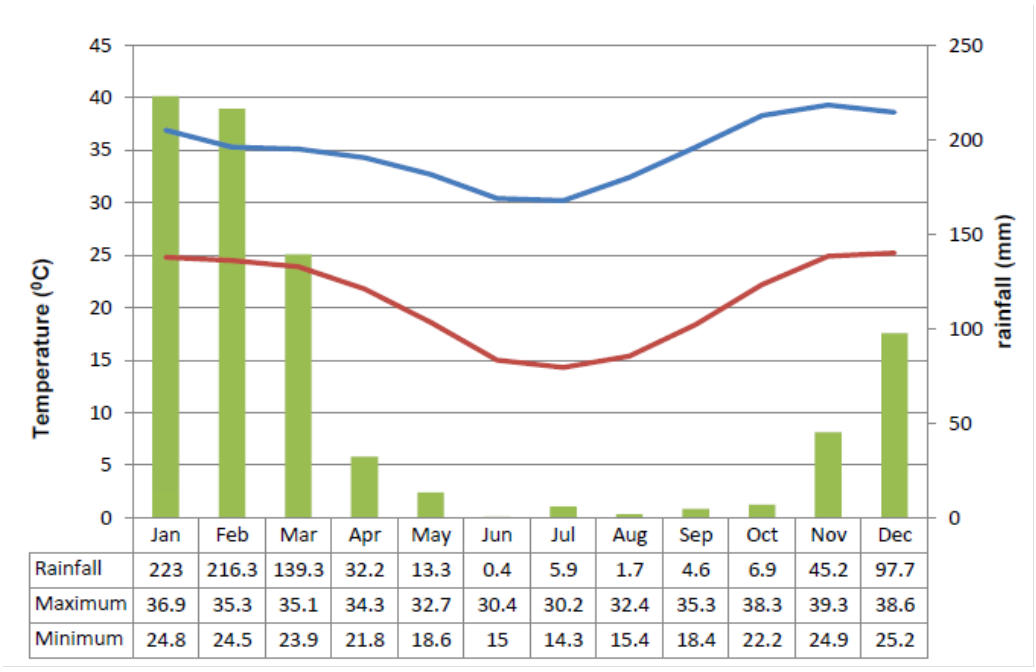
5.1 Climate

The Roper River region experiences two distinct seasons; an almost dry rainless season from May to September and a wet season from November to March (BoM 2017a). Rainfall is concentrated during the wet season, with negligible rain during May to October. The wettest months are January and February with an average of 223 and 216 mm rain respectively. Temperatures range from an average maximum of 39.3°C in November, to average minimum temperatures of 14.3°C in July.

Figure 10 below summarises rainfall and temperature data collected from 1976 to 1995 from the Roper Bar Store weather station, which is located approximately 20 km east of the project area (BoM 2017a).

The average yearly evaporation greatly exceeds the average rainfall, which is typical for northern Australia. Evaporation exceeds rainfall for nine months of the year at Mataranka and peaks at the start of the build-up season (October and November) (Kraatz 2004).

The variability of rainfall in the region and high evaporation rates for much of the year have implications for water sourcing. The project water sourcing strategy and water balance calculations will need to factor in local climatic variables. In addition, project water management and infrastructure planning and design will need to account for wet season conditions and flooding.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall	223	216.3	139.3	32.2	13.3	0.4	5.9	1.7	4.6	6.9	45.2	97.7
Maximum	36.9	35.3	35.1	34.3	32.7	30.4	30.2	32.4	35.3	38.3	39.3	38.6
Minimum	24.8	24.5	23.9	21.8	18.6	15	14.3	15.4	18.4	22.2	24.9	25.2

Figure 10. Climate data from Roper Bar weather station

The project occurs within areas subject to tropical cyclones. Typically, the cyclone period occurs from November to April. BoM cyclone tracking indicates that there have been numerous tropical cyclones across the region in the period of 1970-2004. BoM predicts that the project may be exposed to between 0.1 and 0.2 tropical cyclones per year, using information gathered over a 36-year period (BoM 2017b).

Meteorological monitoring at Larrimah indicates that the highest daily recorded rainfall was 408.6mm (22/01/1987). During the wet season it is common for many roads in the Roper Region to close due to flooding; however, most areas become accessible again from mid-April.

5.2 Air quality

There are no air quality monitoring stations near the project area. The background air quality is expected to be good due to the absence of significant settlement, development or activity in the region.

Air quality will be adversely impacted by emissions associated with bushfires during the dry season. Other air emissions include dust produced from vehicles travelling along the unsealed sections of the Roper Highway and other roads. Emissions of particulates from bushfires and dust are greatest during the dry season months due to the dry and windy conditions.

Wind speed and dominant direction plays an important role in the dispersion of dust particles. On average, throughout the course of a year, wind direction in the region is predominantly south-east in the morning and easterly in the afternoon (BoM 2017a). Mean monthly wind speed at Roper Bar Store ranges from 3.5 km/h (during March at 9 am) to 11.4 km/h (during September at 3 pm). The prevailing dry season winds would disperse dust and any other emissions in a northerly and westerly direction from the Project area. Dust emissions are not expected to be significant in the wet season.

5.3 Topography

Land systems that characterise the project area are documented below in Table 5-1 and Figure 11 (Deposit C and accommodation camp), Table 5-2 and Figure 12 (Deposits W and X) and Table 5-3 and Figure 13 (BLF).

The centre of Deposit C is dominated by the Munyi land system, with the eastern portion mapped as the Cliffdale land system and western parts of the deposit identified as Patterson land system. Munyi is sandstone low hills on sandstone and siltstone with outcrops and shallow stony soils. Cliffdale is a mix of basalt, agglomerate and tuff with some dolerite. It has rocky outcrops with surface stone and pockets of clayey soils. Both Munyi and Cliffdale have a high risk of erosion due to moderate to steep slopes and gently inclined slopes with erodible soils. The Patterson land system commonly has shallow soils with surface stone and rock outcrop. There is a moderate risk of erosion due to gently inclined slopes or level areas with erodible soils.

The southern portion of Deposit W is identified as the Emmerugga land system, with the Favenc land system covering the northern portion of the deposit. Emmerugga is identified as sandstone plains and rises with shallow soils with a surface of stone and rock outcrop. Favenc is hills mostly on sandstone and siltstone with outcrops of shallow stony soils. Both Emmerygga and Favenc have a high risk of erosion due to moderate to steep slopes and gently inclined slopes with erodible soils.

Deposit X is mostly covered by Lancewood land system, which is characterised by lateritic plateaux, scarps and some rises on deeply weathered sediments; shallow soils with rock outcrop. It has a high risk of erosion due to moderate to steep slopes and gently inclined slopes with erodible soils

Between Deposits W and X, where ore processing facilities may be located, is the Patterson land system, characterised by sandstone plains and rises mostly on sandstone and siltstone. There is a moderate risk of erosion in this area.

The proposed BLF site is within the Littoral land system, which is described as coastal mudflats and coastal floodplains with channels and estuaries; subject to tidal inundation. This land system has poorly drained clays and muds and a high risk of erosion associated with flooding.

Table 5-1. Land systems for ML29584 (Deposit C) and ML30317 (Camp)

LAND SYSTEM	MAPUNIT	CLASS	DESCRIPTION	EROSION RISK	DRAINAGE	ACID SULPHATE SOILS (ASS) RISK
Coolibah	Tac	alluvial floodplains	alluvial floodplains, swamps and drainage depressions; seasonally inundated; sandy, silty and clay soils on Quaternary alluvium	high risk - flooding	poor	No occurrence
Cliffdale	Ibc	basalt hills	low hills and hills on basalt, agglomerate and tuff, some dolerite; mostly rock rock outcrop with surface stone and pockets of clayey soils	high risk - moderate to steep slopes and gently inclined slopes with erodible soils		No occurrence
Patterson	Alp	sandstone plains and rises	plains and rises mostly on sandstone and siltstone; commonly shallow soils with surface stone and rock outcrop	moderate risk - gently inclined slopes or level areas with erodible soils		No occurrence
Munyi	Asm	sandstone hills	low hills and hills mostly on sandstone and siltstone; outcrop with shallow stony soils	high risk - moderate to steep slopes and gently inclined slopes with erodible soils		No occurrence
Bukalara	Asb	rugged quartz sandstone plateaux and hills	steep rocky plateaux and hills on quartz sandstone and sandstone; shallow sandy soils and rock outcrop	high risk - moderate to steep slopes and gently inclined slopes with erodible soils		No occurrence

Table 5-2. Land systems for ML29437, ML29071, and ML29070 (Deposits W and X)

LAND SYSTEM	MAPUNIT	CLASS	DESCRIPTION	EROSION RISK	DRAINAGE	ASS RISK
Bukalara	Asb	rugged quartz sandstone plateaux and hills	steep rocky plateaux and hills on quartz sandstone and sandstone; shallow sandy soils and rock outcrop	high risk - moderate to steep slopes and gently inclined slopes with erodible soils		No occurrence
Emmerugga	Rle	sandstone plains and rises	plains and rises mostly on sandstone and siltstone; commonly shallow soils with surface stone and rock outcrop	high risk - moderate to steep slopes and gently inclined slopes with erodible soils		No occurrence
Favenc	Rsf	sandstone hills	low hills and hills mostly on sandstone and siltstone; outcrop with shallow stony soils	high risk - moderate to steep slopes and gently inclined slopes with erodible soils		No occurrence
Lancewood 2		lateritic plateaux	plateaux, scarps and some rises on deeply weathered sediments; shallow soils with rock outcrop	high risk - moderate to steep slopes and gently inclined slopes with erodible soils		No occurrence
Langdon	Tcl	lateritic plains	plains and rises associated with deeply weathered profiles (laterite) including sand sheets and other depositional products; sandy and earth soils	moderate risk - gently inclined slopes or level areas with erodible soils		No occurrence
McArthur	Tam	alluvial floodplains	alluvial floodplains, swamps and drainage depressions; seasonally inundated; sandy, silty and clay soils on Quaternary alluvium	high risk - flooding	poor	No occurrence
Patterson	Alp	sandstone plains and rises	plains and rises mostly on sandstone and siltstone; commonly shallow soils with surface stone and rock outcrop	moderate risk - gently inclined slopes or level areas with erodible soils		No occurrence
Seigal	Als	sandstone plains and rises	plains and rises mostly on sandstone and siltstone; commonly shallow soils with surface stone and rock outcrop	moderate risk - gently inclined slopes or level areas with erodible soils		No occurrence
Surprise	Tas	alluvial floodplains	alluvial floodplains, swamps and drainage depressions; seasonally inundated; sandy, silty and clay soils on Quaternary alluvium	moderate risk - flooding	poor	No occurrence

Table 5-3. Land systems for the BLF

LAND SYSTEM	MAPUNIT	CLASS	DESCRIPTION	EROSION RISK	DRAINAGE	ASS RISK
Fletcher	Lwf	lateritic plains	plains and rises associated with deeply weathered profiles (laterite) including sand sheets and other depositional products; sandy and earth soils	moderate risk - gently inclined slopes or level areas with erodible soils		No occurrence
Littoral 2	Tol	tidal flats	tidal mudflats and coastal floodplains with channels and estuaries; subject to tidal inundation; poorly drained clays and muds	high risk - flooding	very poor	Common on tidal flats, coastal floodplains and coastal sandplains and dunefields
Spillen	Tos	coastal dunes	coastal parabolic dunefields, sandplains, beach ridges and beaches; sandy soils	moderate risk - wind		Common on tidal flats, coastal floodplains and coastal sandplains and dunefields

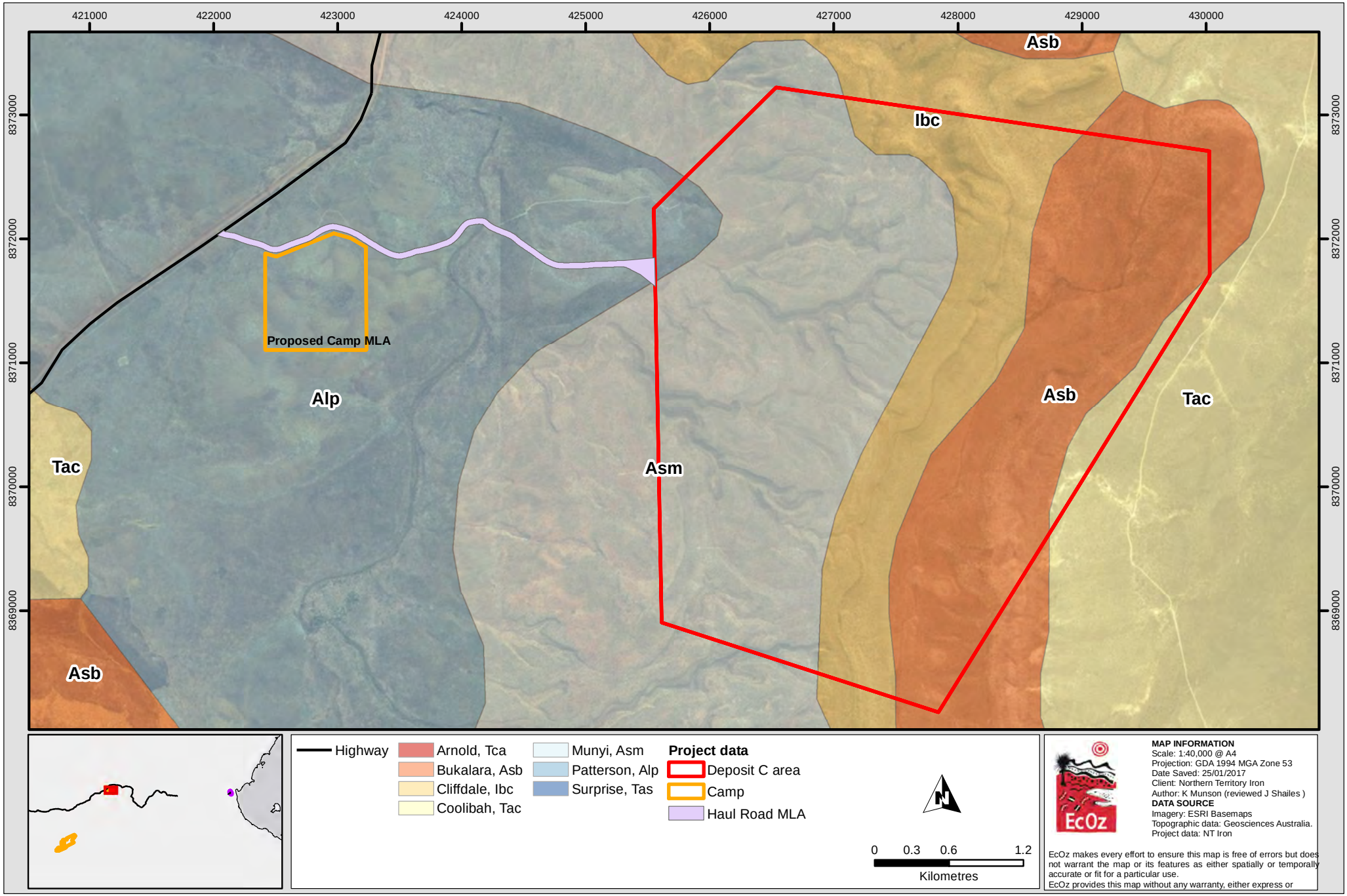


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Figure 11. Landsystem mapping for Deposit C

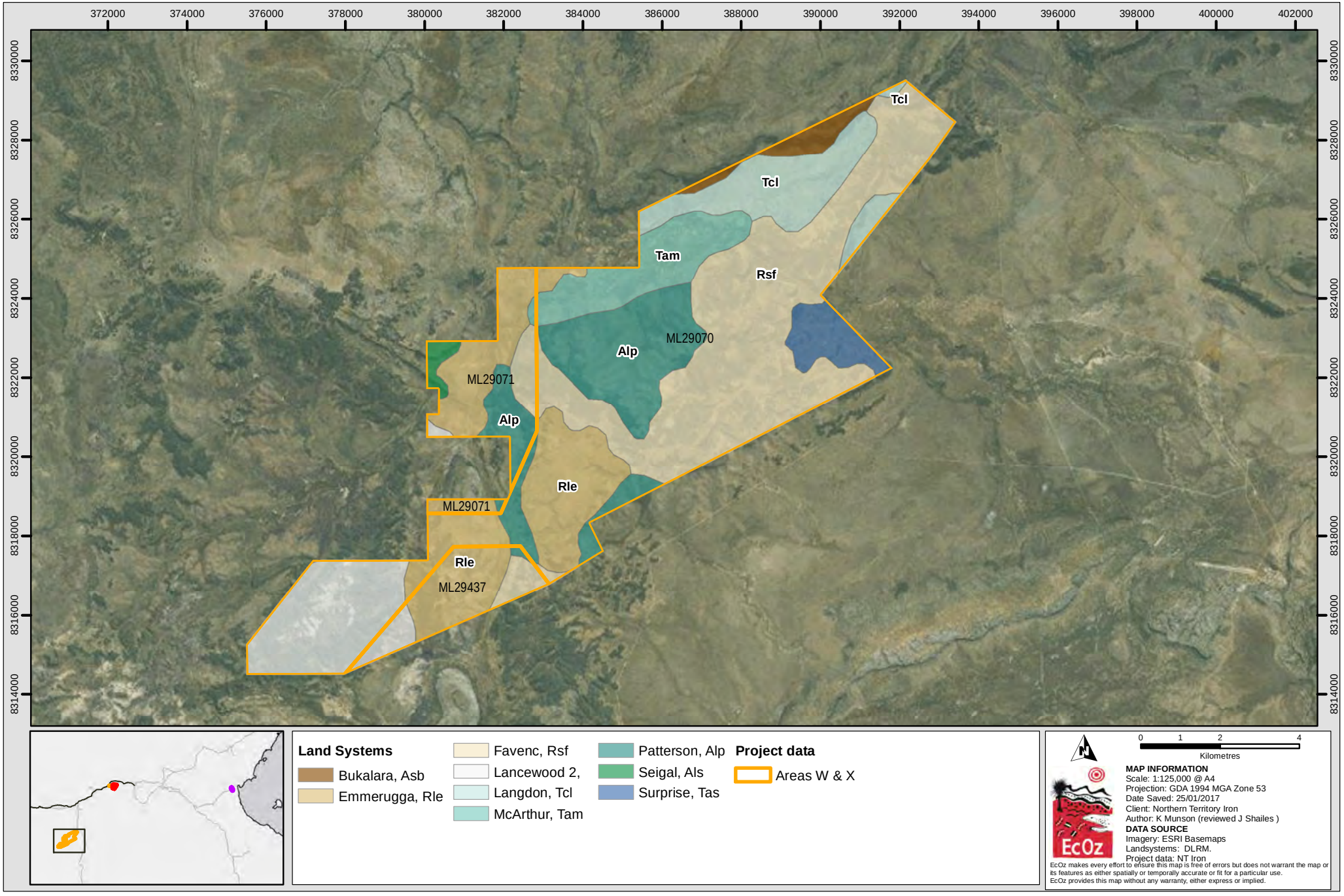

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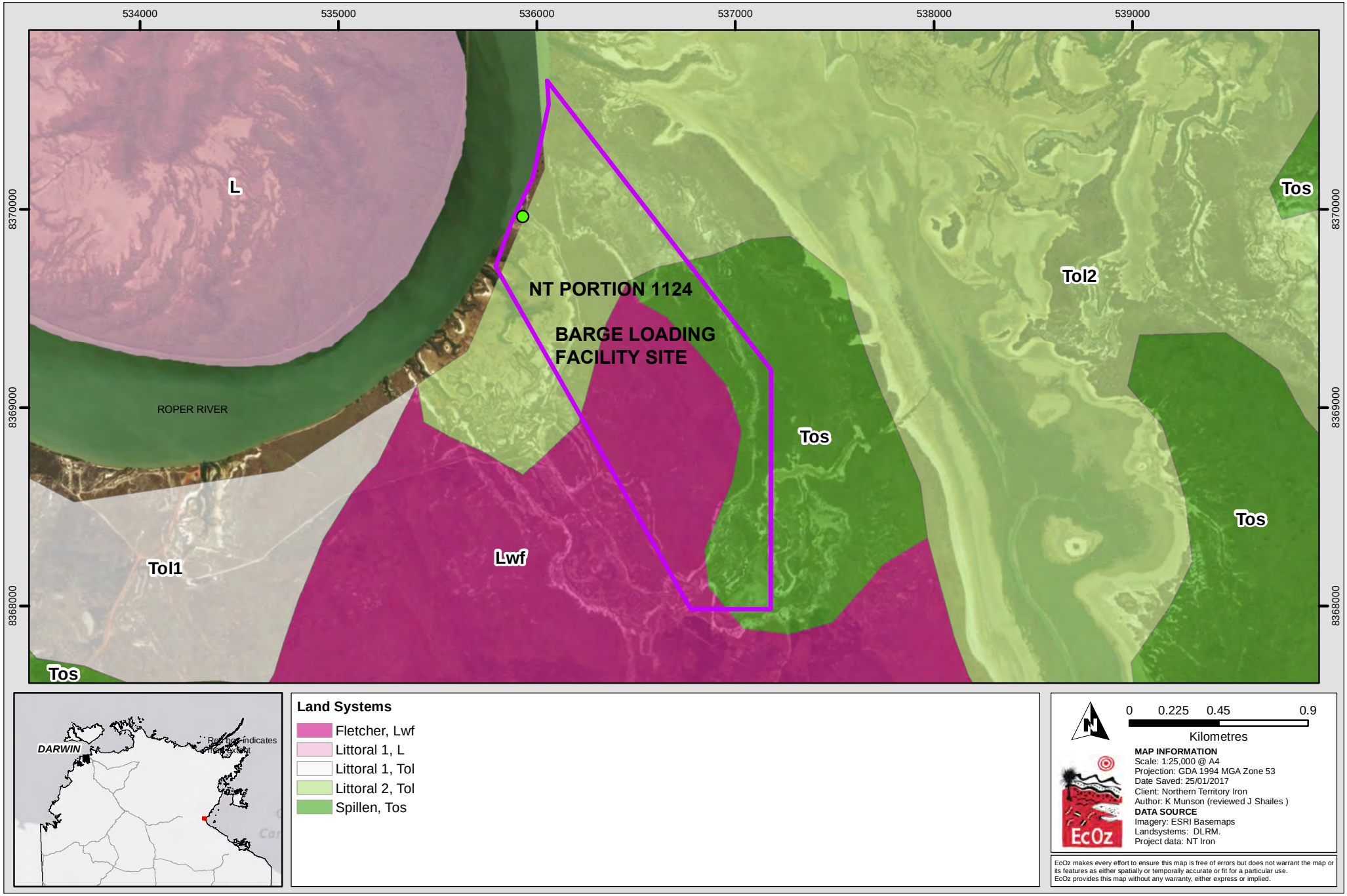
Figure 12 Landsystem mapping for Deposits W & X



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\Nt Iron Ore\EZ16141\01 Project Files\Figure xxx. Landsystems around the barge loading facility.mxd

Figure 13. Landsystem mapping for Barge Loading Facility site

5.4 Soils and geology

The project area is located within the Gulf Region, which is characterised by sandy soils associated with sandstone plateaux with isolated pockets of clay and red earths (Wilson et al. 1990). The resource lies within the Mesoproterozoic aged Roper Group Stratigraphy where iron rich mineralisation is present within several layers of the Sherwin Formation.

The Sherwin Formation comprises quartz sandstone with interbedded micaceous siltstone, mudstone and locally ironstone as distinct units. Ironstones were deposited in marginal, shallow and deeper marine shelf environments reflecting alternating basin-wide sea level rises and falls. Tholeiitic dolerite and gabbro sills are locally present and these can be up to 50 m in thickness.

5.4.1 Erosion risk

The land systems mapping referred to previously indicates areas of moderate to high erosion risk associated with some of the land systems that occur within the project area. Further assessment of erosion risk will be undertaken.

5.4.2 Acid sulfate soils

Acid Sulfate Soils (ASS) can occur in coastal (tidal) and inland or upland (freshwater) settings. These soils are harmless when left undisturbed, but once disturbed sulfides within the soil react with the oxygen in the air, forming sulfuric acid (CSIRO 2006).

The Australian Soil Resource Information System (CSIRO 2006) identifies the soils in the mining areas as having '*extremely low probability of occurrence*' of ASS.

The proposed BLF has potential to disturb ASS. Further studies will be performed prior to any soil disturbance activities.

5.4.3 Potentially acid forming materials

Extensive geochemical testing within Deposit C did not find statistically significant levels of potentially acid forming (PAF) materials (GHD 2015). A few samples had a weekly positive NAPP (net acid producing potential) but neutral pH, likely indicating the presence on non-acid producing sulphur (sulfate) (GHD 2015).

GHD (2015) determined that, although the analyses indicated very low sulfur and low leachable metals and salt content, with significant potential for self-neutralisation, ongoing testing and in-pit encapsulation of any PAF material would be required to keep residual risk of environmental harm low.

Further studies will need to be performed within the pit areas for Deposits C, W and X, as well as at the BLF, to ensure the risks associated with PAF material remain low.

5.5 Surface water

The project area is located within the Roper River Basin. Project activities will occur across the major sub-catchments of the Roper River and Hodgson River. The major surface water features that occur in proximity to the project area are shown in Figure 14.

The Roper River is a large perennial river that has base flow through the dry season due to groundwater discharges that occur in the upper reaches. The Hodgson River and most other rivers and associated tributaries in the region are intermittent, flowing only during the wet season; however, some permanent pools or groundwater fed springs exist along their length. Hodgson River flows north then north-easterly towards the Roper River which is located on the northern region of the project area. The Roper River flows east towards the Gulf of Carpentaria.

Deposit C occurs close to Sherwin Creek, a small, intermittent, first order tributary of the Roper River. In the vicinity of the proposed mine area, Sherwin Creek has a rocky bed with average channel dimensions of 25 m (wide) x 3 m (deep). The area of Deposit C drains predominantly to the west towards Sherwin Creek, which drains from south to north into the Roper River some 8 km north-east of the mine.

Deposits W and X are in the Hodgson River catchment (which itself is part of Roper River catchment). Surface water from both deposits runs into LD Creek, which joins the Hodgson River approximately 17 km downstream. The Hodgson River joins the Roper a further 85 km downstream.

The Roper River is a losing system, with flows decreasing with distance downstream, except for areas of groundwater interaction (Knapton 2009). Only the upper reaches of the Roper River maintain flows greater than 0.1 m^3/s (10 L/s) by the end of the dry season, due to groundwater input. The middle and lower reaches of the river, where the project area is located, usually have flows less than 0.1 m^3/s by the end of the Dry season, and flow records show that cease to flow conditions can often occur at Roper Bar (Knapton 2009). In some very dry periods, such as the 1950s and 1960s, cease to flow events occurred up to 65 km upstream of Roper Bar. There is a network of water gauging stations located along the length of the Roper River that have recorded historical flow data, which will be used to inform an assessment of the amount of water that may be sustainably extracted from the system and to establish triggers for cessation of extraction prior to cease to flow conditions.

The proposed BLF site is on the banks of the Roper River, about 15 km from the Roper River mouth to the Gulf of Carpentaria. The Limmen Bight (Port Roper) Tidal Wetlands System is the second-largest area of saline coastal flats in the Northern Territory and is considered a good example of a system of tidal wetlands (intertidal mud flats, saline coastal flats and estuaries), with a high volume of freshwater inflow, typical of the Gulf of Carpentaria coast (Knapton 2009).

Under the NT *Water Act*, the entire Roper River catchment falls within the Daly Roper Water Control District, in which there is considered a need for close management of water resources in order to avoid stressing groundwater reserves, river flows or wetlands. Legislation in Water Control Districts covers all aspects of sustainable water resource management including the investigation, use, control, protection and allocation. Further work is required to identify a sustainable water supply for the project; however, as indicated in Section 4.9, it is proposed that the water sourcing strategy will include extraction from the Roper River and harvesting wet season flows from rivers/creeks within/near the mining areas.

5.5.1 Surface water quality

There is limited available baseline surface water quality data for Sherwin Creek, which includes two samples at adjacent (1 km apart) sites within the Deposit C project area and one sample from a site on the lower reaches of Sherwin Creek, about 2 km upstream of the Roper River confluence.

Available water quality data indicate that the upper to middle reaches of Sherwin Creek is rainfall-dominated, being characterised by circum-neutral pH, moderate electrical conductivity (EC) and low ionic composition. In contrast, it appears that the lower reaches of Sherwin Creek are groundwater-fed, as indicated by relatively high pH, EC, alkalinity and ionic composition. Concentrations of dissolved heavy metals are generally below laboratory detection limits, with the exception of manganese and iron. Nutrient concentrations are slightly elevated in comparison to default ANZECC (2000) guidelines for 95 % protection of aquatic ecosystem health.

There are no water quality data for LD Creek and as such, further studies will be performed prior to any mining activity to establish baseline information.

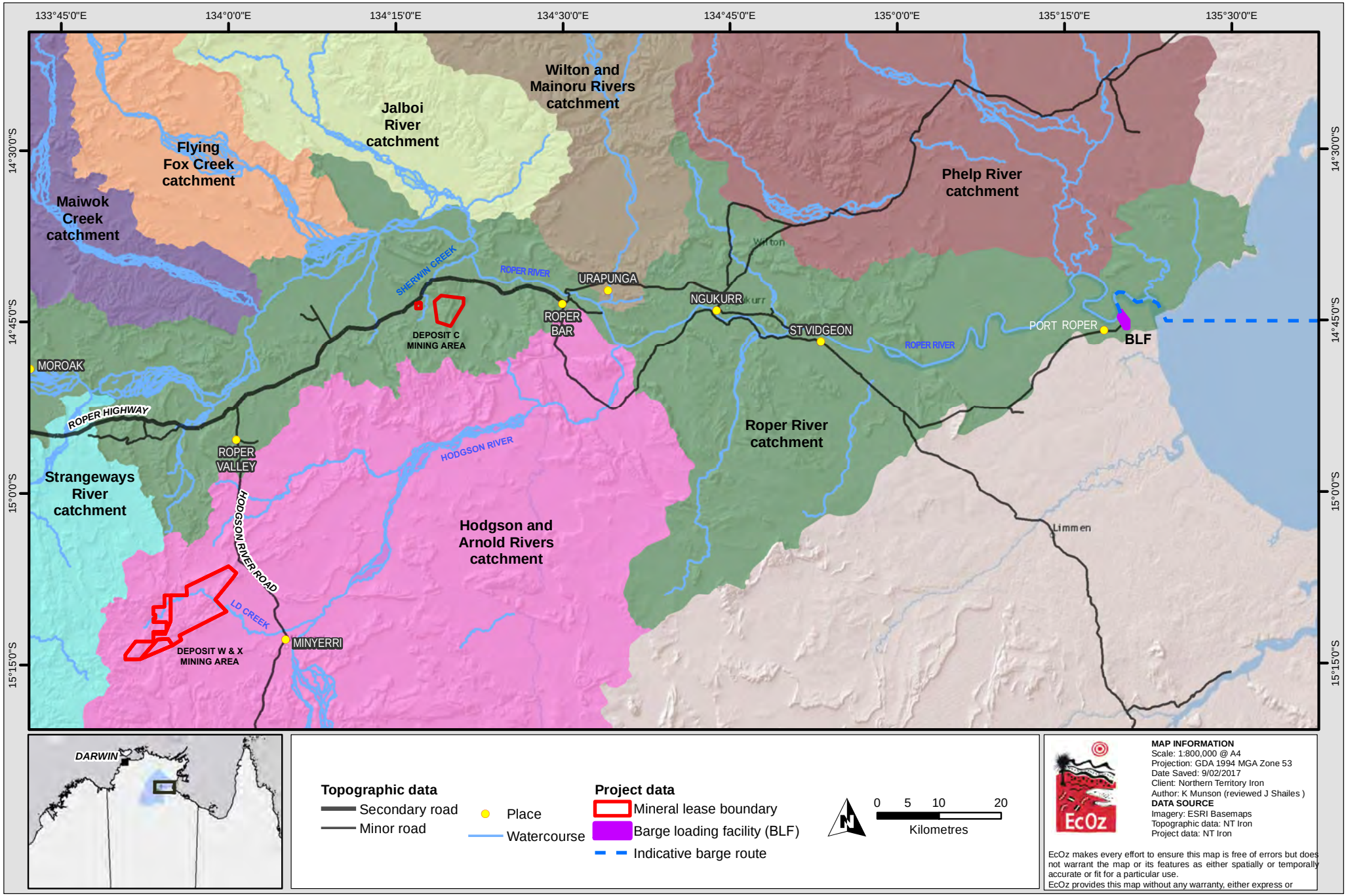


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Figure 12. Map of surface water catchments and watercourses

5.6 Groundwater

5.6.1 Groundwater availability

The project area is situated in the Geological Province of the McArthur Basin, an extensive area dominated by fractured and weathered sedimentary rock supporting local scale aquifers, where discharge areas are typically less than 5 km from recharge areas (Tickell 1994).

Potential groundwater yield per bore is thought to be less than five litres per second and salinity to be in the range of 500 – 1500 mg/L. The mining areas have low to moderate salinity hazard. Deposit C is situated immediately to the east of a more intensive groundwater resource study (Yin Foo 2000), which confirms that the local environment is dominated by fractured and weathered rock with local aquifers and fractured and weathered rock with minor groundwater resources.

At Deposit C, the local aquifers are described as weathered strata overlying hard fractured bed rock and comprise:

- A permeable and ephemeral shallow system. The pedological column, particularly at the north-western end of Deposit C, contains some lenses of fresh ground water trapped locally in silty-clays, overlying extremely weathered sandstone (~6 m thick). These conditions do not extend across the footprint of the proposed open pit and are highly localised, within the alluvial-debris fans located at the outlets of numerous small creek channels and gullies.
- The shallow system is underlain by a sequence of interlayered weathered and fractured siltstones, sandstones, shales and localised mudstones, in which groundwater is encountered between about 20 m below surface (lower lying terrain) and 70 m below surface (across higher lying terrain and the open pit). Below this, there is a thick sequence of siltstones overlying a very hard bluish dolerite that acts as the lower boundary of the confining system.

Baseline groundwater investigations in the area of Deposit C (Alarcon-Leon 2013a) indicated that groundwater depth was between 27 and 100 metres below ground level (mbgl). Eleven bores were assessed and ten bores had groundwater in excess of 40 mbgl. Based on this information, it was concluded that mining to about 30-40 m below surface would not interfere with the deeper fractured aquifers and groundwater inflow would not occur in open pits developed at Deposit C.

Additional groundwater assessments are required at Deposits W and X, and at the BLF.

5.6.2 Groundwater quality

Groundwater studies have been conducted within the Deposit C project area. Pendragon (2013) found that the pH of groundwater was generally circumneutral to slightly alkaline, ranging from 5.84 to 8.99. Electrical conductivities (EC) ranged between 98 µS/cm and 1110 µS/cm averaging 464 µS/cm. Most of the groundwater in the vicinity of Deposit C did not have large concentrations of major anions and cations. Most of the trace elements were well below their assessment levels for drinking water.

Hydro-geochemical assessments at Deposit C indicated the presence of three types of groundwater: the first was a $Ca(HCO^3)^2$ type, indicating recently recharged waters occurring across the low lying ground to the west and south-west of the proposed open pit. The second was a $NaHCO^3$ type which indicated ion-exchange waters to the north and north-west of the proposed open. The third group was a NaCl type, which indicates end-point (saline/brackish) waters across high lying ground and below the proposed mine pit. These waters have lower pH values than elsewhere and slight salinity, indicating slow and little recharge, if any.

Additional baseline studies are required for Deposit W and X to establish baseline water quality.

5.7 Biodiversity

The majority of the project footprint falls within the Gulf Fall and Uplands bioregion; some of the transport routes and all the BLF site occur within the Gulf Coastal bioregion. These are described below using information from Baker et al. (2005).

- The Gulf Falls and Uplands bioregion comprises undulating terrain with scattered low, steep rocky hills. The most extensive vegetation is woodland dominated by *Eucalyptus* and *Corymbia* species with a spinifex understory, and woodland dominated by *Eucalyptus* species with a tussock grass understory. The rocky sandstone ranges of this bioregion have some significant refugial values, and include some endemic or near-endemic species.
- The Gulf Coastal bioregion encompasses the lower reaches of many major rivers which originate in the Gulf Fall and Uplands Bioregion. *Eucalyptus* woodland with tussock or hummock grass understory dominates the bioregion, with significant areas of tidal flats, mangroves and littoral grassland.

5.7.1 Vegetation

From remote sensing datasets, as well as previous surveys undertaken within the project area, it has been identified broadly that:

- Deposit C consists mainly of a prominent sandstone escarpment dominated by Eucalyptus open forest with a grassy understorey with some outer areas of Eucalyptus woodland with tussock grass understorey.
- Deposits W and X consist of Acacia forests and woodland; Deposit W also has a small area to the west of the deposit identified as Eucalyptus woodland with tussock grass understorey.
- Much of the proposed BLF site on the Roper River is either previously cleared land, or naturally bare, sand, rock, claypan and/or mudflat with small areas of mangroves.

A comprehensive vegetation survey has been undertaken for the areas within and around Deposit C. Survey results are presented in Table 5-4.

Further surveys are required to map the vegetation that occurs in the Deposit W and X mining areas, and in proximity to the BLF site.

Table 5-4. Description of the vegetation communities on Deposit C

Land form	Soil	Short description	Area (ha)
Escarpment, hill slopes	Clay	*Eucalyptus tectifica, Acacia pachyphloia, Corymbia terminalis* and *Erythrophleum chlorostachys* low woodland	2116
Plains	Heavy clay	*Eucalyptus microtheca +/- Corymbia confertiflora* low open woodland	666
Escarpment	Sand	*Corymbia aspera +/- Acacia lamprocarpa, Buchanania obovata, Eucalyptus miniata and Eucalyptus tetrodonta* low woodland	409
Gorges, hill slopes			
Escarpment, hill slopes	Sand	*Eucalyptus phoenicea +/- Corymbia dichromophloia, Eucalyptus tetrodonta, Corymbia ferruginea subsp. ferruginea* mid woodland	6047

5.7.2 Sensitive vegetation types

In the Northern Territory, sensitive vegetation types are those considered significant under the Land Clearing Guidelines (DNRETAS 2010). Sensitive vegetation types that occur within the project footprint are described below:

- Dry monsoon rainforest has been recorded within the Deposit C area. Aerial photography and ground surveys have estimated the extent to be approximately 0.25 hectares.
- Riparian vegetation occurs in association with rivers, creeks and wetlands. The mining areas do not encompass any areas of riparian vegetation, however, this vegetation type is intersected by the public roads that will be used for transport of ore, and at locations where surface water will be harvested/extracted to supply the project. Further mapping and assessment of riparian vegetation will be required once the locations of these project components are known.
- Mangroves are present in small patches proximate to the proposed BLF site on the Roper River, but not within areas that will be subject to direct disturbance. The site is either previously cleared or naturally bare, sand, rock, claypan and/or mudflat).

5.7.3 Weeds

Based on data from NRM Maps, there are at least 44 different weed species that may occur within the project footprint. The more commonly-recorded or particularly problematic of these species are listed in Table 5-5. Regionally, the most prolific weed species is Parkinsonia (*Parkinsonia aculeata*) which is well established in the Gulf and grows in a wide range of habitats. Weed species in the region are expected to mainly occur along watercourses (especially the Roper River and tributaries) and previously disturbed areas (i.e. roadsides, fences and water-points).

Table 5-5. Weed species that may occur in the project area

Scientific name	Common name	Cth status	NT status
Azadirachta indica	Neem	-	B, C
Hyptis suaveolens	Hyptis	-	B, C
Mimosa pigra	Mimosa	WONS	A, C
Parkinsonia aculeata	Parkinsonia	WONS	B, C
Parthenium hysterophorus	Parthenium Weed	WONS	A, C
Prosopis spp.	Mesquite	WONS	A, C
Sida spp.	Spiny-head Sida, Flannel Weed & Paddy's Lucerne	-	B, C
Tribulus spp.	Caltrop	-	B, C
Xanthium strumarium	Noogoora Burr	-	B, C
Calotropis procera	Rubber Bush	-	B, C

5.8 Threatened species

To determine which threatened species may occur within the project footprint, a desktop analysis of threatened species databases was undertaken. This resulted in a list of 54 threatened species that have the potential to occur within or proximate to the project footprint. Of these:

- 29 are listed under both the *TPWC Act* and *EPBC Act*
- 9 are listed only under the *TPWC Act*
- 16 are listed only under the EPBC Act.

A desktop 'likelihood of occurrence' assessment was undertaken for each species (refer Appendix D). The results are documented in Table 5-6 and summarised as follows for the project footprint:

- Nineteen species have a high chance of occurring.
- Eleven species have a medium chance of occurring.
- Fifteen species have a low chance of occurring.
- Nine species are considered to not occur. The project footprint it does not support important habitat features for these species, or their known range no longer extends to the area.

Table 5-6. Desktop threatened species' likelihood of occurrence assessment

Likelihood	Common name	Scientific name	Status	
			Cth	NT
HIGH	**SHOREBIRDS**			
	Curlew Sandpiper	*Calidris ferruginea*	CR	VU
	Red Knot	*Calidris canutus*	EN	VU
	Great Knot	*Calidris tenuirostris*	CR	VU
	Greater Sand Plover	*Charadrius leschenaultii*	VU	VU
	Lesser Sand Plover	*Charadrius mongolus*	EN	VU
	Bar-tailed Godwit (Western Alaska subsp.)	*Limosa lapponica baueri*	VU	-
	Bar-tailed Godwit (Northern Siberian subsp.)	*Limosa lapponica menzbieri*	CR	-
	Eastern Curlew	*Numenius madagascariensis*	CR	-
	SAVANNAH			
	Red Goshawk	*Erythrotriorchis radiatus*	VU	VU
	Gouldian Finch	*Erythrura gouldiae*	EN	VU
	Grey Falcon	*Falco hypoleucos*	-	VU
	Bare-rumped Sheath-tailed Bat	*Saccolaimus saccolaimus nudicluniatus*	VU	-
	RIPARIAN / WETLAND			
	Mertens' Water Monitor	*Varanus mertensi*	-	VU
	Mitchell's Water Monitor	*Varanus mitchelli*	-	VU
	ELASMOBRANCHS			
	Freshwater or Largetooth Sawfish	*Pristis pristis*	VU	VU
	Green Sawfish	*Pristis zijsron*	VU	VU
	MARINE TURTLES			
	Green Turtle	*Chelonia mydas*	VU	-
	Flatback Turtle	*Natator depressus*	VU	-
	Olive Ridley Turtle	*Lepidochelys olivacea*	EN	VU
MEDIUM	**SAVANNAH**			
	Crested Shrike-tit (northern subsp.)	*Falcunculus frontatus whitei*	VU	-
	Australian Painted Snipe	*Rostratula australis*	EN	VU
	Masked Owl (northern subsp.)	*Tyto novaehollandiae kimberli*	VU	VU
	Northern Leaf-nosed bat	*Hipposideros stenotis*	-	VU
	Floodplain Monitor	*Varanus panoptes*	-	VU
	RIPARIAN / WETLAND			
	Pale Field-rat	*Rattus tunneyi*	-	VU
	Water Mouse or False Water Rat	*Xeromys myoides*	VU	-
	ELASMOBRANCHS			
	Speartooth Shark	*Glyphis glyphis*	CR	VU
	Dwarf Sawfish	*Pristis clavata*	VU	VU
	MARINE TURTLES			
	Leatherback Turtle	*Dermochelys coriacea*	EN	CR
	Hawksbill Turtle	*Eretmochelys imbricata*	VU	-
LOW	a fern	*Macrothelypteris torresiana*	-	EN
	Asian Dowitcher	*Limnodromus semipalmatus*	-	VU
	Partridge Pigeon (eastern subsp.)	*Geophaps smithii smithii*	VU	VU
	Painted Honeyeater	*Grantiella picta*	VU	VU
	Fawn Antechinus	*Antechinus bellus*	VU	EN
	Blue Whale	*Balaenoptera musculus*	EN	-

Likelihood	Common name	Scientific name	Status	
			Cth	NT
	Northern Quoll	*Dasyurus hallucatus*	EN	CR
	Ghost Bat	*Macroderma gigas*	VU	-
	Humpback Whale	*Megaptera novaeangliae*	VU	-
	Black-footed Tree-rat (Kimberley and mainland Northern Territory subsp.)	*Mesembriomys gouldii gouldii*	EN	VU
	Northern Hopping-mouse	*Notomys aquilo*	VU	VU
	Northern Brush-tailed Phascogale	*Phascogale pirata*	VU	EN
	Great White Shark	*Carcharodon carcharias*	VU	-
	Whale Shark	*Rhincodon typus*	VU	-
	Loggerhead Turtle	*Caretta caretta*	EN	VU
NONE	Gulf Snapping Turtle	*Elseya lavarackorum*	EN	-
	Carpentarian Grasswren	*Amytornis dorotheae*	EN	EN
	Brush-tailed Rabbit-rat	*Conilurus penicillatus*	VU	EN
	Golden Bandicoot	*Isoodon auratus*	VU	EN
	Greater Bilby	*Macrotis lagotis*	VU	VU
	Carpentarian Antechinus	*Pseudantechinus mimulus*	VU	-
	Canefield Rat	*Rattus sordidus*	-	CR
	Carpentarian Rock-rat	*Zyzomys palatalis*	EN	CR
	Plains Death Adder	*Acanthophis hawkei*	VU	VU

Some brief comments on those species attributed a high or medium likelihood of occurrence follow.

5.8.1 Shorebirds

Eight migratory shorebirds have a high likelihood of occurrence. There are recent records for all of these shorebird species within and proximate to the mouth of the Roper River, including within one kilometre of the proposed BLF site.

Targeted shorebird surveys have been undertaken in the area, most comprehensively by Chatto (2003) between 1990 and 2001. Those surveys identified a roost of 2,000+ shorebirds (relative abundance of species unknown) proximate to the Port Roper. In 1996, Chatto counted 1,500 Red Knots near the mouth of the Roper River – making that location one of the three most important areas in the NT for that species. The region is also one of the four important areas in the NT for the Eastern Curlew.

Further historical data acquisition and analysis is required to clarify the diversity and abundance of shorebirds species, and where they roost in the Roper River mouth area in relation to the areas that may be impacted by project activities.

5.8.2 Marine species

Dugongs, in-shore dolphin species and the Indo-Pacific Humpback Whale are expected to be reasonably common in the Limmen Bight area (Delaney 2012).

Three marine turtle species are known to nest on beaches within Limmen Bight – Green, Flatback and Olive Ridley Turtle. There are no important nesting beaches near the Roper River mouth. However, the broader Limmen Bight area does contain some important turtle nesting beaches including at Maria Island and the coast between the Limmen Bight River and Towns River(see Figure 15).

Three other marine turtle species – the Leatherback, Hawksbill and Loggerhead Turtle - are known to forage in the Gulf of Carpentaria that will be traversed by the barge route.

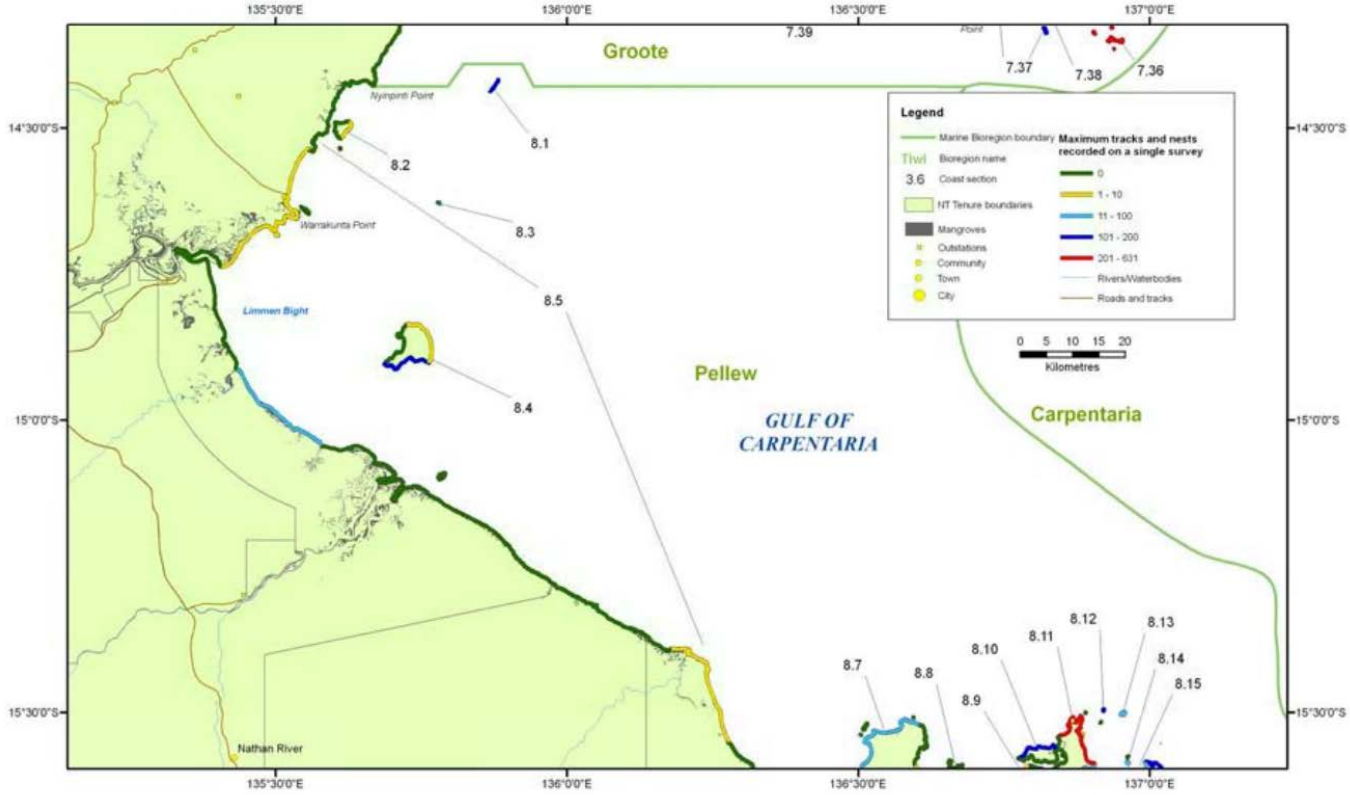


Figure 15. Map showing regional marine turtle breeding spatial analysis by Chatto (2008)

5.8.3 Riparian / wetland species

Riparian habitat along the Roper River is likely to be suitable habitat for the threatened Mertens' Water Monitor and Mitchell's Water Monitor.

Wetlands proximate to the project footprint may be suitable breeding habitat for the nomadic Australian Painted Snipe.

The Gulf Snapping Turtle has previously been recorded as occurring within the Roper River; however, this has been proven to be an error (Freeman et al. 2014). More recent analysis of molecular data confirmed that the snapping turtle species in the Roper River is the Northern Snapping Turtle.

5.8.4 Sawfish

Various sawfish species have been recorded from the Gulf of Carpentaria. The Freshwater or Largetooth Sawfish was recorded at Port Roper in 2010. The Green Sawfish is most commonly known from the Gulf of Carpentaria.

5.8.5 Others

Most of the other species with a high or medium likelihood either occur throughout suitable areas of savannah woodland – the main vegetation type regionally and within the project footprint – (e.g. Red Goshawk, Crested Shrike-tit and Gouldian Finch), or are nomadic across a vast area of Australia and could occur on occasion (e.g. Grey Falcon).

5.9 Significant sites and features

The marine and coastal areas of Limmen Bight are rated as internationally significant (Delaney 2012) and are considered a Site of Conservation Significance in the NT (Harrison 2009). The area is also listed in the *Directory of Important Wetlands in Australia*.

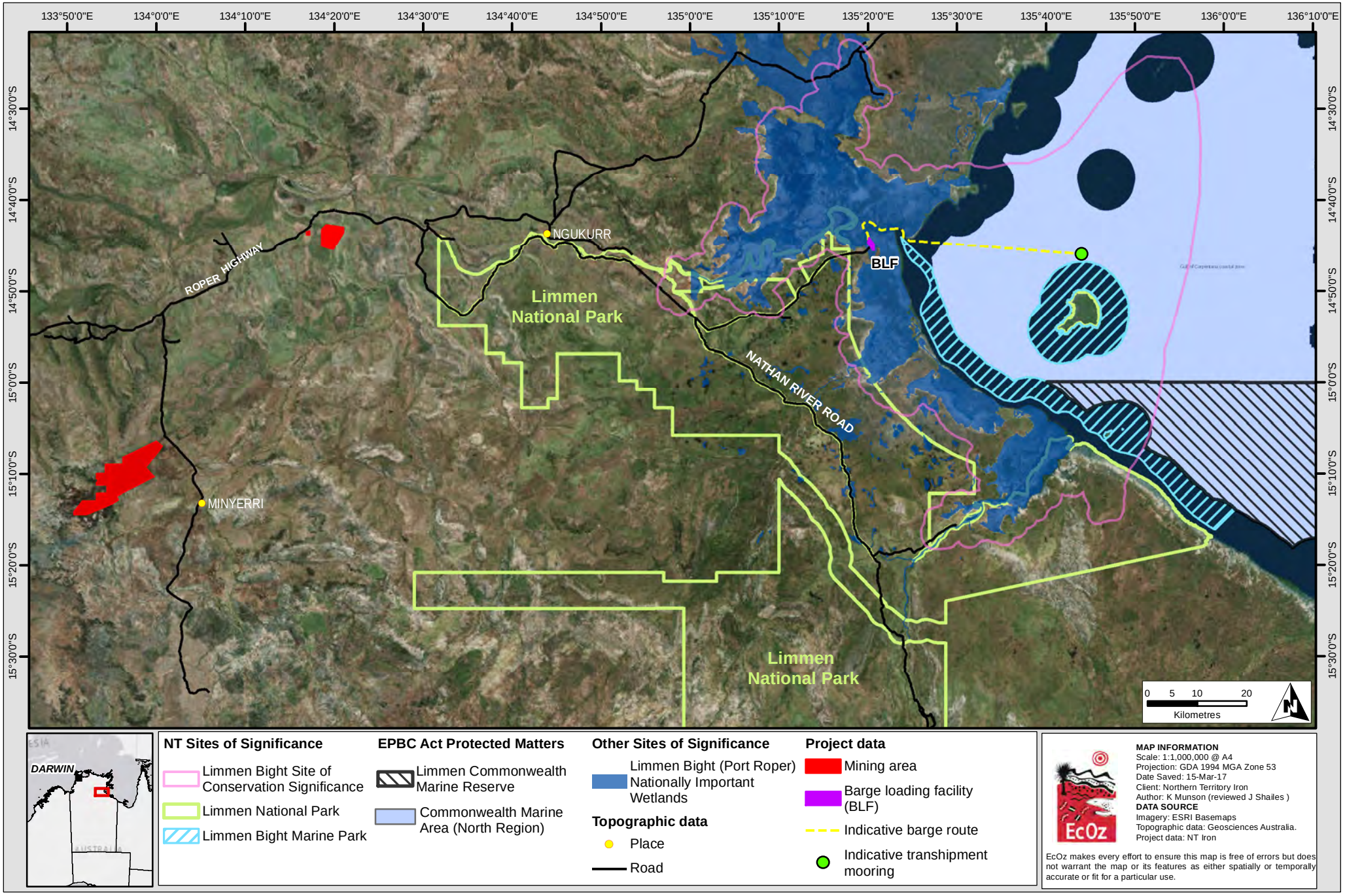
The Limmen National Park and the Limmen Bight Marine Park together form the Limmen Bight Regional Biodiversity Area, which provides for "catchment – to coast – to sea" protection of biodiversity values.

Offshore from the mouth of the Roper River, the Commonwealth waters are part of the Northern Marine Region. Within this region, the Gulf of Carpentaria coastal zone is identified as a Key Ecological Feature[7]. Its values relate to high productivity, aggregations of marine life, biodiversity and endemism (DEWHA 2012). The area is a MNES protected under the *EPBC Act* (refer section 7.1).

The location of these significant sites and features in relation to the project area is shown in Figure 16.the following should be noted:

- Sections of the Roper Highway and Nathan River Road that are proposed for use as a transport route, traverse the northern section of the Limmen National Park.
- The proposed BLF site is located on the tidal section of the Roper River, approximately 15 km upstream from the river mouth, but outside of either the National Park or the Marine Park.
- The proposed barge route will traverse the tidal reaches of the Roper River and shallow near-shore marine environments within Limmen Bight in the Gulf of Carpentaria, but the proposed barge route will not traverse the Marine Park.
- The proposed transhipment site falls within the Gulf of Carpentaria coastal zone.

[7] Key ecological features (KEFs) are elements of the Commonwealth marine environment in the North Marine Region that, based on current scientific understanding, are considered to be of regional importance for either the region's biodiversity or ecosystem function and integrity



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\Nt Iron Ore\EZ16141\01 Project Files\Figure 14. Map of significant sites and features in relation to the project area.mxd

Figure 16. Map of significant sites and features in relation to the project area

5.10 Cultural heritage

A search of the NT Heritage Register and consultation with NT Heritage Branch did not identify any nominated, provisional or declared heritage places located within the project area. The NT Heritage branch advised that there are no previously recorded Aboriginal archaeological sites in the databases maintained by the Branch. However, the mining areas contain areas of vertical relief/rocky outcrop areas where archaeological sites (rock art sites and stone artefact scatters) commonly occur, and the Port Roper area is likely to contain coastal archaeological sites such as shell mounds/middens.

A detailed heritage survey of Deposit C conducted in 2013 by Earth Sea Heritage Surveys located 12 rock art sites, one historical site, one stone artefact scatter and numerous isolated stone artefacts. It is anticipated that further archaeological surveys over the remaining project areas will identify archaeological sites that are protected under the *Heritage Act*.

A search of the AAPA Sacred Sites database indicated that previously authorised Authority Certificates exist over part of all of EL24101 and EL24102, but no such certificate exists for NT Portion 1184. The search showed both registered sacred sites and recorded scared sites within the proposed project area with associated Restricted Works Areas (see Appendix B).

The previous mineral title holder was granted an Authority Certificate by the AAPA under the *Northern Territory Aboriginal Sacred Sites Act 1989* for extensive exploration and ground disturbance activities on EL24101. NTIO will engage with the NLC in relation to sacred sites surveys and will apply for Authority Certificates for all areas associated with the project, but will in the meantime abide by the conditions set out in the Authority Certificate number 2011/14619.

5.11 Social and economic environment

The Roper River region is sparsely populated. About 3,500 people live in the catchment, of which 70% are Indigenous. The largest population centres are Ngukurr (population 1,589), Mataranka (population 600), and Minyerri (population 340) (Bushtel 2007). People of the Jawoyn, Mangarayi, Ngalakan, Ngandi, Nunggubuyu, Mara, Alawa and Yangman language groups live in the region (AIATSIS 2000). English is not the first language for the majority of the Indigenous population and Kriol is commonly spoken.

The community of Urapunga is located approximately 30 km east of the Deposit C mining area. The community is located on the Roper Highway, east of the turn-off to Numbulwar. Project traffic will not pass the community.

The community of Ngukurr is located approximately 50 km east of the Deposit C mining area. The community is located on the Nathan River Road, which will be used as the main transport route from the mining areas to the BLF. Project traffic will not pass the community.

The small community of Minyerri is located approximately 15 km south-east of the Deposit W and X mining area. The main access road to the community is the Hodgson Downs Road, which will be used to transport mined ore from the mining area north to the Roper Highway. Project traffic will not pass the community.

Ngukurr and Minyerri use groundwater for their domestic supply; however, Ngukurr supplements this with water taken from the Roper River (Zaar 2009).

There is a reasonably sparse mixed population of community members and scattered pastoral stations in the district. The nearest town is Mataranka and the district is primarily serviced from Katherine. Towns of Minyerri and Ngukurr mainly service Aboriginal communities, and Roper Bar the recreational fishing visitors. The remoteness of the region means that service provision is expensive and limited.

The following pastoral leases occur within a 20 km radius of Deposits C, W and X:

- Mount McMinn (Deposit C and accommodation camp)

- Big River
- Namul Namul
- Lonesome Dove
- Flying Fox.

Pastoral activities, agriculture, fishing, tourism and, increasingly, mineral exploration are currently the major industries in the region. There is an extractive operation in the form of a limestone quarry at Mataranka and the Sill 80 Ilmenite Project is located approximately 15 km west of the Deposit C mining area. The nearest major mine is the McArthur River base metal mine located 270 km south-east.

The local government area of Roper Gulf has an unemployment rate of 5.2 % according to the 2011 census. This is in line with the national unemployment rate in 2011, which was also 5.2 %. It is anticipated that with appropriate training and job ready programs, some of the workforce required for construction and operation of the project would be employed from local communities.

6 Potential Impacts and Management

This chapter describes the potential impacts that project activities could have on environmental, social and cultural values, and the mitigation and management measures proposed to avoid and/or minimise the risk of these impacts occurring. It should be noted that the mitigation and management strategies proposed are expected to be effective based upon the experiences of similar projects elsewhere in the Gulf of Carpentaria and northern Australia more broadly. The following information is relevant to assessing the likely effectiveness of NTIO's proposed mitigation measures:

- The material types and mining operations proposed for the project have similar characteristics to existing operations at Gove (bauxite) and Groote Eylandt (manganese), which both feature relatively shallow open pits with PAF materials virtually absent.
- Barge loading and transhipping operations with bulk commodities have been authorised and are currently active in other locations around the Gulf of Carpentaria, including at Bing Bong (Northern Territory) and Karumba (Queensland). A further barge transhipping operation at Skardon River (Queensland) is currently under environmental assessment. In addition, the Gulf of Carpentaria hosts at least three bulk commodity ports that load directly onto OGVs at Nhulnbuy and Alyangula in the Northern Territory and Weipa in Queensland.

6.1 Surface water

The existing surface water characteristics within and surrounding the project area are described in section 5.5, and soils and geology are described in section 5.4. In summary, the key characteristics relevant to assessing surface water impacts are:

- The project area lies within the Roper River catchment and is characterised by ephemeral streams that flow mostly during the summer wet season.
- The Roper River is a losing system that is fed from upstream groundwater to maintain year-round flow in most years.
- The project area is above the tidal limit of the Roper River.
- The project area is considered to have a moderate to high erosion risk.
- Within the proposed mining areas, waste rock, low grade ore and ore processing rejects are characterised by ultra-low quantities of PAF.

6.1.1 Potential impacts

Expectations are that off-site discharge of wastewater will not be required as process water and pit water will be stored within the pit and reused as part of the project water supply. Furthermore, previous assessments around Deposit C indicate a low risk of PAF material being present in significant quantities, though further assessment of the extent of PAF at Areas W and X, as well as ASS at the BLF, is required and will be undertaken.

Nevertheless, surface waters within and downstream of the project area could be directly or indirectly impacted by:

- Excessive extraction of water for project usage
- Leaks or spills of chemicals or waste water
- Sedimentation due to erosion and soil destabilisation following vegetation clearing and earthworks

- Spillage of iron ore product during loading or hauling
- Modification of surface water flows by pits and infrastructure
- AMD and/or ASS contaminated runoff.

Changes in the volume or nature of surface waters and/or flows in rivers and streams could cause the following impacts:

- Reduced biodiversity due to deterioration in aquatic and/or riparian habitat condition
- Reduced aesthetic and recreational values due to lower stream levels
- Water shortages for downstream users, with associated social and economic costs.

Changes in the quality of surface waters and run-off into rivers and streams could cause the following impacts:

- Reduced biodiversity due to deterioration in aquatic and/or riparian habitat condition
- Direct mortality from exposure to toxicants
- Reduced recreational amenity (e.g. for fishing)
- Health effects associated with downstream contact with contaminants.

6.1.2 Proposed mitigation measures

The proposed project does not present any unique or unusual surface water management issues that have not been satisfactorily addressed at other surface mining or linear infrastructure projects within the Top End of the Northern Territory. Indeed, the nature of the open pits (shallow), the mining methods (utilising in-pit waste rock dumps) and the material to be mined (ultra-low PAF) will mean that many critical surface water management issues present at other sites will not arise. Nevertheless, the following mitigation measures will be implemented:

Water use and management

A site water balance will be prepared for both construction and operation phases of the project. The water balance will identify the amount of water that may be harvested and/or reused from within the mining areas as a source of water. The water balance will also identify any risks to surface waters associated with release of water from the open pits.

Further assessment of sustainable yields from the potential water sources proposed (see section 4.9) will be undertaken, together with further studies to identify alternative water supply options for the project. Suitably qualified experts will be engaged to undertake hydrological assessments to determine suitable extraction points, sustainable rates of extraction, and to establish trigger points for reduction of offtake to limit significant downstream impacts.

A Water Management Plan will be developed and implemented to measure, monitor and control impacts on surface water and groundwater to acceptable levels.

It is intended that the amount of water extracted from the Roper River will be minimised by maximising the amount of water harvested and reused within the project area. The establishment of trigger points for cessation of extraction from the Roper River is proposed to minimise potential impacts on the downstream environments and other water users.

Impacts to freshwater ecosystems associated with surface water extraction for the project will be further assessed once feasible water source options have been identified.

Storm water and drainage design

Within the mining area, stormwater management will be designed to maximise in pit water capture and storage, with local climatic data used to inform the design of stormwater management infrastructure across the mine site.

It is proposed that public roads will be upgraded to accommodate use by the project. Roads will be engineered in accordance with Department of Infrastructure, Planning and Logistics, which will include specific measures for minimising potential downstream impacts on water quality at river and creek crossings.

Erosion and Sediment Control

Erosion and Sediment Control Plans (ESCP) will be will be developed to be project specific and based on relevant guidelines and applicable standards. ESCP's will be required for each of the project areas and will be reviewed and updated as mining activities progress.

PAF and ASS assessments

Further studies will be undertaken to confirm the absence of PAF across the mining areas and to determine the extent of ASS present within the BLF site. Where required, management plans will be developed to minimise the potential for off-site release of contaminated water.

Storage and handling of fuels, chemicals and hazardous substances

The transport, storage and handling of fuels, chemicals and hazardous substances are regulated by legislation and Australian Standards (including AS1940-2004 and AS1692-2006). Standard operating procedures will be developed, and incorporated within an approved MMP.

6.2 Groundwater

The existing groundwater conditions in the region are described in Section 5.6. In summary, key characteristics relevant to assessment groundwater impacts are:

- There are limited groundwater resources within the project area.
- There are no shallow groundwater resources and no known Groundwater Dependent Ecosystems (GDE) that would depend on groundwater within the project area.
- The Roper River itself is a GDE; however, groundwater inflow to the Roper River occurs upstream of the project area.

6.2.1 Potential impacts

Expectations are that groundwater will provide a relatively small proportion of the overall water needs of the project and unlikely to provide a reliable or sustainable source of water for all of the project's needs. Nevertheless, some groundwater extraction is proposed and groundwater could be directly or indirectly impacted by:

- Interaction between the open pit void and groundwater causing changes to groundwater quality and groundwater discharge
- Leaks or spills of chemicals, hydrocarbons or waste water
- Reduced groundwater recharge due to changes in surface hydrology.

Drawdown and/or contamination of groundwater could cause the following impacts:

- Insufficient groundwater for other land uses and/or the receiving environment

- Deterioration in groundwater quality
- Adverse impacts on GDEs.

6.2.2 Proposed mitigation measures

The proposed project does not present any unique or unusual groundwater water management issues that have not been satisfactorily addressed at other surface mining or linear infrastructure projects within the Top End of the Northern Territory. Indeed, the nature of the open pits (above the water table) and the material to be mined (ultra-low PAF) will mean that many critical groundwater water quality management issues present at other sites will not arise. However, drawdown or depletion of groundwater could occur as a consequence of project development and so the following mitigation measures will be implemented:

Groundwater exploration will include and pump testing and modelling by suitably qualified experts to determine sustainable production rates from any groundwater resources identified. Ongoing monitoring of water quality and water levels will be implemented should groundwater resources be developed

Previous assessments around Deposit C indicate an extremely low likelihood of PAF occurrence. Harvested surface runoff water and process wastewater that will be stored in the pit is expected to be of suitable quality for onsite reuse. Further assessments will be undertaken across the other mining areas to determine the presence/absence of PAF, and associated monitoring and management requirements.

Furthermore, the transport, storage and handling of fuels, chemicals and hazardous substances will be conducted in accordance with relevant legislation and standards such as AS1940-2004 and AS1692-2006 to mitigate the potential for spillage and seepage of such substances.

If the option of sourcing groundwater from more distant aquifers is pursued, further assessment will be undertaken to identify potential impacts to other users and GDE's, and to establish sustainable rates of extraction.

6.3 Biodiversity and Threatened Species

The biodiversity values present within and surrounding the project area are described in Section 5.7 and in summary, key characteristics are:

- A number of significant vegetation types, including monsoon rainforest, riparian vegetation and mangroves are likely to occur.
- Desktop review indicates that 30 listed threatened species have a medium to high likelihood of occurring in areas that may be directly or indirectly impacted by the project activities.

6.3.1 Potential impacts – Biodiversity

The project activities have potential to cause impacts to terrestrial habitats and species at the mining areas and along transport routes. Marine habitats and species could be impacted at the BLF and along the transhipment route.

Terrestrial biodiversity

Project activities could cause the following impacts to terrestrial biodiversity:

- Direct mortality due to:
    - Land clearing activities
    - Vehicle strike.
- Loss of habitat due to land clearing.

- Alterations to habitat due to:
    - Changes in surface and/or groundwater flow and quality
    - Introduction and/or proliferation of weed species
    - Altered fire regimes.
- Changes in species composition and habitation patterns due to:
    - Dust and/or noise and/or light emissions
    - Changes in food availability (eg carrion and onsite waste)
    - Changes in surface water quality or availability
    - Revegetation of cleared / rehabilitated areas.

Marine biodiversity

Based on the expectation that no dredging or bed levelling is required at the BLF, or along the barge transport route, significant direct impacts on marine waters, plants and seagrasses are not anticipated. However, project activities could cause the following impacts to marine biodiversity:

- Direct mortality due to:
    - Vessel strike
    - Hydrocarbon spills
- Loss of habitat due to land / riverbank / mangrove clearing.
- Changes in species composition and habitation patterns due to:
    - Dust and/or noise and/or light emissions.

6.3.2 Potential impacts – Threatened species

Table 6-1 documents potential impacts on NT listed threatened species that may occur within the project footprint[8]. Potential impacts on EPBC listed threatened species are further assessed in Section 7.

Table 6-1. Potential impacts of project activities on threatened species

Species with medium to high likelihood of occurrence	Likely occurrence in project area	Potential impacts
Shorebirds Curlew Sandpiper Red Knot Great Knot Greater Sand Plover Lesser Sand Plover	The mudflats and surrounds proximate to the port	• Changes in roosting and/or feeding patterns due to dust and/or noise and/or light emissions; • Loss of roosting and/or feeding habitat due to land clearing; • Disturbance of roosting and/or feeding birds due to increased human presence. It is not expected that the movement of the barges per se will disturb feeding or roosting shorebirds.
Savannah species Red Goshawk Gouldian Finch Grey Falcon Australian Painted Snipe	Could occur across most of the terrestrial project footprint (excluding the port)	• Direct mortality during land clearing activities (less likely for birds unless they are breeding). • Loss of habitat due to land clearing. • Introduction and/or proliferation of weed species resulting in reduced habitat condition (particularly for the seed-eating Gouldian Finch);

[8] Only species that have a medium to high likelihood of occurring within areas that may be impacted directly or indirectly by Project activities were considered (refer Section 5.7).

Species with medium to high likelihood of occurrence	Likely occurrence in project area	Potential impacts
Masked Owl (northern subsp.) Northern Leaf-nosed bat Floodplain Monitor		• Altered fire regimes (e.g. more frequent and/or later fires) caused by project activities, potentially reducing the abundance of hollows used by owls, bats and finches for roosting and breeding with similar consequences as described in the point above. • Introduction and/or proliferation of feral fauna species leading to displacement of native fauna (low likelihood because of the already established suite of feral fauna populations). • Dust and/or noise emissions leading to reduced habitat condition.
Riparian/wetland species Mertens' Water Monitor Mitchell's Water Monitor Pale Field-rat	Watercourses with riparian vegetation (usually creeks and larger), and wetlands (if present).	• Direct mortality during land clearing activities (less likely for birds unless they are breeding). • Loss of habitat due to land clearing. • Introduction and/or proliferation of weed species resulting in reduced habitat condition (wetter areas can be more susceptible to weed proliferation). • Altered surface and/or groundwater hydrology leading to reduced habitat condition. • Sedimentation and/or pollution of surface water and/or groundwater leading to reduced habitat condition. • Introduction and/or proliferation of feral fauna species leading to displacement of native fauna (low likelihood because of the already established suite of feral fauna populations). • Dust and/or noise emissions leading to reduced habitat condition (low likelihood because it is expected that very little riparian or wetland habitat will be disturbed).
Elasmobranchs (sawfish) Freshwater or Largetooth Sawfish Green Sawfish Speartooth Shark Dwarf Sawfish	Roper River and Gulf of Carpentaria	• Sedimentation and/or pollution of surface water leading to reduced habitat condition. • Direct mortality due to interactions with barges and/or ships (not a recognised threat and a low likelihood given these species are bottom dwelling).
Marine turtles Olive Ridley Turtle Leatherback Turtle	Gulf of Carpentaria	• Sedimentation and/or pollution of surface water leading to reduced habitat condition. • Direct mortality due to interactions with barges and/or ships. • Disorientation of hatchlings (leading to mortality) due to lights from the port and/or vessels used in the project. • Disturbance of feeding turtles because of noise from construction and operation activities (including ship movements).

6.3.3 Proposed mitigation measures

Biodiversity assessments will be undertaken across the mining areas, the transportation corridor and at the BLF site to supplement the information collected during previous site surveys. Assessments will target habitats/areas where threatened species are most likely to be present, and surveys will be timed to maximise the likelihood of detecting a species if present. In particular, the important shorebird habitat area near the BLF site will require further assessment once project activities are more well defined.

Surveys of the marine environment are not anticipated to be required; however, habitat assessments will be undertaken to confirm the absence of turtle nesting areas within the project area.

In the event that an important population of a threatened species is found to be at risk of impact from project activities, avoidance and mitigation measures will be developed by suitably qualified ecologists.

Risk based, site specific management plans will be developed and implemented to avoid, minimise or mitigate any adverse impacts on biodiversity or threatened species. Whilst such plans will be specifically tailored to suit the prevailing circumstances, given the nature of the existing environment and the proposed project, it is not

anticipated any unique or unusual management actions will need to be developed. Generic plans that have been approved for use in similar projects will include:

- Risk based Environmental Management Plan;
- Species specific Management Plans (for high risk species as required)
- Vegetation Clearing Management Plan
- Weed Management Plan
- Bushfire Management Plan
- Traffic Management Plan
- Dust Management Plan
- Noise Management Plan.

To minimise the risk of injury or mortality of marine fauna due to vessel strike, further assessment of specific species at risk is required. Targeted mitigation measures may be required for particular species and may include, for example:

- Avoidance of any identified significant habitat areas
- Vessel speed restrictions in certain areas or at certain times
- Noise and vibration management during construction and operations.

Impacts to marine fauna associated with spills of iron ore product and/or hydrocarbon spills will be minimised by ensuring loading and transhipment facilities are designed in accordance with relevant standards to minimise the likelihood of spills occurring. Project-specific Spill Response and Oil Spill Contingency Plans will also be developed and implemented.

6.4 Historic and cultural heritage

The known historic and cultural heritage values within the project area are described in Section 5.10 and in summary, key characteristics are:

- The project area does not encompass any sites listed on the NT Heritage Register.
- Aboriginal Sacred Sites are also known to occur in proximity to the project area and it is possible that previously unrecorded or registered sites exist.
- Previous surveys around Deposit C identified a number of Aboriginal archaeological sites that are protected under the *Heritage Act* and made a number of specific recommendations in relation to protecting heritage values.
- It is expected that archaeological sites will also be present in the other proposed mining areas and at the BLF site.

6.4.1 Potential impacts

The project activities could cause the following impacts to historic and cultural heritage values:

- Destruction of artefacts due to:
    - Land clearing activities
    - Construction activities
    - Operational activities.

- Damage to physical or spiritual places of historic and/or cultural heritage value due to:
    - Altered surface and/or groundwater flow
    - Altered landforms
    - Blast and other vibration.

6.4.2 Proposed mitigation measures

A Heritage Management Plan that incorporates the requirements of both the *Heritage Act* and the *Northern Territory Aboriginal Sacred Sites* Act will be developed and implemented to protect historic and cultural heritage values within the project area. Successful Heritage Management Plans in the Northern Territory are typically based on the following principles:

- Identification of sites:
    - The NLC and AAPA will be consulted in relation to Aboriginal sacred sites survey requirements.
    - Suitably qualified archaeologists and anthropologists will be engaged to advise on further archaeological assessment and survey requirements across the project area.
- Avoidance of sites wherever reasonably possible.
- Protection of the site where work must be undertaken in close proximity to the site.
- Seeking approvals if the site cannot be avoided. In the event that impacts to Aboriginal archaeological sites cannot be avoided, Works Approvals will be sought in accordance with the requirements of the *Heritage Act*. An Authority Certificate will be obtained from the AAPA based on the outcomes of any sacred sites surveys facilitated by the NLC.

The Heritage Management Plan will document the conditions of any Works Approvals and Authority Certificates. The Plan will detail site protection requirements and management procedures. The Plan will also document the procedures to follow if there are any new discoveries of Aboriginal archaeological sites.

NTIO is in the process of obtaining its own Authority Certificate/s for the project. In the meantime, NTIO will comply with the conditions set out in Authority Certificate number 2011/14619.

6.5 Social and economic

The social and economic environment of the Roper River region is briefly summarised in section 5.11 and in summary, key characteristics are:

- The region is sparsely populated, with people living mainly in the Aboriginal communities of Ngukurr, Urapunga and Minyerri, and pastoral homesteads.
- The Roper River is valued as a fishing and tourism destination.
- There are tourist attractions associated with the Limmen National Park and the Savannah Way tourism drive.
- There are currently minimal mining activities in the region, with most of the economy based on pastoral production and tourism.

6.5.1 Potential impacts

The potential social and economic impacts and opportunities associated with the project will be identified through an Economic and Social Impact Assessment (ESIA) to be conducted in accordance with NT EPA guidelines. NTIO appreciates that previous failure of iron ore developments in the region, including the

deposits that now comprise NTIO's Roper Valley Iron Ore Project, resulted in the expected employment, business, training and other expected economic benefits failing to materialise.

The type of adverse social and economic impacts that will be further assessed in the ESIA will include:

- Increased public road use by heavy vehicles
- Impacts on the Roper River fishing and tourism values
- Displacement of existing activities i.e. hunting, fishing
- Visual amenity impacts
- Impacts associated with increased incomes from employment on the project
- Additional burdens on local health and community services.

The type of positive social and economic opportunities that will be further assessed in the ESIA will include:

- Direct employment opportunities.
- Direct training opportunities.
- Cultural awareness opportunities including cross cultural training and improved identification, documentation and protection of sites of cultural significance.
- Business and contracting opportunities including operational and support services.
- Opportunities arising as a consequence of new, non-project customers including tourism, transport and accommodation ventures.
- Opportunities arising as a consequence of improved regional access and increased regional population.

6.5.2 Proposed mitigation measures

Consultation will be initiated with local and regional communities to discuss the potential impacts and opportunities associated with the project. Regional service providers and other stakeholders within an interest in the region will also be engaged as part of the EISA process.

The ESIA will inform the preparation of an Economic and Social Impact Management Plan (ESIMP) that will document measures to minimise potential negative impacts and maximise the uptake of opportunities provided by the project.

6.6 Noise and vibration

The region where the project is located is characterised by low levels of industrial development. Outside of the main communities, the land is sparsely populated. Background noise in the vicinity of the project is dominated by natural noise sources interspersed with noise from occasional traffic movements along the Roper Highway and periodic noise associated with helicopter mustering operations.

6.6.1 Potential impacts

The operation of the mobile (bulldozers, excavators and trucks) and static plant (power generators, crushers etc.) and blasting within the mining areas will cause localised noise emissions and ground vibration. As the mining areas are remote from communities i.e. the closest community Minyerri is located 15 km from the mining areas, noise impacts from mining activities would not be expected to occur.

The Roper Highway and Nathan River Road haulage route (on the southern side of the Roper River) traverses within 2 km of the community of Ngukurr (on the northern side of the Roper River) and there will be an increase

in noise in Ngukurr associated with truck movements. The section of the Hodgson Downs Road that will be utilised by the project is north of Minyerri and so will not increase traffic noise at the community.

Construction activities at the BLF will cause noise and vibration, and once operational, vessel movements will cause noise that could impact marine fauna. The potential impact on shorebird populations and marine species that utilise habitats nearby will require further assessment.

6.6.2 Mitigation measures

As the mining areas are remote from sensitive receptors it is not anticipated that specific noise mitigation will be required. Noise mitigation may be required at the BLF to reduce potential impacts to shorebird populations and the riverine environment. Noise modelling will be used to assess potential impacts and, if required, mitigation measures will be advised by a suitably qualified person.

6.7 Air emissions

The Roper River region is characterised by low levels of industrial development. Existing emissions are general limited to bushfire smoke and some localised dust emissions around unsealed roads.

6.7.1 Potential impacts

The project activities have potential to create a significant amount of dust. Site preparation works will involve land clearing, which has the potential to cause dust emissions. During operations, clearing, mining, processing, stockpiling and transport of material will all have the potential to generate dust. Loading of product onto barges and transhipment to OGV's also has potential to result in emissions of dust. The level of dust emissions will depend on site layout, collection or suppression methods, method of transportation, loading methods and ore characteristics (e.g. moisture content).

Increased dust levels can lead to a decline in vegetation health; however, studies on the effects of dust on plant growth (NSW Minerals Council 2000 and Lodge et al. 1981) have shown that, at the levels associated with mining, dust has little or no effect on plant growth.

The crystalline silica (quartz) component of dust from iron ore mining is of interest due to its potential for causing silicosis. The national recognised level (*NOHSC: 1003 Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment)* for crystalline silica is 0.1 mg/m^3 (exposure based on an eight hour working day, five days a week). If road transport routes are unsealed, dust emissions have potential to cause visibility issues for other road users.

The prevailing wind conditions during the dry season, when dust emissions will be greatest, are from the south and east. Dust produced from the mining areas is therefore expected to be dispersed to the north and west. These emissions, and dust produced by truck movements, could therefore impact on users of the Hodgson Downs Road and Roper Highway, but are not expected to impact on local communities.

Greenhouse Gas emissions will result from land clearing and exhaust emissions from machinery operating on the site. The emissions from a mine of the size proposed by NTIO are not expected to be significant in the context of the NT's overall emissions.

6.7.2 Mitigation measures

Air emissions from the project will be modelled to determine any requirements for targeted mitigation measures to ensure impacts to sensitive receptors, people and the environment, are within acceptable levels. The assessment will also inform any requirement for ongoing monitoring of emissions.

Sealing of the main transport routes that will be utilised by the project is being proposed to minimise dust generation.

Water will be used for dust suppression at the open pits, ore and product stockpiles and on unsealed roads as required. As mining advances, overburden will be progressively placed back into the pits thus minimising the exposure of waste rock stockpiles to wind erosion. Water requirements for dust suppression will be factored into the site water supply requirements and water balance calculations.

Design of the BLF will seek to minimise dust emissions at stockpiles and during barge loading. Similarly, dust controls will be in place at the transhipment site.

6.8 Cumulative impacts

Cumulative impacts have been considered as they relate to the Roper River region over the next five years. The Roper River region, for the purposes of the cumulative impact assessment, corresponds to the entire Roper River catchment, which shares a variety of common resources, and elements of social identity.

The region is the subject of current interest and a number of recent proposals and developments, particularly in mining. It is difficult to predict or assess any cumulative impacts beyond the short to medium term. The current economy in the area is largely reliant on pastoralism and some tourism. The remoteness of the region, lack of infrastructure and strongly seasonal climate has limited its economic development.

Recently, there has been increasing activity amongst a number of mining companies to exploit the mineral resources of the region, and it is expected that this will continue for the foreseeable future. There remains potential for restart of the Roper Bar Iron Ore project, situated on the Towns River approximately 100 km to the south-east of Deposit C. This mine has the capacity to produce 24 Mt over a nine-year period, though the life of the mine is expected to extend well beyond this period. In addition, an ilmenite project located approximately 16 km east of EL24102 may also restart in the future.

6.8.1 Water use

The key cumulative environmental impact associated with development in the region is associated with water use. Groundwater resources are limited and permanent surface water flows are restricted to the major rivers. The Roper River maintains base flow in most years as it is fed by groundwater discharge high in the catchment; however, the aquifer that feeds the Roper River is under increasing pressure and cease to flow conditions have occurred in the past. Whilst there are currently relatively low amounts of water extraction licensed across the region, increased extraction across the region has potential to reduce water flows in the Roper River and increase the frequencies of cease to flow conditions.

The project is not proposing to extract groundwater as a primary water source; however, in identifying sustainable surface water sources for the project, cumulative impacts will need to be considered.

6.8.2 Economic and social implications

It is likely that, at least initially, skilled workers will be sourced from outside the region on a FIFO basis. Positive impacts are expected as jobs and training become available within the region, which currently has a small employment base. Impacts may become negative if there is a shortage of labour and / or training opportunities for local people.

The NTIO project will require a workforce of 200-400 during construction and 150-300 during operations. This represents a significant increase in the regional population. If other mines were to establish in the region, there would be a cumulative impact associated with increased populations and higher incomes.

7 Matters of National Environmental Significance

The purpose of this section of the NOI is to determine the likelihood that the project will have a significant impact on any MNES. To assist with this, an EPBC Protected Matters Search Tool reports were generated on 20 January 2017 (see Appendix A). Those reports concluded that three MNES may occur within the project footprint:

- Commonwealth marine areas
- Listed threatened species
- Migratory species protected under international agreements.

Each of these is discussed in the sections below. An EPBC Referral will be submitted to the Commonwealth DEE.

7.1 Commonwealth marine areas

The Commonwealth marine area is defined in section 24 of the *EPBC Act* as any part of the sea within Australia's exclusive economic zone and/or over the continental shelf of Australia, that is not State or Northern Territory waters. It extends from 3 to 200 nautical miles from the coast.

The transhipment location will be located within Commonwealth waters approximately 40 km offshore in the Gulf of Carpentaria, which is part of the North Marine Region 'Commonwealth Marine Area'.

7.1.1 Likelihood of significant impact

The Commonwealth *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance* (DOE 2013) describe when an action is likely to have a significant impact on the environment in a Commonwealth marine area. The project is assessed against these guidelines, refer to Table 7-1. It is possible that the project activities could have a significant impact on the Commonwealth marine area.

Table 7-1. Likelihood of significant impact on a Commonwealth marine area

Possible impact	Likelihood of the impact occurring due to this project
An action is likely to have a significant impact on the environment in a Commonwealth marine area if there is a real chance or possibility that the action will:	
Result in a known or potential pest species becoming established in the Commonwealth marine area	**Unlikely.** Pest species could be brought into the region via contaminated construction vessels and/or OGV ballast water (an event against which there are many legally-prescribed safeguards).
Modify, destroy, fragment, isolate or disturb an important or substantial area of habitat such that an adverse impact on marine ecosystem functioning or integrity in a Commonwealth marine area results	**Unlikely.** Barge movements and transshipping will disturb a relatively small area of the marine environment associated with the barge transport route and transshipment site. Seafloor disturbance will be limited to a small area around the Transhipper mooring; there is no dredging proposed.
Have a substantial adverse effect on a population of a marine species or cetacean including its life cycle (for example, breeding, feeding, migration behaviour, life expectancy) and spatial distribution	**Possible.** Increased frequency of ship movements in the Limmen Bight could have this impact. Note: This potential impact has been assessed under the threatened species and migratory species criteria.
Result in a substantial change in air quality or water quality (including temperature) which may adversely impact on biodiversity, ecological integrity; social amenity or human health	**Unlikely.** A major chemical spill from an OGV is an event against which there are many legally-prescribed safeguards.
Result in persistent organic chemicals, heavy metals, or other potentially harmful chemicals accumulating in the marine environment such that biodiversity, ecological integrity, social amenity or human health may be adversely affected	**Unlikely.** Spills of iron ore product during loading and transshipment could cause iron ore to accumulate in the marine environment. However, iron ore is stable and chemically inert in the environment. MSDS indicates iron ore fines has no biological exposure limit [9]
Have a substantial adverse impact on heritage values of the Commonwealth marine area, including damage or destruction of an historic shipwreck.	**None.** Not relevant to this project – the region of the Commonwealth marine area in question is not known to have heritage values.

[9] Material Safety Data Sheet – Cliffs NR Iron Ore Pellets and Fines, Version #3, 26 February 2015

7.2 Listed threatened species

Searches of threatened species databases produced a list of 45 EPBC listed threatened species that have the potential to occur within the project footprint. A desktop 'likelihood of occurrence' assessment was undertaken for each of the species (refer Appendix D). The results are presented in Table 5-6 and summarised as follows for the project footprint:

- Sixteen species have a **high** chance of occurring.
- Eight species have a **medium** chance of occurring.
- Thirteen species have a **low** chance of occurring.
- Eight species are considered to not occur within the project footprint as it does not support important habitat features for these species, or the species range no longer extends to the area.

7.2.1 Likelihood of significant impact

The likelihood of significant impact on a Critically Endangered, Endangered or Vulnerable species is assessed against the criteria contained within the *EPBC Significant Impact Guidelines 1.1* (DoE 2013). It is acknowledged that there is incomplete information about which threatened species do occur within the project footprint, and the details available in relation to barge movements and transhipping activities are conceptual. Accordingly, Table 7-2 documents a preliminary assessment of the potential for significant impacts on threatened species applying the precautionary principle and using the most stringent criteria (i.e. those applying to Critically Endangered species).

Table 7-2. Significant impact assessment for MNES-listed threatened species

Possible impact	Likelihood of the impact occurring due to this project
An action is likely to have a significant impact on a Critically Endangered or 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.	**Possible.** If the project activities affect water flows or water quality in the Roper River, threatened species that occur in the river could be impacted, including Sawfish species. As the habitats impacted within the mining areas are widespread, any threatened species populations that occur within these areas are unlikely to be significantly impacted. Potential impacts to marine turtles are expected to be limited to vessel strike (as there are no known important nesting areas), which would not be expected to lead to population level impacts.
Reduce the area of occupancy of the species.	**Unlikely.** Could occur for threatened shorebirds if the port is placed within known roosting or feeding habitat, or for Australian Painted Snipe if a wetland is impacted. Land clearing in savannah woodland will reduce the area of occupancy for some species, but not in area that could be reasonably considered as significant to any of those species (given the extent of remaining contiguous habitat).
Fragment an existing population into two or more populations.	**Unlikely.** Perhaps only relevant in this context for a species with a more linear habitat, such as Water Mouse. If occurring in the port area, a population of that species could be fragmented if the placement of the port infrastructure bisects riparian habitat supporting that population.
Adversely affect habitat critical to the survival of a species.	**Unlikely.** No one species occurring within the project footprint is restricted to habitat that only (or even mostly) occurs within the footprint.
Disrupt the breeding cycle of a population.	**Possible.** Marine turtles are known to nest in the Limmen Bight. Nesting areas will not be directly impacted by project activities; however, it is possible that lights associated with barges/ships could disorientate turtle hatchlings, leading to their mortality. Vessel strikes impacting individual turtles, if occurring at high rates, could disrupt breeding.

Possible impact	Likelihood of the impact occurring due to this project
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	**Possible.** If the project activities affect water flows or water quality in the Roper River, habitats for threatened species that occur in the river could be impacted, including Sawfish species.
Result in the invasive species that are harmful to the species becoming established in the species' habitat.	**Unlikely.** For the most part, such invasive species already occur in the region. Existing pastoral activities present a greater risk of exotic weed introduction due to their widespread nature and movement of livestock, feedstock and vehicles throughout the Northern Territory Unmitigated weed proliferation could have such an impact on feeding and breeding habitat for some savannah species, particularly if it led to more intense and/or frequent bushfires.
Introduce disease that may cause the species to decline.	**Unlikely.** Introduced disease is not an identified threatening process for any of the species that occur.
Interfere with the recovery of the species.	**Possible**. Each species has its own list of recovery priorities and actions, and some of these may be hindered by activities associated with this project. Whether this has significant consequences can only be determined once the relevant species are identified and assessed.

7.3 Migratory species protected under international agreements

The EPBC Protected Matters Search (Appendix A) identified that the project footprint could support 29 migratory species that are protected under international agreements (excluding those also listed as threatened). For each of these species, a preliminary likelihood of occurrence has been undertaken based on distribution, ecology and historic records – see Table 7-3. It has been assumed that the barges and OGV's are not operating so close to Low Rock island (an important seabird nesting site) as to cause any disturbance to nesting birds. Table 7-3 does not include migratory shorebirds, which are assessed in Section 7.2 according to the relevant significant impact criteria.

When assessing if a project will significantly impact upon a migratory species, the key considerations under the *EPBC Significant Impact Guidelines 1.1* (DoE 2013) are whether an important habitat for a migratory species or an ecologically-significant population of a migratory species is involved. The preliminary likelihood of occurrence presented in Table 7-3 includes, for each relevant migratory species, an indicative assessment of whether important habitat and/or an ecologically-significant proportion of a population are likely to occur within the project footprint.

It is concluded that there are some migratory species that have a high likelihood of occurring in areas that will be directly or indirectly impacted by project activities. For most of them the habitat within the project footprint is not likely to meet the criteria for being an 'important' habitat (refer DoE (2013). For instance, sea birds that nest on Low Rock island likely feed within the marine waters of the project footprint, but probably as much so in the rest of the Gulf of Carpentaria as well.

Table 7-3. Likelihood of occurrence of listed migratory species within the project footprint

Scientific name	Common name	Likelihood	Important habitat?	Ecologically-significant population?	Comments
Marine birds					
Anous stolidus	Common Noddy	Low	No	No	Rarely encountered off the coast of the Northern Territory (DoE 2017).
Apus pacificus	Fork-tailed Swift	High	No	No	The airspace above the project footprint for feeding and passage.
Calonectris leucomelas	Streaked Shearwater	High	No	No	There are many records throughout the Gulf of Carpentaria, but does not breed in the region.
Fregata ariel	Lesser Frigatebird	Medium	No	No	Breed on the Qld side of the Gulf of Carpentaria.
Fregata minor	Greater Frigatebird	Medium	No	No	
Sterna albifrons	Little Tern	High	No	No	Breed in small numbers in the region (Chatto 2001).
Sterna anaethetus	Bridled Tern	High	No	No	Breed in large numbers on Low Rock island in Limmen Bight (Chatto 2001). Individuals forage within project footprint.
Sterna dougallii	Roseate Tern	High	No	No	
Sterna sumatrana	Black-naped Tern	High	No	No	
Marine species					
Anoxypristis cuspidata	Narrow Sawfish	High	Yes	Possible (further advice required)	There are many records of this little known species throughout the Gulf of Carpentaria. The Roper River mouth may be an important habitat during breeding and for immature fish.
Balaenoptera edeni	Bryde's Whale	Low	No	No	Not known from NT waters (DoE 2017).
Crocodylus porosus	Salt-water Crocodile	High	No	No	Occur in the Roper River and throughout the Gulf of Carpentaria.
Dugong dugong	Dugong	High	Possible (depending on proximity of project activity to sea grass)	Yes	There are sea grass areas known to support this species to the east and north of the Roper River mouth. Those populations are considered important (DoE 2017).
Manta alfredi	Reef Manta Ray	Low	No	No	No records for the Gulf of Carpentaria.
Manta birostris	Giant Manta Ray	Low	No	No	
Orcaella brevirostris	Irrawaddy Dolphin	High	Yes	Possible (further advice required)	Occur mostly near to the coast and to river mouths (DoE 2017). The Gulf of Carpentaria may be an important region for this species.
Orcinus orca	Killer Whale or Orca	Low	No	No	Only a few records for NT waters (DoE 2017).
Sousa chinensis	Indo-Pacific Humpback Dolphin	High	Yes	Possible (further advice required)	Occur mostly near to the coast and to river mouths (DoE 2017). The Gulf of Carpentaria may be an important region for this species.

Scientific name	Common name	Likelihood	Important habitat?	Ecologically-significant population?	Comments
Wetland species					
Acrocephalus orientalis	Oriental Reed-Warbler	Low	No	No	A vagrant in Australia.
Charadrius veredus	Oriental Plover	High	No	No	Likely summer migrant to inland open plains.
Glareola maldivarum	Oriental Pratincole	High	No	No	Likely summer migrant to inland open plains and coastal areas.
Limosa limosa	Black-tailed Godwit	Low	No	No	Not a common shorebird in the region (Chatto 2003).
Pandion haliaetus	Osprey	High	No	No	Likely this species forages within the project footprint. Possible breeding too.
Thalasseus bergii	Crested Tern	High	No	No	Breed on islands in Limmen Bight.
Terrestrial species					
Cecropis daurica	Red-rumped Swallow	Low	No	No	A vagrant in Australia.
Cuculus optatus	Oriental Cuckoo	Medium	No	No	Summer migrant to woodland.
Hirundo rustica	Barn Swallow	Low	No	No	A vagrant in Australia.
Motacilla cinerea	Grey Wagtail	Low	No	No	A vagrant in Australia.
Motacilla flava	Yellow Wagtail	Low	No	No	A vagrant in Australia.

7.3.1 Likelihood of significant impact

Migratory species (non-shorebird)

Four migratory species are assessed as those most likely to have important habitat and/or an ecologically-significant proportion of a population occurring within the project footprint. These are the Narrow Sawfish (*Anoxypristis cuspidata*), Dugong (*Dugong dugon*), Irrawaddy Dolphin (*Orcaella brevirostris*) and Indo-Pacific Humpback Dolphin (*Sousa chinensis*). Further investigation is required to more accurately determine whether or not important populations of these species are present.

Although there is incomplete information about the potential relationship between these species and the project's activities, it is possible to make some inferences for the purposes of undertaking an indicative assessment of the likelihood of significant impacts (considering them all collectively). This has been done against the criteria contained within the *EPBC Significant Impact Guidelines 1.1* (DoE 2013) (refer Table 7-4). It is concluded that, with the existing environment and project description information currently available, it is possible that all four species could be significantly impacted by the project.

Table 7-4. Likelihood of impacts to Narrow Sawfish, Dugong, Irrawaddy Dolphin and Indo-Pacific Humpback Dolphin

Action is likely to…	Likelihood of the impact occurring due to this project
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	**Possible**. Roper River and its receiving waters may be critical habitat for Sawfish species. If the project reduced flows or impacted water quality in the Roper River, an impact could occur, though flows have been known to cease completely naturally in the recent past. Noise generated during the construction and/or operation of the loading facility, as well as increased vessel activity around the mouth of the Roper River, could adversely impact important habitat areas for near-shore marine species.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	**Unlikely**. The project will not introduce invasive species to the aquatic or marine environments that may be important habitats for the four species of concern.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically-significant proportion of the population of a migratory species	**Possible**. Roper River and its receiving waters may be critical habitat during certain stages of these species' lifecycles – particularly breeding. If the project reduced flows or impacted water quality in the Roper River, an impact could occur, though flows have been known to cease completely naturally in the recent past. Noise generated during the construction and/or operation of the loading facility, as well as increased vessel activity around the mouth of the Roper River, all could have the effect of disrupting movements in and out of the river mouth, which occur as part of some species lifecycles.

Migratory shorebirds

EPBC Act Policy Statement 3.21 – Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species (Commonwealth of Australia 2015) defines the criteria for important habitat for migratory shorebirds as sites that support any of the following:

- At least 0.1 per cent of the flyway population of a single species
- At least 2,000 migratory shorebirds
- At least 15 migratory shorebird species.

Targeted shorebird surveys have been undertaken in the area, most comprehensively by Chatto (2003) between 1990 and 2001. Those surveys identified a roost of 2,000+ shorebirds (relative abundance of species unknown) proximate to the port. In 1996, Chatto counted 1,500 Red Knots near the mouth of the Roper River – making that location one of the three most important areas in the NT for that species. The region is also one of the four important areas in the NT for Eastern Curlew. Also recorded from the mouth of the Roper River was a count of 200 Broad-billed Sandpipers – making it one of only two sites in NT to support such an abundance of that species. Chatto did not record any particular shorebird species as occurring in internationally-significant numbers (determined as a single count within a local area of at least one per cent of the flyway population), but did record approximately ten species as occurring in nationally-significant numbers.

Further historical data acquisition and analysis is required to clarify where shorebirds species roost in the Roper River mouth area, and the diversity and abundance of those species. However, in the absence of absolute values, there is sufficient existing information from Chatto (2008) to suggest that the mouth of the Roper River may meet *EPBC Act* criteria for listing as nationally-important, and possibly internationally-important, habitat.

Given that the shorebird species in question all roost and forage in similar areas of the project footprint, the threat to each species is essentially the same. Therefore, the likelihood of significant impact by this development on these species is assessed collectively in Table 7-5 against the criteria contained within the *EPBC Act Policy Statement 3.21* (Commonwealth of Australia 2015).

Whether or not there is a significant impact on migratory shorebirds will largely depend on (a) how close the BLF is located to shorebird roosting and/or feeding habitat, and (b) the composition and size of the flock of migratory shorebirds that routinely use that habitat. An important population close to the BLF has a high likelihood of being significantly impacted upon; a minor and/or less proximate population has a low likelihood.

Table 7-5. Likelihood of significant impact on migratory shorebirds

Possible impact	Likelihood of the impact occurring due to this project
Loss of habitat.	**Unlikely**. Whether or not there will be any direct loss of habitat for migratory shorebirds will depend on the location of the BLF in relation to the important habitat areas. As this has not yet been determined, this impact cannot be reliably assessed until further work is undertaken, however the direct disturbance footprint of the BLF is relatively small. Disturbance to roosting and feeding shorebirds is addressed below.
Degradation of habitat leading to a *substantial reduction** in migratory shorebird numbers	**Unlikely**. The *EPBC Act Policy Statement 3.21 – Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species* (Commonwealth of Australia 2015) consider habitat degradation to be 'any activity that reduces the ability of shorebirds to use an area for roosting or foraging, or reduces the availability of food'. Development and operation of the BLF is not expected to directly degrade shorebird habitats; however, increased activity in the area will increase disturbance, which could indirectly impact on shorebird numbers (see below).
Increased disturbance leading to a *substantial reduction** in migratory shorebird numbers.	**Possible**. Construction activities and/or personnel movements in proximity to mudflats could cause disturbance of roosting and/or feeding birds. Disturbance to those birds and may significantly reduce the opportunity for those birds to access and utilise those sites. The result may be a substantial reduction in the number of migratory shorebird numbers that historically use that area of Roper River mouth as a roost. It is feasible that this reduction in use by these shorebirds will lead to some degree of long-term decrease in the size of the regional population.
Direct mortality of birds leading to a *substantial reduction** in migratory shorebird numbers.	**Unlikely**. Project activities will not introduce the risk of direct mortality to shorebirds. There is no likelihood that an increase in traffic because of the development will lead to an increase in vehicle collision with shorebirds, because they move about the region over the sea, not inland. Spill management measures are expected to limit any potential impact of oil spills on the marine and shore environments.

** A 'substantial reduction' includes the number of migratory shorebirds using an area*

7.4 Will the project be referred?

This project **<u>will be referred</u>** to DEE under the *EPBC Act*.

8 Conclusion

This NOI aims to provide sufficient information about the proposed project activities, existing environment and proposed management measures, for a decision to be made regarding the likelihood that this project will have potential to have a significant impact on the environment. NTIO is of the view that the project does have potential to cause significant impact to the environment for the following reasons:

- Land clearing within the mining areas and BLF site could impact sensitive vegetation types and habitats, with subsequent impacts on biodiversity.
- Project activities have potential to introduce and spread weeds, with subsequent impacts on biodiversity and other land uses.
- Extraction of water from the Roper River and other surface waters has potential to reduce flows downstream, which could impact on environmental, recreational, tourism and aesthetic values.
- Mining and transport activities will increase the risk of soil erosion and dust emissions.
- Construction of the BLF, and vessel movements to and from the transhipment site, could impact threatened and migratory marine species that utilise the near-shore environments.
- Construction and operation of the BLF could cause disturbance of important shorebird habitats.
- Aboriginal archaeological heritage sites and sacred sites could be damaged or destroyed.
- Use of public roads for transportation of ore product to the BLF will significantly increase traffic on the Hodgson Downs Road, Roper River Road and Nathan River Road, which could increase the risk of vehicle accidents.
- Potential impacts to stakeholders, including landowners and Traditional Owners, due to exclusion from the mining areas, increased road traffic and activity at Port Roper.
- Potential social, cultural and economic impacts, including the risk of project opportunities not being realised, which has occurred in the past.

It is expected that this project will trigger the requirement for assessment at the level of an EIS under both the *EA Act* and *EPBC Act*.

NTIO is of the view that the potential impacts associated with this project are manageable and is confident that the proposed mitigation measures will be effective. NTIO is committed to ensuring the project does not result in significant environmental harm, and is actively developing plans to ensure the project operates in an environmentally sustainable and responsible manner.

9 References

ADWG 2004, *Australian drinking water guidelines*, National Health and Medical Research Council.

AIATSIS 2000, *Australian Institute of Aboriginal and Torres Strait Islander Studies*, Australian Indigenous Language Map, Canberra.

Alarcon-Leon E 2013, *Ground Water Assessment: Implications for Mine Water Management – Deposit C Sherwin Creek Iron Ore Project*, Appendix to EIS, Pendragon Environmental Solutions, November 2013.

ANZECC 2000, *Australian Water Quality Guidelines for Fresh and Marine Waters*, Australian and New Zealand Environment and Conservation Council, Kingston.

Bannister, JL, Kemper, CM & Warneke, RM, 1996, *The Action Plan for Australian Cetaceans*. Canberra: Australian Nature Conservation Agency.

BOM 2017b, *Tropical Cyclones*, accessed 19 January 2017, <http://www.bom.gov.au/climate/maps/averages/tropical-cyclones/>.

Bureau of Meteorology 2017a, *Climate Data Online*, accessed 19 January 2017 <http://www.bom.gov.au/climate/data/>.

Bushtel 2016, *Community profiles*, Northern Territory Government, accessed 17 January 2017 <www.bushtel.nt.gov.au>.

CSIRO 2009, *Water in the Roper region*, pp 59-120 in CSIRO (2009) Water in the Gulf of Carpentaria Drainage Division, A report to the Australian Government from the CSIRO Northern Australia Sustainable Yields Project, CSIRO Water for a Healthy Country Flagship, Australia. xl + 479pp

CSIRO 2006, *Atlas of Australian Acid Sulphate Soils,* Commonwealth Scientific and Industrial Research Organisation <www.asris.csiro.au>.

Delaney R, 2012, *Limmen Bight Marine and Coastal Biodiversity Values,* Parks and Wildlife Service NT, accessed 25 January 2017 <https://denr.nt.gov.au/__data/assets/pdf_file/0009/255087/Limmen-Marine-Technical-Report.pdf>

Department of the Environment (DoE) 2013, *Matters of National Environmental Significance - Significant impact guidelines 1.1*, Commonwealth fo Australia, Canberra.

Department of the Environment and Energy (DEE) 2017, *Species Profile and Threats Database*, accessed 5 January 2017 <https://www.environment.gov.au/sprat-public/action/kef/view/84;jsessionid=01AD87551D0DE1B0248C8722BE137004>.

Department of the Environment, Water, Heritage and the Arts (DEWHA) 2007, *Characterisation of the Marine Environment of the North Marine Region* – Outcomes of an expert workshop – Darwin, Northern Territory, North Marine Bioregional Planning Section.

Earth Sea Heritage Surveys 2013, *An assessment of the archaeological potential of Area C and the proposed haul road*, Sherwin Rion 2013, Draft V1.1, Darwin, NT.

European Commission 1999, *Guidelines for the assessment of indirect and cumulative impacts as well as impact interactions*, Office for Official Publications of the European Communities, Luxembourg.

Freeman A, Thomson S and Cann J 2014, *Elseya lavarackorum – Gulf Snapping Turtle, Gulf Snapper, Riversleigh Snapping Turtle, Lavarack's Turtle,* in Conservation Biology of Freshwater Turtles and Tortoises – Chelonian Research Monographs, No. 5. Accessed 1 March 2017 <http://www.iucn-tftsg.org/wp-content/uploads/file/Accounts/crm_5_082_lavarackorum_v1_2014.pdf>.

GHD 2015a, *Report for Sherwin Iron Ltd - Roper River Iron Ore Project* - Deposit C DSO Proposal.

GHD 2015b, *Roper River Iron Ore Project - Deposit C DSO Proposal AMD Assessment and Management Plan*

Knapton A 2009, *Gulf Water Study Integrated Surface Groundwater Model of the Roper River Catchment Part A: Coupled Surface – Groundwater Model*, NT Department of Natural Resources, Environment, The Arts and Sport, Darwin.

Kraatz M 2004, *Roper River Catchment Natural Resource Management Plan*, Roper River Landcare Group Incorporated.

Lodge J, Waggoner A, Klodt D and Crain C 1981, *Non-health effects of airborne particulate matter,* Atmospheric Environment Volume 15, 431-482.

New South Wales (NSW) Minerals Council 2000, *Particulate Matter and Mining*, Technical paper, Interim Report.

NT Environment Protection Authority (NT EPA) 2014, *Sherwin Creek Iron Ore Project - Sherwin iron Pty Ltd*, Assessment Report 75, May 2014, Darwin, Northern Territory. Accessed 17 January 2017 <https://ntepa.nt.gov.au/__data/assets/pdf_file/0008/290492/sherwin_assessment_report.pdf>.

NT Environment Protection Authority (NT EPA) 2015, *Draft Guidelines for the preparation of a Notice of Intent*, Version 0.7, Darwin, Northern Territory.

NT Government 2006, *Northern Territory Water Allocation Planning Framework*, NT Department of Natural Resources, Environment, the Arts and Sport, Darwin.

Pendragon Environmental Solutions 2013, *Ground Water Assessment - Implications for Mine Water Management* - Deposit C Sherwin Creek Iron Ore Project - Sherwin Iron Ltd, Revision No 1, Northbridge WA.

SRK Consulting 2012, *ASX announcement - Independent Technical and Fair Market Valuation Update Report* (2012) on Roper River Iron Ore Project

Tickell S J 1994, *Dryland Salinity Hazard of the Northern Territory*, Northern Territory of Australia.

URS Australia Pty Ltd 2010, *Desktop Hydrological Study – Hodgson Downs Iron Ore Project*, Final report - Prepared for Engenium Pty Ltd, Darwin, Australia.

Wilson PL, Brocklehurst PS, Clark MJ and Dickinson KJM 1990, *Vegetation survey of the Northern Territory, Australia*, Conservation Commission, Northern Territory.

Yin Foo D 2000, *Water resources development map commentary notes: Avago, Birdum Creek, Maryfield, Middlecreek, Sunday Creek, Tarlee, Vermelha and Western Creek Stations*, Northern Territory Government.

Zaar U, 2009, *Gulf Water Study – Water resources of the Roper River Region,* Northern Territory Government, Darwin, NT.

Appendix A EPBC Act Protected Matters Reports

- **Report 1 Deposit C**
- **Report 2 Deposits X & W**
- **Report 3 Barge Loading Facility**
- **Report 4 Transhipping**

Australian Government
Department of the Environment and Energy

EPBC Act Protected Matters Report

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

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

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

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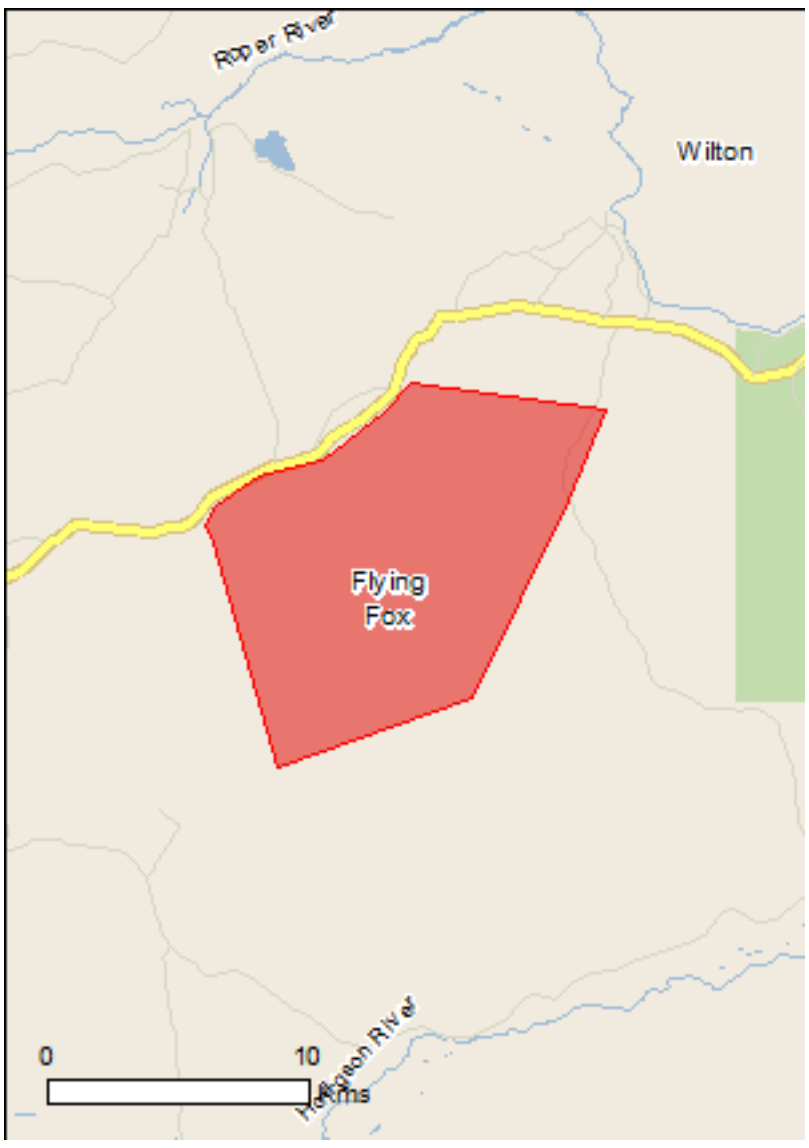

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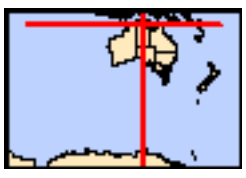

Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	26
Listed Migratory Species:	25

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	26
Whales and Other Cetaceans:	1
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

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

State and Territory Reserves:	2
Regional Forest Agreements:	None
Invasive Species:	15
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities		[Resource Information]
For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.		
Name	Status	Type of Presence
Arnhem Plateau Sandstone Shrubland Complex	Endangered	Community may occur within area

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Erythrura gouldiae Gouldian Finch [413]	Endangered	Species or species habitat known to occur within area
Falcunculus frontatus whitei Crested Shrike-tit (northern), Northern Shrike-tit [26013]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Tyto novaehollandiae kimberli Masked Owl (northern) [26048]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Antechinus bellus Fawn Antechinus [344]	Vulnerable	Species or species habitat may occur within area
Conilurus penicillatus Brush-tailed Rabbit-rat, Brush-tailed Tree-rat, Pakooma [132]	Vulnerable	Species or species habitat may occur within area
Dasyurus hallucatus Northern Quoll, Digul [331]	Endangered	Species or species habitat known to occur within area

Name	Status	Type of Presence
[Macroderma gigas](#)		
Ghost Bat [174]	Vulnerable	Breeding likely to occur within area
[Macrotis lagotis](#)		
Greater Bilby [282]	Vulnerable	Species or species habitat likely to occur within area
[Notomys aquilo](#)		
Northern Hopping-mouse, Woorrentinta [123]	Vulnerable	Species or species habitat may occur within area
[Phascogale pirata](#)		
Northern Brush-tailed Phascogale [82954]	Vulnerable	Species or species habitat likely to occur within area
[Saccolaimus saccolaimus nudicluniatus](#)		
Bare-rumped Sheath-tailed Bat, Bare-rumped Sheathtail Bat [66889]	Vulnerable	Species or species habitat may occur within area
Reptiles		
[Caretta caretta](#)		
Loggerhead Turtle [1763]	Endangered	Species or species habitat may occur within area
[Chelonia mydas](#)		
Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
[Dermochelys coriacea](#)		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat may occur within area
[Elseya lavarackorum](#)		
Gulf Snapping Turtle [67197]	Endangered	Species or species habitat known to occur within area
[Eretmochelys imbricata](#)		
Hawksbill Turtle [1766]	Vulnerable	Species or species habitat may occur within area
[Lepidochelys olivacea](#)		
Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat may occur within area
[Natator depressus](#)		
Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
Sharks		
[Glyphis glyphis](#)		
Speartooth Shark [82453]	Critically Endangered	Species or species habitat may occur within area
[Pristis clavata](#)		
Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
[Pristis pristis](#)		
Largetooth Sawfish, Freshwater Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
[Pristis zijsron](#)		
Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area

Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
[Apus pacificus](#)		
Fork-tailed Swift [678]		Species or species

Name	Threatened	Type of Presence
		habitat likely to occur within area
Migratory Marine Species		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat may occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat may occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat may occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat may occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis Largetooth Sawfish, Freshwater Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat may occur within area
Migratory Terrestrial Species		
Cecropis daurica Red-rumped Swallow [80610]		Species or species habitat may occur within area
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat known to occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Acrocephalus orientalis		
Oriental Reed-Warbler [59570]		Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Charadrius veredus		
Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Glareola maldivarum		
Oriental Pratincole [840]		Species or species habitat may occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus		
Osprey [952]		Species or species habitat known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

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

Name
Commonwealth Land -

Listed Marine Species [Resource Information]

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

Name	Threatened	Type of Presence
Birds		
Acrocephalus orientalis		
Oriental Reed-Warbler [59570]		Species or species habitat may occur within area
Anseranas semipalmata		
Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Cuculus saturatus Oriental Cuckoo, Himalayan Cuckoo [710]		Species or species habitat known to occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundo daurica Red-rumped Swallow [59480]		Species or species habitat may occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat may occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Crocodylus johnstoni Freshwater Crocodile, Johnston's Crocodile, Johnston's River Crocodile [1773]		Species or species habitat may occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Lepidochelys olivacea		
Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat may occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area

Whales and other Cetaceans [Resource Information]

Name	Status	Type of Presence
Mammals		
Sousa chinensis		
Indo-Pacific Humpback Dolphin [50]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Limmen	NT
Wongalara	NT

Invasive Species [Resource Information]

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

Name	Status	Type of Presence
Frogs		
Rhinella marina		
Cane Toad [83218]		Species or species habitat likely to occur within area
Mammals		
Bos taurus		
Domestic Cattle [16]		Species or species habitat likely to occur within area
Bubalus bubalis		
Water Buffalo, Swamp Buffalo [1]		Species or species habitat likely to occur within area
Canis lupus familiaris		
Domestic Dog [82654]		Species or species habitat likely to occur within area
Equus asinus		
Donkey, Ass [4]		Species or species habitat likely to occur within area
Equus caballus		
Horse [5]		Species or species habitat likely to occur within area
Felis catus		
Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Rattus rattus		
Black Rat, Ship Rat [84]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Plants		
Acacia nilotica subsp. indica Prickly Acacia [6196]		Species or species habitat may occur within area
Jatropha gossypifolia Cotton-leaved Physic-Nut, Bellyache Bush, Cotton-leaf Physic Nut, Cotton-leaf Jatropha, Black Physic Nut [7507]		Species or species habitat likely to occur within area
Mimosa pigra Mimosa, Giant Mimosa, Giant Sensitive Plant, ThornySensitive Plant, Black Mimosa, Catclaw Mimosa, Bashful Plant [11223]		Species or species habitat likely to occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
Vachellia nilotica Prickly Acacia, Blackthorn, Prickly Mimosa, Black Piquant, Babul [84351]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area

Caveat

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

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

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

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

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

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-14.7604 134.221923,-14.75376 134.225356,-14.744464 134.239776,-14.738487 134.261749,-14.722835 134.282842,-14.713538 134.292455,-14.722171 134.35906,-14.752054 134.346014,-14.817781 134.313741,-14.840163 134.246862,-14.765812 134.22489,-14.765812 134.22489,-14.7604 134.221923

Acknowledgements

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

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

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

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

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Australian Government
Department of the Environment and Energy

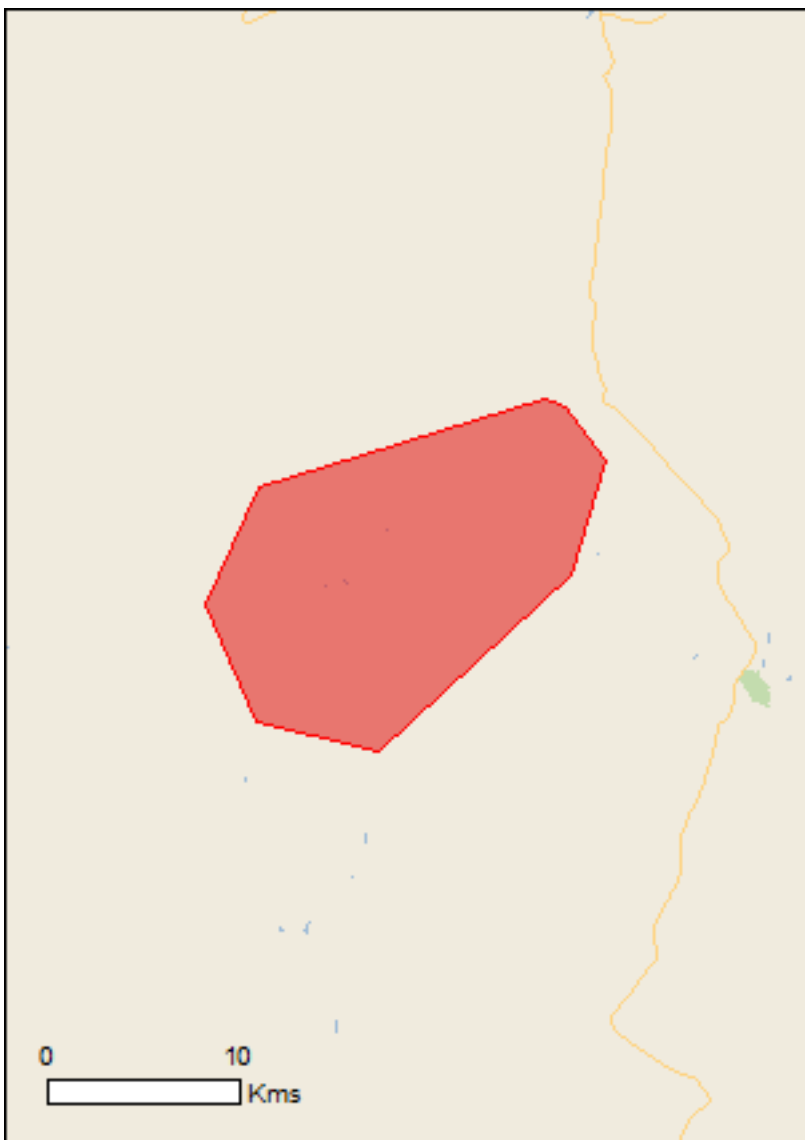
EPBC Act Protected Matters Report

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

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

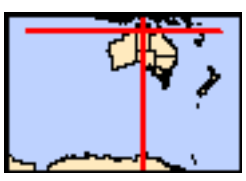
Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 20/01/17 16:42:51



Coordinates

Buffer: 50.0Km



Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	17
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 http://www.environment.gov.au/heritage

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

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	19
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	20
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Erythrura gouldiae Gouldian Finch [413]	Endangered	Species or species habitat known to occur within area
Falcunculus frontatus whitei Crested Shrike-tit (northern), Northern Shrike-tit [26013]	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Tyto novaehollandiae kimberli Masked Owl (northern) [26048]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Conilurus penicillatus Brush-tailed Rabbit-rat, Brush-tailed Tree-rat, Pakooma [132]	Vulnerable	Species or species habitat may occur within area
Dasyurus hallucatus Northern Quoll, Digul [331]	Endangered	Species or species habitat likely to occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Breeding likely to occur within area
Macrotis lagotis Greater Bilby [282]	Vulnerable	Species or species habitat likely to occur within area
Notomys aquilo Northern Hopping-mouse, Woorrentinta [123]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat may occur within area
Phascogale pirata		
Northern Brush-tailed Phascogale [82954]	Vulnerable	Species or species habitat may occur within area
Saccolaimus saccolaimus nudicluniatus		
Bare-rumped Sheath-tailed Bat, Bare-rumped Sheathtail Bat [66889]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Elseya lavarackorum		
Gulf Snapping Turtle [67197]	Endangered	Species or species habitat known to occur within area
Sharks		
Pristis pristis		
Largetooth Sawfish, Freshwater Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area

Listed Migratory Species [Resource Information]

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

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Marine Species		
Crocodylus porosus		
Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Pristis pristis		
Largetooth Sawfish, Freshwater Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
Migratory Terrestrial Species		
Cecropis daurica		
Red-rumped Swallow [80610]		Species or species habitat may occur within area
Cuculus optatus		
Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundo rustica		
Barn Swallow [662]		Species or species habitat may occur within area
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Charadrius veredus		
Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Glareola maldivarum		
Oriental Pratincole [840]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus		
Osprey [952]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Anseranas semipalmata		
Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Charadrius veredus		
Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Cuculus saturatus		
Oriental Cuckoo, Himalayan Cuckoo [710]		Species or species habitat may occur within area
Glareola maldivarum		
Oriental Pratincole [840]		Species or species habitat may occur within area
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundo daurica		
Red-rumped Swallow [59480]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Hirundo rustica		
Barn Swallow [662]		Species or species habitat may occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus		
Osprey [952]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato)		
Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Reptiles		
Crocodylus johnstoni		
Freshwater Crocodile, Johnston's Crocodile, Johnston's River Crocodile [1773]		Species or species habitat may occur within area
Crocodylus porosus		
Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area

Extra Information

Invasive Species [Resource Information]

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

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

Name	Status	Type of Presence
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Bubalus bubalis Water Buffalo, Swamp Buffalo [1]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Equus asinus Donkey, Ass [4]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Plants		
Acacia nilotica subsp. indica Prickly Acacia [6196]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area
Jatropha gossypifolia Cotton-leaved Physic-Nut, Bellyache Bush, Cotton-leaf Physic Nut, Cotton-leaf Jatropha, Black Physic Nut [7507]		Species or species habitat likely to occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
Parthenium hysterophorus Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566]		Species or species habitat may occur within area
Prosopis spp. Mesquite, Algaroba [68407]		Species or species habitat likely to occur within area
Vachellia nilotica Prickly Acacia, Blackthorn, Prickly Mimosa, Black Piquant, Babul [84351]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area

Caveat

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

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

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

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

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

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-15.10136 133.993662,-15.126549 134.012888,-15.177676 133.996408,-15.257184 133.907144,-15.243935 133.849466,-15.190929 133.82612,-15.137911 133.850839,-15.098138 133.984049,-15.098138 133.984049,-15.10136 133.993662

Acknowledgements

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

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

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

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

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Australian Government
Department of the Environment and Energy

EPBC Act Protected Matters Report

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

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

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

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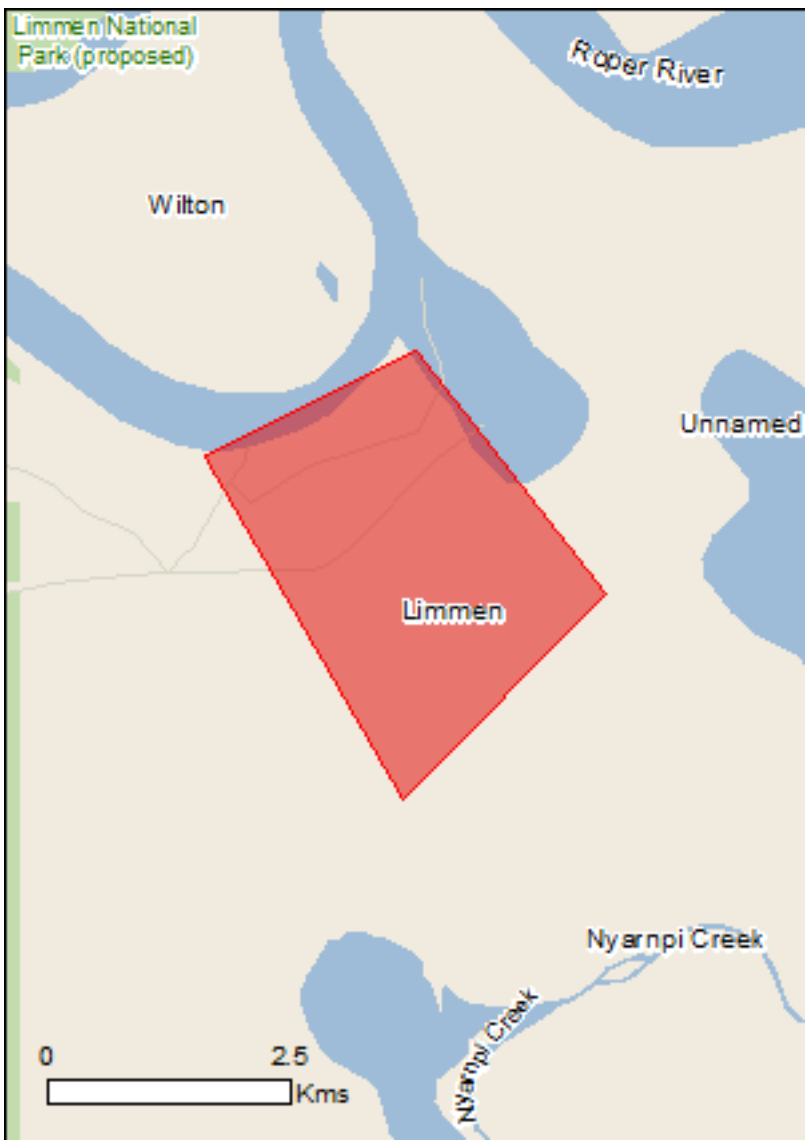

Coordinates
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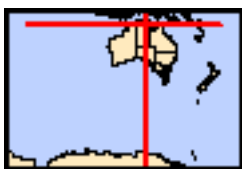

Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	34
Listed Migratory Species:	47

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	81
Whales and Other Cetaceans:	11
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	1

Extra Information

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

State and Territory Reserves:	1
Regional Forest Agreements:	None
Invasive Species:	13
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	1

Details

Matters of National Environmental Significance

Commonwealth Marine Area [Resource Information]

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

Name
EEZ and Territorial Sea

Marine Regions [Resource Information]

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

Name
North

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat likely to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Erythrura gouldiae Gouldian Finch [413]	Endangered	Species or species habitat known to occur within area
Falcunculus frontatus whitei Crested Shrike-tit (northern), Northern Shrike-tit [26013]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur

Name	Status	Type of Presence within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Tyto novaehollandiae kimberli Masked Owl (northern) [26048]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Conilurus penicillatus Brush-tailed Rabbit-rat, Brush-tailed Tree-rat, Pakooma [132]	Vulnerable	Species or species habitat may occur within area
Dasyurus hallucatus Northern Quoll, Digul [331]	Endangered	Species or species habitat likely to occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Breeding likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat may occur within area
Notomys aquilo Northern Hopping-mouse, Woorrentinta [123]	Vulnerable	Species or species habitat may occur within area
Phascogale pirata Northern Brush-tailed Phascogale [82954]	Vulnerable	Species or species habitat may occur within area
Saccolaimus saccolaimus nudicluniatus Bare-rumped Sheath-tailed Bat, Bare-rumped Sheathtail Bat [66889]	Vulnerable	Species or species habitat known to occur within area
Xeromys myoides Water Mouse, False Water Rat, Yirrkoo [66]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Acanthophis hawkei Plains Death Adder [83821]	Vulnerable	Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Elseya lavarackorum Gulf Snapping Turtle [67197]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour known

Name	Status	Type of Presence
		to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sharks		
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Glyphis glyphis		
Speartooth Shark [82453]	Critically Endangered	Species or species habitat may occur within area
Pristis clavata		
Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis		
Largetooth Sawfish, Freshwater Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron		
Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

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

Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus		
Common Noddy [825]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Calonectris leucomelas		
Streaked Shearwater [1077]		Species or species habitat may occur within area
Fregata ariel		
Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor		
Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Sterna albifrons		
Little Tern [813]		Species or species habitat may occur within area
Sterna anaethetus		
Bridled Tern [814]		Breeding known to occur within area
Sterna dougallii		
Roseate Tern [817]		Breeding known to occur within area
Sterna sumatrana		
Black-naped Tern [800]		Breeding known to occur within area
Migratory Marine Species		
Anoxypristis cuspidata		
Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Dugong dugon Dugong [28]		Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour known to occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat may occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Orcaella brevirostris Irrawaddy Dolphin [45]		Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis Largetooth Sawfish, Freshwater Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat known to occur within area
Migratory Terrestrial Species		
Cecropis daurica Red-rumped Swallow [80610]		Species or species habitat may occur within area
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Acrocephalus orientalis Oriental Reed-Warbler [59570]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat likely to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur

Name	Threatened	Type of Presence
		within area
Thalasseus bergii		
Crested Tern [83000]		Breeding known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

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

Name
Commonwealth Land -

Listed Marine Species [Resource Information]

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

Name	Threatened	Type of Presence
Birds		
Acrocephalus orientalis		
Oriental Reed-Warbler [59570]		Species or species habitat may occur within area
Anous stolidus		
Common Noddy [825]		Species or species habitat may occur within area
Anseranas semipalmata		
Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Calidris canutus		
Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris		
Great Knot [862]	Critically Endangered	Species or species habitat likely to occur

Name	Threatened	Type of Presence within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Cuculus saturatus Oriental Cuckoo, Himalayan Cuckoo [710]		Species or species habitat may occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundo daurica Red-rumped Swallow [59480]		Species or species habitat may occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Sterna albifrons Little Tern [813]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Sterna anaethetus Bridled Tern [814]		Breeding known to occur within area
Sterna bengalensis Lesser Crested Tern [815]		Breeding known to occur within area
Sterna bergii Crested Tern [816]		Breeding known to occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sterna sumatrana Black-naped Tern [800]		Breeding known to occur within area
Fish		
Campichthys tricarinatus Three-keel Pipefish [66192]		Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
Festucalex cinctus Girdled Pipefish [66214]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
Hippichthys cyanospilos Blue-speckled Pipefish, Blue-spotted Pipefish [66228]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus spinosissimus Hedgehog Seahorse [66239]		Species or species habitat may occur within area
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Mammals		
Dugong dugon Dugong [28]		Species or species habitat known to occur within area
Reptiles		
Acalyptophis peronii Horned Seasnake [1114]		Species or species habitat may occur within area
Aipysurus duboisii Dubois' Seasnake [1116]		Species or species habitat may occur within area
Aipysurus eydouxii Spine-tailed Seasnake [1117]		Species or species habitat may occur within area
Aipysurus laevis Olive Seasnake [1120]		Species or species habitat may occur within area
Astrotia stokesii Stokes' Seasnake [1122]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Crocodylus johnstoni Freshwater Crocodile, Johnston's Crocodile, Johnston's River Crocodile [1773]		Species or species habitat may occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur

Name	Threatened	Type of Presence within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Disteira kingii Spectacled Seasnake [1123]		Species or species habitat may occur within area
Disteira major Olive-headed Seasnake [1124]		Species or species habitat may occur within area
Enhydrina schistosa Beaked Seasnake [1126]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Hydrelaps darwiniensis Black-ringed Seasnake [1100]		Species or species habitat may occur within area
Hydrophis atriceps Black-headed Seasnake [1101]		Species or species habitat may occur within area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area
Hydrophis inornatus Plain Seasnake [1107]		Species or species habitat may occur within area
Hydrophis mcdowelli null [25926]		Species or species habitat may occur within area
Hydrophis ornatus Spotted Seasnake, Ornate Reef Seasnake [1111]		Species or species habitat may occur within area
Hydrophis pacificus Large-headed Seasnake, Pacific Seasnake [1112]		Species or species habitat may occur within area
Lapemis hardwickii Spine-bellied Seasnake [1113]		Species or species habitat may occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Parahydrophis mertoni Northern Mangrove Seasnake [1090]		Species or species habitat may occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans [Resource Information]

Name	Status	Type of Presence
Mammals		

Name	Status	Type of Presence
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat may occur within area
Orcaella brevirostris Irrawaddy Dolphin [45]		Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat known to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Commonwealth Reserves Marine	[Resource Information]
Name	Label
Limmen	Multiple Use Zone (IUCN VI)

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Limmen	NT

Invasive Species	[Resource Information]

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

Name	Status	Type of Presence
Frogs		
Rhinella marina Cane Toad [83218]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Bubalus bubalis Water Buffalo, Swamp Buffalo [1]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Equus asinus Donkey, Ass [4]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Plants		
Acacia nilotica subsp. indica Prickly Acacia [6196]		Species or species habitat may occur within area
Jatropha gossypifolia Cotton-leaved Physic-Nut, Bellyache Bush, Cotton-leaf Physic Nut, Cotton-leaf Jatropha, Black Physic Nut [7507]		Species or species habitat likely to occur within area
Mimosa pigra Mimosa, Giant Mimosa, Giant Sensitive Plant, ThornySensitive Plant, Black Mimosa, Catclaw Mimosa, Bashful Plant [11223]		Species or species habitat likely to occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
Parthenium hysterophorus Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566]		Species or species habitat may occur within area

Nationally Important Wetlands [Resource Information]

Name	State
Limmen Bight (Port Roper) Tidal Wetlands System	NT

Key Ecological Features (Marine) [Resource Information]

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

Name	Region
Gulf of Carpentaria coastal zone	North

Caveat

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

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

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

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

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

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-14.756038 135.315434,-14.746741 135.335003,-14.768514 135.352612,-14.786772 135.333729,-14.75623 135.315533,-14.75623 135.315533,-14.756038 135.315434

Acknowledgements

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

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

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

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

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EPBC Act Protected Matters Report

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

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

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

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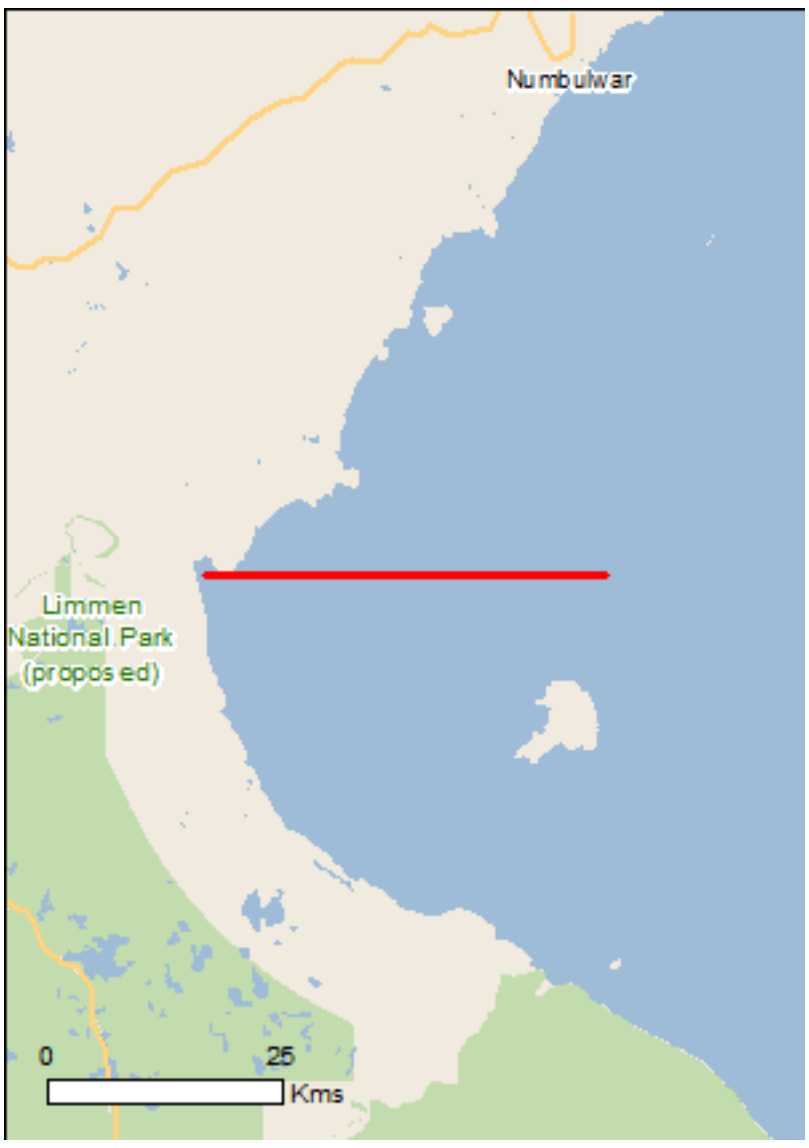

Coordinates
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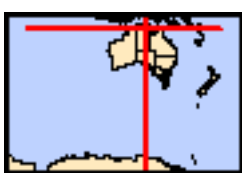


Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	34
Listed Migratory Species:	48

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	81
Whales and Other Cetaceans:	11
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	1

Extra Information

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

State and Territory Reserves:	1
Regional Forest Agreements:	None
Invasive Species:	12
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	1

Details

Matters of National Environmental Significance

Commonwealth Marine Area [Resource Information]

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

Name
EEZ and Territorial Sea

Marine Regions [Resource Information]

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

Name
North

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat likely to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Erythrura gouldiae Gouldian Finch [413]	Endangered	Species or species habitat known to occur within area
Falcunculus frontatus whitei Crested Shrike-tit (northern), Northern Shrike-tit [26013]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur

Name	Status	Type of Presence within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Tyto novaehollandiae kimberli Masked Owl (northern) [26048]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Conilurus penicillatus Brush-tailed Rabbit-rat, Brush-tailed Tree-rat, Pakooma [132]	Vulnerable	Species or species habitat may occur within area
Dasyurus hallucatus Northern Quoll, Digul [331]	Endangered	Species or species habitat likely to occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Breeding likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat may occur within area
Notomys aquilo Northern Hopping-mouse, Woorrentinta [123]	Vulnerable	Species or species habitat may occur within area
Phascogale pirata Northern Brush-tailed Phascogale [82954]	Vulnerable	Species or species habitat likely to occur within area
Saccolaimus saccolaimus nudicluniatus Bare-rumped Sheath-tailed Bat, Bare-rumped Sheathtail Bat [66889]	Vulnerable	Species or species habitat known to occur within area
Xeromys myoides Water Mouse, False Water Rat, Yirrkoo [66]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Acanthophis hawkei Plains Death Adder [83821]	Vulnerable	Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Elseya lavarackorum Gulf Snapping Turtle [67197]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour known

Name	Status	Type of Presence
		to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sharks		
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Glyphis glyphis		
Speartooth Shark [82453]	Critically Endangered	Species or species habitat may occur within area
Pristis clavata		
Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis		
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron		
Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

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

Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus		
Common Noddy [825]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Calonectris leucomelas		
Streaked Shearwater [1077]		Species or species habitat may occur within area
Fregata ariel		
Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor		
Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Sterna albifrons		
Little Tern [813]		Species or species habitat may occur within area
Sterna anaethetus		
Bridled Tern [814]		Breeding known to occur within area
Sterna dougallii		
Roseate Tern [817]		Breeding known to occur within area
Sterna sumatrana		
Black-naped Tern [800]		Breeding known to occur within area
Migratory Marine Species		
Anoxypristis cuspidata		
Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Dugong dugon Dugong [28]		Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour known to occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat may occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Orcaella brevirostris Irrawaddy Dolphin [45]		Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Pristis pristis		
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron		
Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Sousa chinensis		
Indo-Pacific Humpback Dolphin [50]		Species or species habitat known to occur within area
Migratory Terrestrial Species		
Cecropis daurica		
Red-rumped Swallow [80610]		Species or species habitat may occur within area
Cuculus optatus		
Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundo rustica		
Barn Swallow [662]		Species or species habitat may occur within area
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Acrocephalus orientalis		
Oriental Reed-Warbler [59570]		Species or species habitat may occur within area
Calidris canutus		
Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris		
Great Knot [862]	Critically Endangered	Species or species habitat likely to occur within area
Charadrius veredus		
Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Glareola maldivarum		
Oriental Pratincole [840]		Species or species habitat may occur within area
Limosa lapponica		
Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa		
Black-tailed Godwit [845]		Species or species habitat likely to occur within area
Numenius madagascariensis		
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur

Name	Threatened	Type of Presence
		within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Thalasseus bergii Crested Tern [83000]		Breeding known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

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

Name
Commonwealth Land -

Listed Marine Species [Resource Information]

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

Name	Threatened	Type of Presence
Birds		
Acrocephalus orientalis Oriental Reed-Warbler [59570]		Species or species habitat may occur within area
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat likely to occur

Name	Threatened	Type of Presence within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Cuculus saturatus Oriental Cuckoo, Himalayan Cuckoo [710]		Species or species habitat may occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundo daurica Red-rumped Swallow [59480]		Species or species habitat may occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Sterna albifrons Little Tern [813]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Sterna anaethetus Bridled Tern [814]		Breeding known to occur within area
Sterna bengalensis Lesser Crested Tern [815]		Breeding known to occur within area
Sterna bergii Crested Tern [816]		Breeding known to occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sterna sumatrana Black-naped Tern [800]		Breeding known to occur within area
Fish		
Campichthys tricarinatus Three-keel Pipefish [66192]		Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
Festucalex cinctus Girdled Pipefish [66214]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
Hippichthys cyanospilos Blue-speckled Pipefish, Blue-spotted Pipefish [66228]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus spinosissimus Hedgehog Seahorse [66239]		Species or species habitat may occur within area
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Mammals		
Dugong dugon Dugong [28]		Species or species habitat known to occur within area
Reptiles		
Acalyptophis peronii Horned Seasnake [1114]		Species or species habitat may occur within area
Aipysurus duboisii Dubois' Seasnake [1116]		Species or species habitat may occur within area
Aipysurus eydouxii Spine-tailed Seasnake [1117]		Species or species habitat may occur within area
Aipysurus laevis Olive Seasnake [1120]		Species or species habitat may occur within area
Astrotia stokesii Stokes' Seasnake [1122]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Crocodylus johnstoni Freshwater Crocodile, Johnston's Crocodile, Johnston's River Crocodile [1773]		Species or species habitat may occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur

Name	Threatened	Type of Presence within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Disteira kingii Spectacled Seasnake [1123]		Species or species habitat may occur within area
Disteira major Olive-headed Seasnake [1124]		Species or species habitat may occur within area
Enhydrina schistosa Beaked Seasnake [1126]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Hydrelaps darwiniensis Black-ringed Seasnake [1100]		Species or species habitat may occur within area
Hydrophis atriceps Black-headed Seasnake [1101]		Species or species habitat may occur within area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area
Hydrophis inornatus Plain Seasnake [1107]		Species or species habitat may occur within area
Hydrophis mcdowelli null [25926]		Species or species habitat may occur within area
Hydrophis ornatus Spotted Seasnake, Ornate Reef Seasnake [1111]		Species or species habitat may occur within area
Hydrophis pacificus Large-headed Seasnake, Pacific Seasnake [1112]		Species or species habitat may occur within area
Lapemis hardwickii Spine-bellied Seasnake [1113]		Species or species habitat may occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Parahydrophis mertoni Northern Mangrove Seasnake [1090]		Species or species habitat may occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans [Resource Information]

Name	Status	Type of Presence
Mammals		

Name	Status	Type of Presence
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat may occur within area
Orcaella brevirostris Irrawaddy Dolphin [45]		Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat known to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Commonwealth Reserves Marine	[Resource Information]
Name	Label
Limmen	Multiple Use Zone (IUCN VI)

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Limmen	NT

Invasive Species	[Resource Information]

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

Name	Status	Type of Presence
Frogs		
Rhinella marina Cane Toad [83218]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Bubalus bubalis Water Buffalo, Swamp Buffalo [1]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Plants		
Acacia nilotica subsp. indica Prickly Acacia [6196]		Species or species habitat may occur within area
Jatropha gossypifolia Cotton-leaved Physic-Nut, Bellyache Bush, Cotton-leaf Physic Nut, Cotton-leaf Jatropha, Black Physic Nut [7507]		Species or species habitat likely to occur within area
Mimosa pigra Mimosa, Giant Mimosa, Giant Sensitive Plant, ThornySensitive Plant, Black Mimosa, Catclaw Mimosa, Bashful Plant [11223]		Species or species habitat likely to occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
Parthenium hysterophorus Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566]		Species or species habitat may occur within area

Nationally Important Wetlands [Resource Information]

Name	State
Limmen Bight (Port Roper) Tidal Wetlands System	NT

Key Ecological Features (Marine) [Resource Information]

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

Name	Region
Gulf of Carpentaria coastal zone	North

Caveat

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

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

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

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

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

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-14.737422 135.392684,-14.737422 135.774459

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.

Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

Appendix B Aboriginal Sacred Sites Register search

Aboriginal Areas Protection Authority
protecting sacred sites across the territory

Our File: 2017/45
In Reply Please Quote: 201700430
Your Reference:

03 February 2017

Ecoz Environmental Consultants
GPO Box 381
Darwin 0801

Attention: **Keith Munson**

RE **Abstract of Records - Port Roper and Hodgson River Road and Roper Highway (NT Portion 1184)**

Referring to your request received on 23 January 2017 seeking information of AAPA records within the above area, I advise as follows:

The area contained by your proposal lies on Aboriginal land held by the Yutpundji-Djindiwirritj Aboriginal Land Trust, Marra Aboriginal Land Trust, Arnhem Land Aboriginal Land Trust, Kewulyi Aboriginal Land Trust and Alawa 1 Aboriginal Land Trust and is administered by the Northern Land Council. Under section 23 of the Land Rights Act this Land Council has the Statutory responsibility for consulting with the traditional owners with respect to any proposal relating to the use of the land.

The Authority has sacred sites within the area, which is shown on the map accompanying this letter as either "registered sacred sites" or "recorded sacred sites". Those listed as "registered sacred sites" are sacred sites that Aboriginal custodians have asked the Authority to protect and that have subsequently been documented and evaluated by the Authority and entered in the Public Register of Sacred Sites in accordance with the *Northern Territory Aboriginal Sacred Sites Act 1989.*

Whereas, those listed as "recorded sacred sites" are sites that have not been evaluated or placed in the Register but there is information indicating that they are nonetheless significant according to Aboriginal tradition and therefore "sacred sites" within the meaning of the Act. The Authority does not purport to hold detailed information regarding all these sites. However, the information attached to this letter regarding recorded sacred sites is relevant to your query as the offence provisions of the Act apply to all sacred sites, whether or not these have been listed in the Public Register of Sacred Sites.

The sacred site point shown on the map is not indicative of the specific site location and doesn't represent the full location of any features of the site. Before entering or undertaking works on, or in the vicinity of these sites, further advice should be sought from the Registrar.

An Abstract of the Authority's Records is not a definitive way of determining the location of all sacred sites in a given area, particularly in circumstances where use or works are proposed that may result in disturbance of the natural features of the area.

Darwin
P: +61 (08) 8999 5511
F: +61 (08) 8999 4334
www.aapant.org.au
enquiries.aapa@nt.gov.au
4th Floor, R.C.G Centre,
47 Mitchell Street Darwin NT
GPO Box 1890, Darwin NT 0801

Alice Springs
P: +61 (08) 8999 5511
F: +61 (08) 8952 2824
www.aapant.org.au
enquiries.aapa@nt.gov.au
Ground Floor, Belvedere House
Cnr Bath & Parsons Streets Alice Springs NT
All mail to Darwin GPO

There is a risk that a sacred site previously unknown to the Authority may be identified after the commencement of works, leaving no option but to cease works or possibly breach the offence provisions of the Act.

To overcome this problem the *Northern Territory Aboriginal Sacred Sites Act 1989* enables a person, wishing to make use of or carry out works on land in the Northern Territory, to request that the Aboriginal Areas Protection Authority consult with custodians and provide written advice specifying the constraints (if any) to a particular activity imposed by the existence of sacred sites. Section 19G of the Act also provides the opportunity for an Applicant to discuss the project with Aboriginal custodians at a meeting convened by the Authority.

The written advice provided by the Authority following the completion of the procedures established in Sections 19A-22 of the Act is termed an "Authority Certificate". An Authority Certificate sets out the conditions (if any) on which, under the Act the proposed work may be carried out or use made of the land. As long as the holder of a Certificate complies with its conditions the holder is indemnified against prosecution under any of the offence provisions of the Act.

An Authority Certificate has previously been issued over either part or all of your search area. As a consequence of this, under Sections 19A-22 of the Act, the Authority has placed conditions relating to the protection of sacred sites in relation to particular works. The accompanying map shows the approximate location of the Restricted Works Area identified in the Certificate.

The Authority highly recommends that an Authority Certificate be applied for any proposed works or use on or near Port Roper and Hodgson River Road and Roper Highway (NT Portion 1184).

Inspection of the Public Register of Authority Certificates may be carried out in the Authority's Darwin or Alice Springs office at a cost of 23 Revenue Units ($26) per Certificate viewed. Inspection of the Public Register of Sacred Sites may be carried out in the Authority's Darwin or Alice Springs office at a cost of 23 Revenue Units ($26) per registered site viewed.

Please note that the cost of this Abstract of Records will be 23 Revenue Units per Lot Searched ($26) and an invoice will be issued to you by the Department of Corporate and Information Services. The terms and conditions of the invoice will require you to make payment within 30 days of receipt. Please do not hesitate to contact the Registrar through enquiries.aapa@nt.gov.au if you have any queries.

During consultations reference was made by Aboriginal custodians to the possibility of burial sites being located within the subject land for the attached Certificate. Under the Northern Territory Criminal Code it in an offence to interfere with remains of a deceased person. Under the Northern Territory Heritage Act it is an offence to interfere with the remains of a deceased Aboriginal person without authorization under that Act.

In the event that any skeletal remains are unearthed it is your responsibility in law to stop works and report immediately such disturbance to the NT Police, and to the Director Heritage Branch, Department of Tourism and Culture, if you have reason to believe the remains are those of an Aboriginal burial. For further information please contact the Director Heritage Branch, Department of Tourism and Culture on (08) 8999 5051 or email heritage.nretas@nt.gov.au.

If you have any queries, please do not hesitate to contact the Registrar via email through enquiries.aapa@nt.gov.au or by phone on 8999 4332.

Yours sincerely,

Ambre Philpott
Registrar

Port Roper and Hodgson River Road and Roper Highway (NT Portion 1184)

MAP SHOWING SACRED SITES RECORDED AS AT 03/02/2017

ISSUED TO:
Ecoz Environmental Consultants

SCALE 1 : 650000

0 13000 26000

metres

Projection: MGA Zone 53
Horizontal Datum: GDA94

KEY

- Recorded Sacred Site
- Registered Sacred Site
- Restricted Works Area
- Extent of Registered Site
- Subject Land

** The Sacred Site point is not indicative of the specific site location and does not represent the location of any features of the site.*

Prepared and produced by Aboriginal Areas Protection Authority (AAPA), Darwin, Northern Territory of Australia 03/02/2017

J2017-0023

8380000mN
8347500mN
8315000mN
392500mE
425000mE
457500mE
490000mE
522500mE
555000mE

See Inset 1
See Inset 2
See Inset 3

C1993/171 5668-33 5668-18A 5668-18B C2016/066 C2007/109 5768-2 C1992/055 C2012/185 C2014/121 5768-6 C2013/036 5868-60 C1996/184 C1993/170 C2014/179 C1991/150 C1991/108 C2015/085 5868-19 5868-20 C1992/140 C2012/250 5868-8

Inset 1

falls DOUGALL BLUFF 172 5768-41 5768-23A 5768-23B 5668-33 5668-18A 5668-18B Duck Ponds C1993/171 BLACK JACK 168 Ripper Valley C2016/066 C2007/109 C1995/063 5768-2 81 150

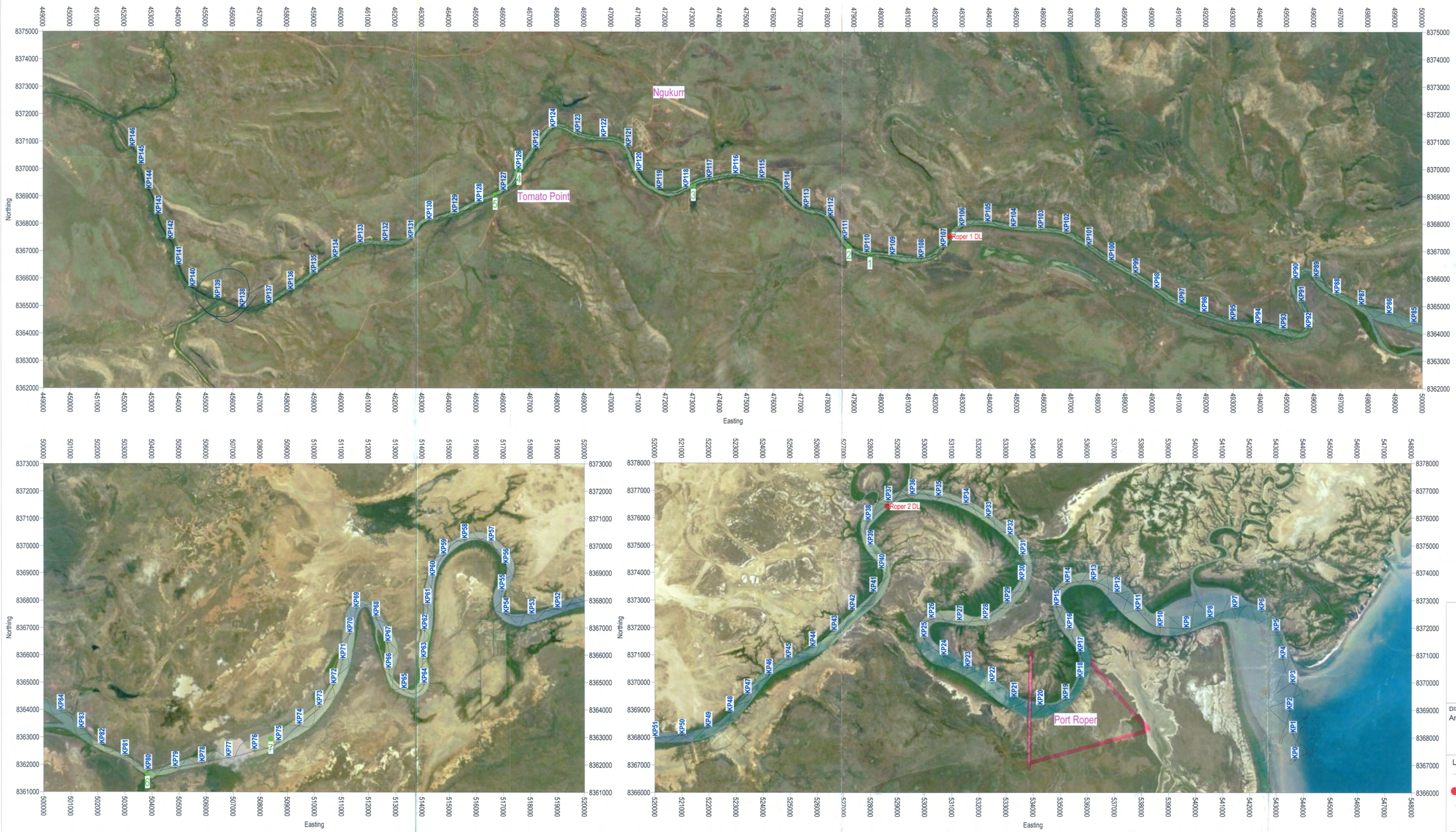
Inset 2

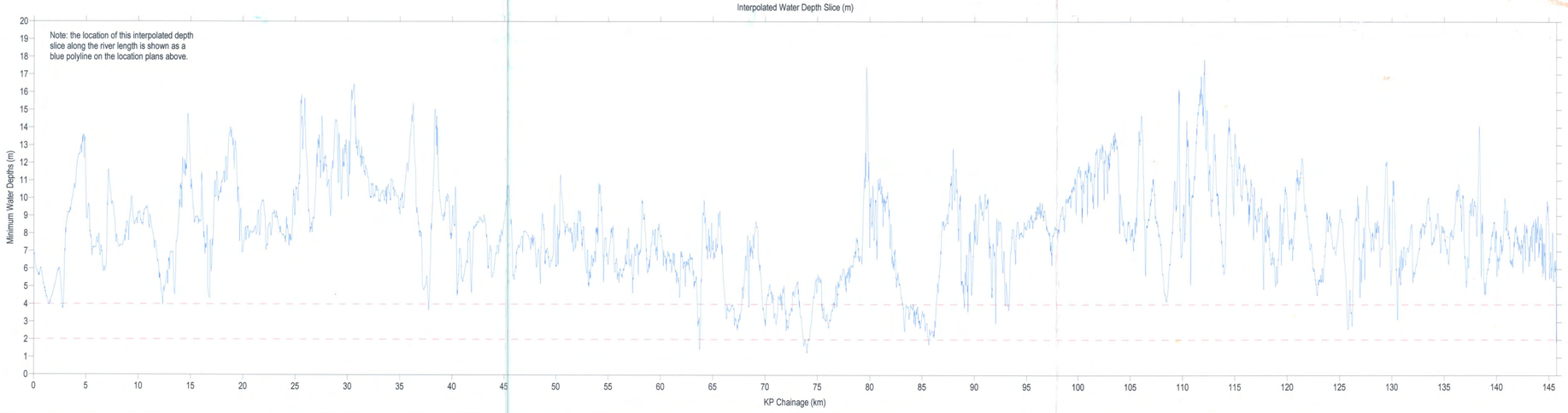
pool 177 MT M-MINN 5768-9 C1991/098 C2016/068 C2014/121 5768-6 C1993/171 5768-11 quarry Jowar pools EAGLE BLUFF 125 C2013/036 5868-79 5868-9 5868-10 5868-60 Rittarangu (Urapunga) RIVER ROPER HIGHWAY

Inset 3

105 MT ST GEORGE 5868-17 CC1993/170 C2014/179 Lomarieum Lagoon 5868-19 C2015/085 St Vidgeon 71 MT HILL Nullawun Lagoon Nulawan RIVER waterhole Wadamunga Lagoon (marine) 5868-20

Appendix C Roper River Reconnaissance Depth Survey





GEODETIC INFORMATION

Horizontal Datum: MGA/GDA 94 Zone 53
Vertical Datum: Not Applicable

DISCLAIMER

Any plans must be read in conjunction with the accompanying report

LEGEND

- KP20 — Kilometer Points from River Mouth
- Roper1 — Roper No.1 Depth Logging Site
- Vessel Trackplot
- Interpolated Water Depth Slice Alignment

Easting	Northing	Description	Feature Number
479579	8366896	2x Rock Outcrops	1
478801	8367205	Rock Outcrop	2
473033	8369387	Island Vegetated	3
466586	8369968	Rock Outcrop	4
465710	8369056	Wreck	5
503830	8361669	Rock Outcrop	6
508389	8362937	Sand bank at Low Tide	7

CLIENT DETAILS

Sherwin Iron Limited

marine & earth sciences
162 Brisbane Street,
Bulimba QLD 4171
+61 409 844 605

ROPER RIVER RECONNAISSANCE SURVEY

LOCATION PLANS VESSEL TRACKPLOTS AND INTERPOLATED MINIMUM WATER DEPTH SLICE

SCALE As Shown

Survey Date: May 2012 | Project Ref: 358

Issue No.	Date:	Description	Surv.	Interp.	Drawn	Appr.
1	22/05/12	Location/Slice	dpk	dpk	dpk	dpk

Client Drawing No. | Figure No. 2 | Sheet No.

Appendix D Threatened species likelihood of occurrence

Threatened species 'likelihood of occurrence' assessment

This 'likelihood of occurrence' assessment identifies which threatened species have potential to occur within the project footprint. The following procedure was used to determine the likelihood of occurrence of threatened species:

1) Identify potential habitat features within the project footprint using available desktop information (i.e. land unit mapping, existing vegetation mapping, aerial imagery, fire history etc.).
2) Identify:
    a. Matters of National Environmental Significance obtained using the Protected Matters Search Tool (undertaken January 2017).
    b. Bioregional threatened species records extracted from the NT flora and fauna atlases maintained by DENR.
3) Collate the following details for each of those species – conservation status (NT and Federal), habitat requirements, distribution and number of records within the bioregions.
4) Analyse the likelihood that each species will occur in the project footprint by applying the following likelihood classifications:
    a. HIGH – it is expected that this species will be within the project footprint because of the presence of core suitable habitat, and/or there are recent proximate records (i.e. post-2000).
    b. MEDIUM – this species may occur within the project footprint; however, there is evidence that lowers its likelihood of occurrence (i.e. lack of core habitat, no recent records with the search area, habitat degradation etc.).
    c. LOW – it is not expected that this species is supported within the project footprint, as there is no suitable habitat for the species and/or current threats in the region are known to have significantly impacted upon the species.
    d. NONE – there is strong evidence that this species will not occur within the project footprint.

Note: For many threatened species, the Atlas of Living Australia provides 'likely' and 'possible' modelled expert distributions. These distributions are referred to throughout this document and mostly come from the Species of National Environmental Significance Database maintained by the federal Department of the Environment.

The location of some threatened species records from the Atlas of Living Australia has been generalised to 0.1 degree (introducing a location variance of up to 11 km) due to concerns that revealing the actual location may lead to poaching. Spatially-generalised records have been considered in this assessment; however, use of these records has been noted where relevant.

THREATENED SPECIES LIKELIHOOD ANALYSIS				
Name	**Status**		**Summary**	**Likelihood of occurrence**
	Cth	**NT**		
FLORA				
a fern *Macrothelypteris torresiana*	-	EN	**Habitat:** Sheltered sandstone gorges associated with springs and groundwater seepages (Cowie & Westaway 2012). **Distribution:** Isolated populations in northern WA, eastern Qld, north-eastern NSW and the NT (two locations on Wollogorang Station in the Gulf region, adjacent to the Qld border) (Cowie & Westaway 2012). **Records:** Four from near the NT/Qld border, more than 350 km to the south-east.	**LOW** • There may be suitable habitat within the project footprint. • This species appears to have a very restricted range that is not proximate to the project footprint. • There is no *expert distribution* mapping. It is unknown how well this species has been surveyed for in suitable habitat across its potential range.
BIRDS				
***Carpentarian Grasswren** *Amytornis dorotheae*	EN	EN	**Habitat:** NT population is restricted to dissected, topographically complex, sandstone and conglomerate hills and plateaux with infrequent fires (Lewis & Woinarski 2006). The only recent observations were recorded in a site that had been burnt only twice in the preceding 12 years. All other historic sites with no recent observations had been burnt between three and eight times. **Distribution:** Gulf of Carpentaria hinterland – between Limmen River in the NT and Mount Isa in Qld. No records in the Borroloola area since 1986 despite several targeted surveys in the last decade (McKean & Martin 1989; Garnett et al. 2011). Within the NT, now restricted to a tiny isolated population approximately 6 km to the west of Calvert Hills Station in the Wollogorang area (TSSC 2016). **Records:** 47 for the Gull Falls and Uplands bioregion only. Clustered around Borroloola (~150 km to the south-east) and near NT/Qld border.	**NONE** • There may be suitable habitat within the project footprint. • This species has a very restricted range that is not proximate to the project footprint. • There is no *expert distribution* mapping. However, this species has been well surveyed for in suitable habitat across its potential range.
***Curlew Sandpiper** *Calidris ferruginea*	CR	VU	*Threatened migratory shorebirds have been assessed collectively for the NOI in the absence of sufficient population data.* **Habitat:** Coastal and estuarine with tidal mudflats. May roost during high tide on nearby beaches. May also be found at near-coastal swamps and lakes (apart from Red and Great Knot). **Distribution:** Mostly widespread around the northern Australian coast, less common in the south, with few inland records. Eastern Curlew is uncommon across. Every year these species breed in the northern hemisphere in the summer, and migrate to Australia for the southern hemisphere summer. Some birds remain in Australia during the winter. **Records:** There appears to be recent records for all of these shorebird species	**HIGH** • There is suitable habitat proximate to the port area of the project footprint. • There are recent records for the region, possibly including some within the project footprint. Some of these species may occur in nationally-significant numbers. It is unlikely there is sufficient historic data to identify which sub-species of Bar-tailed Godwit is present. • The project footprint is within the *expert distribution* mapping of these species.
***Red Knot** *Calidris canutus*	EN	VU		
***Great Knot** *Calidris tenuirostris*	CR	VU		
***Greater Sand Plover** *Charadrius leschenaultii*	VU	VU		
***Lesser Sand Plover** *Charadrius mongolus*	EN	VU		
***Bar-tailed Godwit (Western Alaska subsp.)** *Limosa lapponica*	VU	-		

THREATENED SPECIES LIKELIHOOD ANALYSIS				
Name	**Status**		**Summary**	**Likelihood of occurrence**
	Cth	**NT**		
baueri			within and proximate to the mouth of the Roper River, including within a kilometre of the proposed port footprint. Targeted shorebird surveys have been undertaken in the area, most comprehensively by Chatto (2003) between 1990 and 2001. Those surveys identified a roost of 2000+ shorebirds (relative abundance of species unknown) proximate to the port footprint. In 1996, Chatto counted 1,500 Red Knots near the mouth of the Roper River – making that location one of the three most important areas in the NT for Red Knots. The region is also one of the four important areas in the NT for Eastern Curlew. Within the region, Chatto did not record any particular shorebird species as occurring in internationally-significant numbers, but did record approximately ten species as occurring in nationally-significant numbers.	
***Bar-tailed Godwit (Northern Siberian subsp.)** *Limosa lapponica menzbieri*	CR	-		
***Eastern Curlew** *Numenius madagascariensis*	CR	-		
***Asian Dowitcher** *Limnodromus semipalmatus*	-	VU	**Habitat:** Coastal and estuarine with tidal mudflats. May roost during high tide on nearby beaches. May also be found at near-coastal swamps and lakes. **Distribution:** Mostly widespread around the northern Australian coast, less common in the south, with few inland records. Asian Dowitcher is rare across Australia. Every year, breed in the northern hemisphere in the summer, and migrate to Australia for the southern hemisphere summer. Some birds remain in Australia during the winter. **Records:** Two for the Gulf Coastal bioregion – from the mouth of the McArthur River, more than 200 km to the south-east.	**LOW** • There is suitable habitat proximate to the port area of the project footprint. • There are very few records for the region – despite comprehensive surveys – and none proximate. • The project footprint is within the *expert distribution* mapping.
***Red Goshawk** *Erythrotriorchis radiatus*	VU	VU	**Habitat:** Prefers tall, open Eucalypt forest and riparian areas. Nests in large trees, frequently the tallest and most massive in a tall stand, nest trees are invariably within 1 km of permanent water (Debus et al. 1988; Aumann et al. 1991). **Distribution:** Sparsely distributed across much of the northern Australia, from the Kimberley in WA to south-eastern Qld. Within this range, generally occurs in taller forests characteristic of higher rainfall areas, but there are some isolated records from central Australia. **Records:** 44 for the Gull Falls and Uplands bioregion only. Almost all from Borroloola area or Mataranka (both more than 150 km away).	**HIGH** • There is suitable habitat throughout the project footprint. • There are records for the region, but none proximate. • The project footprint is within the *expert distribution (likely).*
Gouldian Finch *Erythrura gouldiae*	EN	VU	**Habitat:** Prefers 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*) (Tidemann	**HIGH** • There is suitable habitat throughout the project footprint. • There are many records for the region, including some within the

THREATENED SPECIES LIKELIHOOD ANALYSIS				
Name	**Status**		**Summary**	**Likelihood of occurrence**
	Cth	**NT**		
			1996; O'Malley 2006). **Distribution:** Sparsely across northern Australia from the Kimberley to north-central Qld (Dostine 1998; Franklin 1999; Barrett et al. 2003; Franklin et al. 2005). Non-breeding birds disperse widely (Garnett et al. 2011), greatly increasing the possible range of this species. **Records:** 109 across both bioregions, including some within the project footprint.	project footprint. • It is unknown whether suitable breeding habitat occurs within the project footprint. • Some of the project footprint is within the *expert distribution (likely),* the remainder is within *expert distribution (likely).*
***Grey Falcon** *Falco hypoleucos*	-	VU	**Habitat:** Areas of lightly-timbered lowland plains, typically on inland drainage systems, where the average annual rainfall is less than 500 mm (Ward 2012a). **Distribution:** Sparsely through much of the arid and semi-arid areas of Australia, but is recorded across the country. In the NT, the majority of records are from the southern half, but there are records all the way up to Darwin (Ward 2012). **Records:** Six records spread across the Gull Falls and Uplands bioregion only (most recent from 2002). Recorded at Deposit W in 2011 during surveys for the Sherwin EIS.	**HIGH** • There is suitable habitat throughout the project footprint, but the region is not considered core habitat for this species. • There are a few records for the region, but one within the project footprint. • The project footprint is within the generalised *expert distribution.*
Crested Shrike-tit (northern subsp.) *Falcunculus frontatus whitei*	VU	-	**Habitat:** Recorded in eight different woodland types in northern Australia, mainly those dominated by *Eucalyptus miniata, E. tetrodonta* or *E. bleeseri* (Robinson & Woinarski 1992). **Distribution:** North-western Australia from the Kimberley in WA, across the Top End of the NT to Borroloola (TSSC 2016). In the NT, recorded in very low densities in many isolated subpopulations (Garnett & Crowley 2000) between north-east Arnhem Land and semi-arid Victoria River District. Scarcity of records suggests that populations are at very low density (Woinarski 2004). Not known to have disappeared from any area where recorded historically (TSSC 2016). **Records:** Six in Borroloola area from 1913-17, and one near Sturt Hwy from 1952.	**MEDIUM** • There is suitable habitat throughout the project footprint. • There are no records for the region since 1952. The species has not been relocated in the Borroloola area since it was first recorded there in 1913. However, there have been no recent surveys targeting the species in this region (Ward 2009). • There is no *expert distribution* mapping.
***Partridge Pigeon (eastern subsp.)** *Geophaps smithii smithii*	VU	VU	**Habitat:** Occurs in open forests and woodlands with an understorey of grasses (Woinarski 2006). Prefers woodland dominated by *Eucalyptus tetrodonta* and *E. miniata* (Braithwaite 1985; Garnett & Crowley 2000; Higgins & Davies 1996). **Distribution:** Historically, across the Top End (from Kununurra in WA to Borroloola in NT). Since early 20th century, severe range contraction from the western, eastern and southern parts of the former distribution (Higgins & Davies 1996; Woinarski et al. 2007). Currently, distribution is limited to sub-coastal Northern Territory from Yinberrie Hill in the south, Litchfield NP in the west and (western) Arnhem Land in the east (Garnett et al. 2011).	**LOW** • There is suitable habitat throughout the project footprint. • There are no records for the region since 1952. This species has likely experienced a significant range contraction. • The project footprint is outside the *expert distribution.*

THREATENED SPECIES LIKELIHOOD ANALYSIS				
Name	**Status**		**Summary**	**Likelihood of occurrence**
	Cth	**NT**		
			Records: 26 spread across Gulf Uplands and Falls bioregion only; all but one (from 1952) recorded pre-1924	
Painted Honeyeater *Grantiella picta*	VU	VU	**Habitat:** *Acacia* and *Eucalyptus*-dominated woodlands and open forest, preferring habitats with more mature trees that host more mistletoe. Breeding times and seasonal movements (south to north) likely governed by the fruiting of mistletoe (Garnett et al. 2011). **Distribution:** Across eastern and northern parts of the country – but nowhere very numerous (Ward 2012). Many birds move after breeding to semi-arid regions such as north-eastern SA, central and western Qld, and central NT (TSSC 2015). Few NT records – most from the Barkly Tablelands – but no evidence of a breeding population in the NT, and the records are likely irregular visitors from south-eastern Australia (Ward 2012). **Records:** Six from between 1914 and 1978 at least 200 km to the south-east, one from 2005 from Limmen NP (approximately 120 km south-east).	**LOW** • There is suitable habitat throughout the project footprint. • There are a few records for the region. This species is considered an irregular visitor to the NT. • The project footprint is outside the generalised *expert distribution.*
Australian Painted Snipe *Rostratula australis*	EN	VU	**Habitat:** Fringes of permanent and temporary wetlands, swamps and inundated grasslands (Taylor et al. 2013). **Distribution:** Nomadic and scattered across Australia with no predictable occurrence (Rogers 2001) but could occur at any wetland or inundated grassland across its distribution, including nearly all of the NT and Qld (Garnett et al. 2011). **Records:** Five (1985 and four from 1999), across both bioregions, all more than 100 km to the south-east.	**MEDIUM** • There is likely to be suitable habitat within the project footprint. • There are a few records for the region. • The project footprint between Ngukurr and Port Roper is within the *expert distribution (likely)*, the rest of the project footprint is within the *expert distribution (maybe).*
Masked Owl (northern subsp.) *Tyto novaehollandiae kimberli*	VU	VU	**Habitat:** Mainly in *Eucalyptus* tall open forests (especially those dominated by *Eucalyptus miniata* and *E. tetrodonta*), but also roosts in monsoon rainforests and forages in more open vegetation types, including grasslands (Woinarski & Ward 2006). **Distribution:** Poorly known, with few records from across a broad range in northern Australia. In the NT, records from the Top End, Kakadu, Coburg Peninsula (majority of records) and south-west Gulf country (Woinarski & Ward 2006). **Records:** Six around Borroloola area (1913, 1971 & 1977). Queensland Museum has a specimen dated 1910 collected from Port Roper. This may be a geo-spatial error – in analysing the metadata for that record, the Atlas of Living Australia determined the habitat to be incorrect for the species.	**MEDIUM** • There is suitable habitat throughout the project footprint. • There are a few old records for the region. The specimen dated 1910 collected from Port Roper is likely a geo-spatial error due to the location not constituting suitable habitat for the species. • There is no *expert distribution* mapping.
MAMMALS				

THREATENED SPECIES LIKELIHOOD ANALYSIS				
Name	**Status**		**Summary**	**Likelihood of occurrence**
	Cth	**NT**		
Fawn Antechinus *Antechinus bellus*	VU	EN	**Habitat:** Mostly in open forests and woodlands dominated by *Eucalyptus miniata* and/or *E. tetrodonta*, particularly where these forests have a relatively dense shrubby understorey (Friend 1985; Friend & Taylor 1985). Declines in areas with frequent intense fires (Corbett et al. 2003) but not necessarily common in areas where fire has been excluded for long periods (>20 years) (Woinarski et al. 2004). **Distribution:** Restricted to the Top End of the NT (Watson & Calaby 2008), with one record from Melville Island. Recent surveys have failed to record it across central and eastern Arnhem Land (TSSC 2015). **Records:** None for either bioregion. Nearest more than 200 km to the north-east and west.	**LOW** • There is suitable habitat throughout the project footprint. • There are no records for the region. This species has likely experienced a significant range contraction. • There is no *expert distribution* mapping.
†**Blue Whale** *Balaenoptera musculus*	EN	-	**Habitat:** Polar to tropical regions in coastal, continental shelf and oceanic waters (DoE 2017). **Distribution:** Global. Annual migration from Antarctic feeding areas, through Australian waters, to tropical breeding areas (DoE 2017). Most Australian waters have no particular significance to the whales and are used only for migration and opportunistic feeding (DoE 2017). The only known areas of significance in Australia are feeding areas around the southern continental shelf near in southern WA, SA and Victoria (DEH 2005). In the NT, known only from two beach-washed specimens at Cape Hotham near Darwin in 1980 and Port Essington on Cobourg Peninsula in 2003 (Woinarski & Chatto 2006). **Records:** None for the Gulf of Carpentaria.	**LOW** • There is suitable habitat within the marine section of the project footprint. • There are no records for the Gulf of Carpentaria and only two for other NT waters. • NT waters are mapped as a region where the species 'may' occur (DoE 2017).
Brush-tailed Rabbit-rat *Conilurus penicillatus*	VU	EN	**Habitat:** Largely restricted to mixed *Eucalypt* open forest and woodland, or on dunes with *Casuarina* – seeming to prefer habitats that are not burnt annually, that have an understorey of predominantly perennial grasses and a sparse-to-moderate middle storey (Firth et al. 2006; Firth 2007; Kemper & Firth 2008). **Distribution:** Formerly widespread across northern Australia, but has declined extensively from Qld and lower rainfall areas of the Kimberley in WA and the Top End in the NT. No recent records from much of the historically recorded NT range between near the mouth of Victoria River (in the west) and Sir Edward Pellew island group (in east). Most recently known from Cobourg Peninsula, Tiwi Islands, Groote Eylandt and a small area within Kakadu National Park (Woinarski 2007). **Records:** Six in 1967 from the Sir Edward Pellew island group, three undated from near	**NONE** • There is suitable habitat throughout the project footprint. • There are three (undated) records proximate to the project footprint. This species has likely experienced a significant range contraction. • There is no *expert distribution* mapping.

THREATENED SPECIES LIKELIHOOD ANALYSIS				
Name	**Status**		**Summary**	**Likelihood of occurrence**
	Cth	**NT**		
			Ngukurr.	
Northern Quoll *Dasyurus hallucatus*	EN	CR	**Habitat:** Wide range of habitats – especially coastal *Eucalypt* tall open forests – but since Cane Toads the most suitable habitats are rocky areas (Van Dam et al. 2002). Prime habitat in NT consists of rocky sandstone escarpments (Braithwaite & Griffiths 1994). **Distribution:** Dramatic range contraction associated with Cane Toad invasion. Now occurs across northern Australia in five regional populations – including the Top End in the NT. Records indicate this species occurs from Borroloola in the south-east as far west as the NT/WA border (Woinarski et al. 2007). **Records:** Seven from Sir Edward Pellew island group (2003 and 1988) and seven from the mainland, including proximate to the project area (most recently 2002, then 1986, with 3 undated).	**LOW** • There is suitable habitat throughout the project footprint. • There is a 2002 record proximate to the project footprint. This species has experienced a significant reduction in population sizes and ranges since the invasion of the Top End by Cane Toads. This occurred circa 1995 for the Roper River area. • The project footprint is within the *expert distribution (likely).*
Northern Leaf-nosed bat *Hipposideros stenotis*	-	VU	**Habitat:** Prefers rocky outcrops – often associated with large sandstone escarpments – roosting in shallow caves, boulder piles and old mine sites (Milne 2012). Forages in a wide range of habitats including monsoon vine thickets, woodlands and open grasslands (Milne 2012). **Distribution:** Locally in parts of the Kimberley in WA, the NT and near Mt Isa in Qld (Milne 2012). There are 31 records from the NT, and since 2000 has only been definitely recorded four times (Milne 2012). Known to have disappeared from at least two sites where previously occurred – Red Bank mine and Pine Creek (Milne 2012). **Records:** 13 records, all from near Wollogorang Station approximately 350 km to the south-east.	**MEDIUM** • There may be suitable habitat within or proximate to the project footprint. • There are no records proximate to the project area. • There is no *expert distribution* mapping.
***Golden Bandicoot** *Isoodon auratus*	VU	EN	**Habitat:** Mainly in heathland and shrubland on sandstone sheets, avoiding vegetation with greater tree cover (Palmer et al. 2012; Southgate et al. 1996) **Distribution:** Formerly across most of northern, central and western Australia (across a broad range of habitats), but now only recorded population on mainland Australia is within the Kimberley. Within the NT, the species is confined to the offshore islands of Arnhem Land. The only records from mainland NT are from the north-east corner of Arnhem Land between 1950 and 1980 (Palmer et al. 2012). Now extinct on the mainland except in a few locations in the north-west Kimberley (TSSC 2015). **Records:** Six, all undated.	**NONE** • There is suitable habitat within the project footprint. • There are six undated old records for the region; however, this species is considered extinct from mainland NT. • The project footprint is not within the *expert distribution.*
Ghost Bat *Macroderma gigas*	VU	-	**Habitat:** Ranging from the arid Pilbara to tropical savannah woodlands and north Qld rainforests (TSSC 2016). Permanent roost sites are generally deep natural caves or	**LOW** • There is suitable habitat throughout the project footprint.

THREATENED SPECIES LIKELIHOOD ANALYSIS				
Name	**Status**		**Summary**	**Likelihood of occurrence**
	Cth	**NT**		
			disused mines (TSSC 2016). **Distribution:** Geographically-disjunct colonies occur in the Pilbara and Kimberley in WA, NT north of approximately 17º latitude (including Elcho Island and Groote Eylandt), the Gulf of Carpentaria, eastern Qld from Cape York to near Rockhampton, and western Qld (including Riversleigh and Camooweal districts) (TSSC 2016). Distribution likely influenced by the availability of suitable caves and mines for roost sites (Ward & Milne 2016). Only 14 breeding sites known (Worthington Wilmer 2012). In arid Australia, including southern NT until the early 1960s (Ward & Milne 2016). **Records:** None from either bioregion. Nearest are scattered through central Arnhem Land.	There may be suitable roost sites. • There are no records for the region. • There is no *expert distribution* mapping.
***Greater Bilby** *Macrotis lagotis*	VU	VU	**Habitat:** In the NT, hummock grasslands on sandy soils with a preference for palaeo-drainage lines (Southgate 1990). Has large foraging area and will move home range in search for food (Johnson 2008). In Qld, it occurs on clay plains dominated by Mitchell Grass. **Distribution:** Historically widespread in arid Australia. Currently arid WA, the Tanami Desert in the NT and south-western Qld (Woinarski et al. 2014). **Records:** None for either bioregion. Nearest are more than 200 km to the south-west.	**NONE** • There is no suitable habitat within the project footprint. • There are no records for the region. • There is no *expert distribution* mapping.
†**Humpback Whale** *Megaptera novaeangliae*	VU	-	**Habitat:** All major oceans, mostly in coastal and continental shelf waters (Reeves et al. 2002). **Distribution:** Global. Annual migration from Antarctic feeding areas, through Australian waters to tropical breeding areas off the Kimberley coast in WA, and central Qld coast (DoE 2017). In the NT, only known from one beach-washed specimen on the Napier Peninsula (east Arnhem Land) in 1881 and a pair sighted west of Darwin in 2002 (Woinarski et.al 2012). **Records:** None for the Gulf of Carpentaria.	**LOW** • There is suitable habitat within the marine section of the project footprint. • There are no records for the Gulf of Carpentaria and only two for other NT waters. • NT waters from Cobourg Peninsula westwards are mapped as 'likely' habitat; eastwards to Cape York (Qld) is attributed a likelihood as habitat (DoE 2017).
†**Black-footed Tree-rat (Kimberley and mainland Northern Territory subsp.)** *Mesembriomys gouldii gouldii*	EN	VU	**Habitat:** In the NT, found in tropical woodlands and open forests in coastal areas. Shelters in tree hollows and *Pandanus* stands during the day (Hill 2012). **Distribution:** Kimberley in WA and Top End of the NT – but mainland only (TSSC 2015). **Records:** Three for Gulf Coastal bioregion only – two undated, one from 1911 – all more than 200 km to the south-east.	**LOW** • There may be suitable habitat within the parts of the project footprint closer to the coast. • There are only three old records for the region, none proximate to the project footprint. This species has likely experienced a significant range contraction. • There is no *expert distribution* mapping.
†**Northern**	VU	VU	**Habitat:** Most often sandy substrates,	**LOW**

THREATENED SPECIES LIKELIHOOD ANALYSIS				
Name	**Status**		**Summary**	**Likelihood of occurrence**
	Cth	**NT**		
Hopping-mouse *Notomys aquilo*			seemingly favouring coastal sand dunes and sand sheets with a cover of tussock grass or heath. Also shrubland, Eucalypt open forest, and the margins of coastal rainforest thickets (Woinarski 2004; Woinarski & Flannery 2008). **Distribution:** Restricted to the NT – mostly Groote Eylandt, but also central north-east Arnhem Land. No confirmed records from the Australian mainland for at least 10 years (Woinarski et al. 2014). **Records:** One across both bioregions – from 1930 approximately 10 km south of Port Roper.	• There may be suitable habitat within the parts of the project footprint closer to the coast. • There is one old record proximate to the project footprint. This is the only mainland record for hundreds of kilometres. This species has likely experienced a significant range contraction. • The project footprint is at the southern limit of the *expert distribution (maybe).*
†**Northern Brush-tailed Phascogale** *Phascogale pirata*	VU	EN	**Habitat:** Tall open forests dominated by *Eucalyptus miniata* and *E. tetrodonta* (Woinarski et.al 2012). **Distribution:** Restricted to the Top End of the NT. Few records exist. Historically West Island, east Arnhem Land, Coburg Peninsula, Kakadu, Litchfield and the Tiwi Islands. Only recorded in Kakadu, Coburg Peninsula and the Tiwi Islands in the last 10 years (Woinarski et.al, 2012). **Records:** Ten, all from 1988 on the Sir Edward Pellew island group (more than 150 km to the south-east).	**LOW** • There may be suitable habitat within the project footprint. • There are no proximate records to the project footprint. This species has likely experienced a significant range contraction. • The project footprint is at the southern limit of the *expert distribution (maybe).*
Carpentarian Antechinus *Pseudantechinus mimulus*	VU	-	**Habitat**: In NT, sloping sandstone hills with boulders, pavement, outcrops and rocky surface, with open woodland of *Eucalyptus tetrodonta* and *E. aspera*, and a dense understorey and ground cover of *Plectrachne pungens* (DoE 2017). **Distribution:** In the NT, the Sir Edward Pellew island group and Pungalina-Seven Emu (mainland reserve south-west of Borroloola (Woinarski & Ward 2012). Also a few records around Mount Isa in Qld (DoE 2017). **Records:** None proximate. Nearest mainland records are more than 300 km to south-east.	**NONE** • There may be suitable habitat within the project footprint. • This species has a very restricted range that is not proximate to the project footprint. • The project footprint is not within the *expert distribution.*
†**Canefield Rat** *Rattus sordidus*	-	CR	**Habitat:** NT records all from coastal dunes and low-lying open woodlands with grassy understorey (Woinarski & Ward 2012). **Distribution:** Through north-eastern Australia, northern NSW and west to Normanton in Queensland (Woinarski & Ward 2012). In the NT, known only from the Sir Edward Pellew island group. **Records:** None on mainland, seven from Sir Edward Pellew island group more than 150 km to the south-east.	**NONE** • There are no mainland NT records. • There is no *expert distribution* mapping.
Pale Field-rat *Rattus tunneyi*	-	VU	**Habitat:** Historically occurred in a wide range of habitats, but now primarily in dense vegetation along creeks (Aplin et al. 2008). **Distribution:** Higher rainfall areas of northern Australia, extending from Kimberley	**MEDIUM** • There may be suitable habitat within the project footprint (particularly along the Roper River and associated creeks).

THREATENED SPECIES LIKELIHOOD ANALYSIS				
Name	**Status**		**Summary**	**Likelihood of occurrence**
	Cth	**NT**		
			in WA to south-eastern Qld, including the Top End of the NT (Braithwaite & Griffiths 1996). **Records:** 197 – mostly from the Edward Pellow island group, with a few from Limmen River (approximately 70 km south-east). Two proximate to project area from 1982 and 1997.	• There are two proximate records (most recently 1997). • There is no *expert distribution* mapping.
Bare-rumped Sheath-tailed Bat *Saccolaimus saccolaimus nudicluniatus*	VU	-	**Habitat:** Mostly in lowland areas, in a range of woodland, forest and open environments (DoE 2017). In the NT, known from *Pandanus* woodland fringing the sedgelands of the South Alligator River and Eucalypt tall open forests (Friend & Braithwaite 1986; Churchill 1998). **Distribution:** India through south-eastern Asia to the Solomon Islands, and north-eastern Qld and the NT (Milne & Woinarski 2006). Few scattered records in the NT. Most records are near-coastal (TSSC 2016). **Records:** One, a specimen collected at Port Roper in 2001.	**HIGH** • There is suitable habitat throughout the project footprint. • There was a specimen of this species collected from Port Roper in 2001. • There is no *expert distribution* mapping.
†**Water Mouse or False Water Rat** *Xeromys myoides*	VU	-	**Habitat:** In the NT, not well documented due to a low number of records. Appears to utilise both intertidal and freshwater habitats, with most records from mangrove forests, saltmarsh, sedgelands, claypans and freshwater melaleuca wetlands (DoE 2017). **Distribution:** Three regions of coastal Australia: the NT, central south Qld and south-east Qld (DoE 2017). In the NT, known only from coastal Top End with ten records at six sites – South Alligator River in 1903, Daly River floodplain in 1972, two sites on the Tomkinson River in 1975, Melville Island in 1975 and Glyde River floodplain in 1998 and 1999 (Woinarski 2006). **Records:** None for either bioregion. Nearest about 300 km to the north.	**MEDIUM** • There may be suitable habitat around the port section of the project footprint. • There are no records for the region. • The project footprint is within the *expert distribution (maybe).*
***Carpentarian Rock-rat** *Zyzomys palatalis*	EN	CR	**Habitat:** Restricted to sandstone gorges and escarpments containing a core of dry or wet rainforest vegetation, mixed with woodland, scree slopes and permanent water, surrounded by savannah woodlands (Puckey & Woinarski 2006). **Distribution:** Restricted to the NT, where known only from five locations within a radius of 35 km (Puckey 2003) at Wollogorang Station in the Gulf of Carpentaria (Kitchener 1989). **Records:** All records are from Wollogorang Station approximately 350 km to the south-east.	**NONE** • There may be suitable habitat within the project footprint. • This species has a very restricted range that is not proximate to the project footprint. • The project footprint is not within the *expert distribution.*
REPTILES				
***Plains Death Adder** *Acanthophis hawkei*	VU	VU	**Habitat:** Floodplains and cracking soil plains (Webb et al. 2002). **Distribution**: Habitat mapping suggests the potential geographic range extends from	**NONE** • There is no suitable habitat within the project footprint. • There are no proximate records

THREATENED SPECIES LIKELIHOOD ANALYSIS				
Name	**Status**		**Summary**	**Likelihood of occurrence**
	Cth	**NT**		
			western Qld, across the north of the NT to north-eastern WA. Fragmented populations occur in the Mitchell Grass Downs of western Qld, the Barkly Tablelands on the NT/Qld border and east of Darwin in the NT (TSSC 2012). **Records:** Two (1976 and 1980), nearest more than 240 km to the south-east.	from the region. • The project footprint is within the *expert distribution (maybe).*
†**Loggerhead Turtle** *Caretta caretta*	EN	VU	**Habitat:** Pelagic in tropical, sub-tropical and temperate waters. Nests mainly on sub-tropical sandy beaches (Marquez 1990). **Distribution:** Global, including the Australian coast (DoE 2017) where nesting is concentrated in southern Qld and from Shark Bay to the North West Cape in WA (DoE 2017). No breeding known to occur in the NT but records in NT waters (Taylor et al. 2006). **Records:** Three (1985) – Bing Bong near McArthur River. Only a few for the Gulf of Carpentaria.	**LOW** (foraging) **NONE** (breeding) • There is suitable habitat within the marine section of the project footprint. • There are only a few records for the Gulf of Carpentaria, and none of nesting. • There is no *expert distribution* mapping.
†**Green Turtle** *Chelonia mydas*	VU	-	**Habitat:** Pelagic in tropical and subtropical waters, although individuals may also stray into temperate waters (Cogger et al. 1993). In the NT, nesting mainly on wide beaches backed by large dune systems (Chatto 1998). **Distribution:** Global. Nests, forages and migrates across tropical northern Australia, with main breeding sites being the Great Barrier Reef of Qld, the north-west shelf of WA, Wellesley Island group in the southern Gulf of Carpentaria and the Top End coast (DoE 2017). Many nesting sites in the NT, mostly from the western end of Melville Island to near NT/Qld border (Chatto 1998). **Records:** 42 – to the north and east of Roper River mouth.	**HIGH** (foraging) **MEDIUM** (breeding) • There is suitable habitat within the marine section of the project footprint. • There are many records for the Gulf of Carpentaria. Chatto (2008) recorded high breeding activity in the Gulf of Carpentaria (second highest of the eight regions within the NT) – but not near the Roper River • The project footprint is within the *expert distribution (likely).*
†**Leatherback Turtle** *Dermochelys coriacea*	EN	CR	**Habitat:** Pelagic in tropical, subtropical and temperate waters (DoE 2017). **Distribution:** Global, including the northern and eastern seaboards of Australia (DoE 2017). No major nesting recorded in Australia. In the NT, only a few records in the waters off northern Arnhem Land and the Gulf of Carpentaria (Taylor et al. 2013). **Records:** Only a few for the Gulf of Carpentaria.	**MEDIUM** (foraging) **NONE** (breeding) • There is suitable habitat within the marine section of the project footprint. • There are only a few records for the Gulf of Carpentaria, and none of nesting. • The project footprint is within the *expert distribution (likely).*
Gulf Snapping Turtle *Elseya lavarackorum*	EN	-	**Habitat:** Large rivers and their associated overflow lagoons and oxbow lakes (Cogger 2000; Woinarski 2006). Found in deeper permanent pools most often with muddy, sandy or rocky bottoms. Also found in the middle reaches of rivers, upstream of saline regions and downstream of escarpments, including plunge pools. Steep rocky gorges, and river reaches with intact river banks seem to be preferred habitats (Thomson et	**NONE** • There is suitable habitat throughout the project footprint (the Roper River). • There are no records from the Roper River. A closely-related species occurs instead. • The project footprint is incorrectly assigned as being within the

THREATENED SPECIES LIKELIHOOD ANALYSIS				
Name	**Status**		**Summary**	**Likelihood of occurrence**
	Cth	**NT**		
			al. 1997). **Distribution:** Rivers in far eastern NT and far western Qld that discharge into the Gulf of Carpentaria. In the NT, this includes the Roper, Limmen Bight, Robinson and Nicholson Rivers (DoE 2017). **Records:** Seven (2006 to 2010) – one from about 150 km to the south-east, the remainder a further 150 km. However, DoE (2017) state that there are records for the Roper River.	*expert distribution (likely).*
†**Hawksbill Turtle** *Eretmochelys imbricata*	VU	-	**Habitat:** Tropical, sub-tropical and temperate waters (DoE 2017). In the NT, most nesting occurs on islands rather than mainland beaches. (Taylor et al. 2012). **Distribution:** Global. In the NT, principal nesting sites are concentrated around north-eastern Arnhem land and Groote Eylandt (Chatto 1998). **Records:** Very few for southern Gulf of Carpentaria.	**MEDIUM** (foraging) **LOW** (breeding) • There is suitable habitat within the marine section of the project footprint. • There are many records for the Gulf of Carpentaria; however, Chatto (2008) recorded relatively low breeding activity (second lowest of the eight regions within the NT). • The project footprint is within the *expert distribution (likely).*
†**Olive Ridley Turtle** *Lepidochelys olivacea*	EN	VU	**Habitat:** Tropical and subtropical waters, preferring shallow protected waters (DoE 2017). In the NT, breeds at a wide range of sites on island and, less commonly, mainland beaches (Chatto 1998). **Distribution:** Global. In the NT, second most widespread nesting species (after Flatbacks) (Chatto & Baker 2008). Vast majority of the nesting population recorded from Melville Island to Groote Eylandt (Chatto 1998). **Records:** One near NT/Qld border. Very few records for southern or eastern Gulf of Carpentaria.	**HIGH** (foraging) **LOW** (breeding) • There is suitable habitat within the marine section of the project footprint. • There are very few records for the Gulf of Carpentaria and Chatto (2008) recorded very low breeding activity (the lowest of the eight regions within the NT). • The project footprint is within the *expert distribution (likely).*
†**Flatback Turtle** *Natator depressus*	VU	-	**Habitat:** Prefers shallow, soft-bottomed seabed habitats away from reefs (DoE 2017). In the NT, nests on a wide variety of beach types around the entire coastline (Chatto & Baker 2008) **Distribution:** Northern Australia and New Guinea, with all known breeding sites occurring only in Australia (DoE 2017). In the NT, the most widely spread marine turtle species, nesting around the entire coastline (Chatto 2008). **Records:** 61 – mostly to the north and east of Roper River mouth.	**HIGH** (foraging) **LOW** (breeding) • There is suitable habitat within the marine section of the project footprint. • There are many records for the Gulf of Carpentaria; however, Chatto (2008) recorded relatively low breeding activity (second lowest of the eight regions within the NT). • The project footprint is within the *expert distribution (likely).*
Mertens' Water Monitor *Varanus mertensi*	-	VU	**Habitat:** Semi-aquatic, occupying edges of watercourses and lagoons, but seldom seen far from water (Christian 2004). **Distribution:** Across far northern Australia from the western Cape York Peninsula in Qld	**HIGH** • There is suitable habitat throughout the project footprint. • There are records from the region, including one from 2012 proximate

THREATENED SPECIES LIKELIHOOD ANALYSIS				
Name	**Status**		**Summary**	**Likelihood of occurrence**
	Cth	**NT**		
			to the Kimberley in WA (Christian 2004). Widespread in the NT, occupying all of the Top End river systems (Ward et al. 2006). **Records:** 33 throughout both bioregions, most recently from 2002. Recorded at LD Creek 60km south-east of Deposit C in 2012 during surveys for the Sherwin EIS.	to the project footprint. The arrival of Cane Toads in the mid-1990's led to a drastic decline in the occurrence of monitor species (due to poisoning by ingestion) from which there has been some recovery by this species. • There is no *expert distribution* mapping.
Mitchell's Water Monitor *Varanus mitchelli*	-	VU	**Habitat:** Semi-aquatic and arboreal, inhabiting margins of watercourses, swamps and lagoons (Ward 2012). **Distribution:** Top End of the NT and Kimberley in WA (Schultz & Doody 2004). In the NT, recorded in most catchments flowing into the Timor Sea, Arafura Sea and the Gulf of Carpentaria (Ward 2012). **Records:** 13 throughout both bioregions, most recently from 2003.	**HIGH** • There is suitable habitat throughout the project footprint. • There are records from the region, but none from the past decade. The arrival of Cane Toads in the mid-1990's led to a drastic decline in the occurrence of monitor species (due to poisoning by ingestion) from which there has been some recovery by this species. • There is no *expert distribution* mapping.
Floodplain Monitor *Varanus panoptes*	-	VU	**Habitat:** Broad range of habitats from coastal beaches to savannah woodlands (Christian 2004). Also common throughout floodplains grasslands and a variety of native woodlands (Ward et.al 2012). **Distribution:** Across northern Australia from the Kimberley in WA to Cape York Peninsula, and southwards through most of Queensland. In the NT, recorded across most of the Top End and the Gulf Region (Christian 2004). **Records:** 15 from Gulf Coastal bioregion, most recently from 2003.	**MEDIUM** • There is suitable habitat throughout the project footprint. • There are records from the region, but none from the past decade. The arrival of Cane Toads in the mid-1990's led to a drastic decline in the occurrence of monitor species (due to poisoning by ingestion) from which there may not have been significant recovery by this species. • There is no *expert distribution* mapping.
FISH				
†**Great White Shark** *Carcharodon carcharias*	VU	-	**Habitat:** Marine, anywhere between close inshore habitats (such are shallow coastal bays or reefs) and the outer continental shelf and slope areas (DoE 2017). **Distribution:** Globally in all seas in both hemispheres. In Australia, from central Qld the south coast to north-west WA (DoE 2017). There have been no verified sightings in the NT (DoE 2017). **Records:** None for the Gulf of Carpentaria.	**LOW** • There is suitable habitat within the marine section of the project footprint. • There are no records for the Gulf of Carpentaria or other NT waters. • The project footprint is <u>not</u> within the *expert distribution (maybe).*
Speartooth Shark *Glyphis glyphis*	CR	VU	**Habitat:** Tropical fresh water and marine environments (Bradshaw et al. 2008). May be restricted to low salinity environments such as freshwater or brackish areas of rivers (DOE, 2016). **Distribution:** Papua New Guinea and Northern Australia. Considered to be very rare in Australia as few specimens have	**MEDIUM** • There is suitable habitat within the port and marine sections of the project footprint. • There are no records for the Gulf of Carpentaria. • The project footprint is within the

THREATENED SPECIES LIKELIHOOD ANALYSIS				
Name	**Status**		**Summary**	**Likelihood of occurrence**
	Cth	**NT**		
			been collected (Cavenagh et al. 2003). Three distinct geographical locations in NT and northern Qld (DoE 2015). In the NT, recorded in the Alligator River region across to Adelaide River, and the Bizant River (Ward and Larson 2006). **Records:** None for the Gulf of Carpentaria.	*expert distribution (maybe).*
Dwarf Sawfish *Pristis clavata*	VU	VU	**Habitat:** Tropical marine and estuarine habitats, entering estuarine or fresh waters to breed during the wet season and moving into marine waters following the wet season (Peverell 2005). **Distribution:** Indonesia, South-East Asia and northern Australia (Cavenagh et al. 2003). In NT, known to occur around Darwin (including Buffalo Creek and Rapid Creek), in Kakadu National Park (Alligator River), and Keep River and Victoria River (Thornburn et al. 2003). **Records:** One for the Gulf of Carpentaria (Qld side) from 1969.	**MEDIUM** • There is suitable habitat within the port and marine sections of the project footprint. • There is only one record for the Gulf of Carpentaria. • The project footprint is within the generalised *expert distribution.*
Freshwater or Largetooth Sawfish *Pristis pristis* (previously known as *Pristis microdon*)	VU	VU	**Habitat:** Tropical marine and estuarine habitats, entering estuarine or fresh waters to breed during the wet season and moving into marine waters following the wet season (Peverell 2005). **Distribution:** Circumtropical, with distinct populations in the eastern Atlantic, western Atlantic, eastern Pacific and Indo-West Pacific – including northern Australia (TSSC 2014). In the NT, reported in Adelaide, Victoria, Daly, East and South Alligator, Goomadeer, Roper, McArthur, Wearyan and Robinson Rivers (TSSC 2014). **Records:** Two records for rivers draining into the Gulf of Carpentaria – one a specimen from Port Roper in 2010.	**HIGH** • There is suitable habitat within the port and marine sections of the project footprint. • There is a record from the Roper River. • The project footprint is within the *expert distribution (likely).*
Green Sawfish *Pristis zijsron*	VU	VU	**Habitat:** Tropical waters including marine inshore waters, estuaries, lagoons and freshwater. However, the majority of records are from marine or estuarine waters (Thornburn et al. 2003). The species enters estuarine or fresh waters to breed during the wet season and moves back into marine waters following the wet season (Peverell 2005). **Distribution:** Northern Australia, South-East Asia and the Indian Ocean (Cavenagh et al. 2003). Most frequently encountered of the sawfish species in Australian waters (Last & Stevens 1994). Most commonly known from the Gulf of Carpentaria (Stevens et al. 2005). In the NT, specimens have only been collected from Buffalo Creek in Darwin (Stirrat et al. 2006). **Records:** Four records for the NT side of the Gulf of Carpentaria (1997, two from 1980 and 1969)	**HIGH** • There is suitable habitat within the port and marine sections of the project footprint. • Fishing catch records show that the species inhabits all regions of the Gulf of Carpentaria, in low numbers and with a highly variable frequency of occurrence (Peverell 2005). • The project footprint is within the *expert distribution (likely).*
†**Whale Shark**	VU	-	**Habitat:** Pelagic, in both oceanic and	**LOW**

THREATENED SPECIES LIKELIHOOD ANALYSIS				
Name	**Status**		**Summary**	**Likelihood of occurrence**
	Cth	**NT**		
Rhincodon typus			coastal areas in tropical to warm-temperate waters. Most common in offshore open waters; however, often seen close to shore, and known to enter lagoons and atolls (DOE 2016). **Distribution:** Records from NSW, Qld, NT and WA, occasionally sighted in Victoria and SA. Most common off the north-western WA coast (Ningaloo Reef) (DOE, 2016). Status and distribution within the NT is not well known, with only a few unconfirmed sightings (Woinarski & Larson 2006). **Records:** None for the Gulf of Carpentaria.	• There is suitable habitat within the marine section of the project footprint. • Unconfirmed to occur within NT waters (Woinarski & Larson 2006) and no records for the Gulf of Carpentaria. • The project footprint is within the *expert distribution (maybe).*

** Habitat occurs only in the Gulf Falls and Uplands bioregion*

† Habitat occurs only in the Gulf Coastal bioregion

Selected references used for the Threatened Species Likeihood Analysis

Aumann, T & Baker-Gabb, D 1991, 'A Management Plan for the Red Goshawk', *RAOU Report 75*, Royal Australasian Ornithologists Union, Melbourne.

Barrett, G, Silcocks, A, Barry, S, Cunningham, R & Poulter, R 2003, *The New Atlas of Australian Birds*, Birds Australia, Melbourne, Victoria.

Blakers, M, Davies SJJF & Reilly PN, 1984, The Atlas of Australian Birds. Melbourne, Victoria: Melbourne University Press.

Chatto, R 2003 'The distribution and status of shorebirds around the coast and coastal wetlands of the Northern Territory, *Technical Report 73*, Parks and Wildlife Commission of the Northern Territory, Darwin, <http://www.nt.gov.au/nreta/publications/wildlife/science/pdf/2003_shorebirds_rpt76.pdf>

Cogger, HG 2000, *Reptiles and Amphibians of Australia - 6th edition,* Reed New Holland, Sydney, NSW.

Cogger, HC, Cameron, EE, Sadlier, RA & Eggler, P 1993, *The Action Plan for Australian Reptiles*, Australian Nature Conservancy Agency, Canberra.

Debus, S & Czechura, G 1988, 'Field identification of the Red Goshawk Erythrotriorchis radiatus'*. Australian Bird Watcher*, vol. 12, pp. 154-159.

Dostine, P 1998, *Gouldian Finch Recovery Plan (Erythrura gouldiae)*, Gouldian Finch Recovery Team and Parks & Wildlife Commission NT, Darwin.

Franklin, DC 1999, Evidence of disarray amongst granivorous bird assemblages in the savannas of northern Australia, a region of sparse human settlement. *Biological Conservation*, 90, pp.53-68.

Franklin, DC, Whitehead, PJ, Pardon, G, Matthews, J, McMahon, P & McIntyre, D 2005, 'Geographic patterns and correlates of the decline of granivorous birds in northern Australia', *Wildlife Research*, vol. 32, pp. 399-408.

Garnett, ST, Szabo, JK & Dutson, G 2011, The action plan for Australian Birds 2010, CSIRO Publishing/Birds Australia, Melbourne, Victoria.

Georges, A & Adams, M 1996, 'Electrophoretic delineation of species boundaries within the short-necked freshwater turtles of Australia (Testudines: Chelidae)', *Zoological Journal of the Linnean Society*, London, 118, pp.241-260.

Higgins, PJ (ed.) 1999, *Handbook of Australian, New Zealand and Antarctic* Birds, Volume 4: Parrots to Dollarbird, Oxford University Press, Melbourne, Victoria.

Johnson, KA & Kerle, JA 1991, *Flora and vertebrate fauna of the Sir Edward Pellew group of islands, Northern Territory*, Report to the Australian Heritage Commission, Conservation Commission of the Northern Territory, Alice Springs, NT.

Johnson, KA, 2008, 'Bilby *Macrotis lagotis'*, In Van Dyck, S & Strahan R (eds), *The mammals of Australia,* Third edition, pp. 191-193, Reed New Holland, Sydney.

Johnson KJ, Woinarski JCZ & Langford DJ 2008, Carpentarian Pseudantechinus *Pseudantechinus mimulus*, Van Dyck, S. & R. Strahan (eds.) The Mammals of Australia, pp. 71-72. New Holland Publishers, Sydney.

Kitchener, D 1991, 'Pseudantechinus mimumlus (Thomas 1906) *Marsupalia: Dasyuridae*: rediscovery and redescription', *Records of the Western Australian Museum,* vol. 15, pp. 191-202.

O'Malley, C 2006, 'National Recovery Plan for the Gouldian Finch (Erythrura gouldiae)', *WWF-Australia*, Sydney and Parks and Wildlife NT, Department of Natural Resources, Environment and the Arts, NT Government, Palmerston.

Palmer, C, Woinarski, J & Hill, B 2012, 'Threatened Species of the Northern Territory- Golden Bandicoot Isoodon auratus', *Northern Territory Department of Land Resource Management*, viewed 20 Jan 2016, <http://www.lrm.nt.gov.au/__data/assets/pdf_file/0017/10817/golden_bandicoot_EN_FINAL.pdf>.

Pavey, C 2006c, 'Threatened Species of the Northern Territory- Black-footed Rock-Wallaby Petrogale lateralis', Northern Territory Department of Land Resource Management, viewed 23 Jan 2016, <http://lrm.nt.gov.au/__data/assets/pdf_file/0015/10842/blackfooted_rockwallaby_nt.pdf>.

Rogers, D 2001, 'Painted Snipe', *Wingspan*, vol. 11, no. 4, pp. 6-7.

Southgate R, Palmer C, Adams M, Masters P, Triggs B, & Woinarski J 1996, Population and habitat characteristics of the Golden Bandicoot (*Isoodon auratus*) on Marchinbar Island, Northern Territory *Wildlife Research* 23, 647-664.

Taylor, R, Woinarski, J, Charlie, A, Dixon, R, Pracy, D & Rhind, S 2004, 'Report on mammal survey of the Pellew Islands 2003', *Lianthawirriyarra Sea Ranger Unit*, Department of Infrastructure, Planning and Environment and Tropical Savannas CRC, Darwin, NT.

Taylor, R. Chatto, R & Woinarski, JCZ 2013, 'Threatened Species of the Northern Territory- Australian pained snipe *Rostratula australis*', *Northern Territory Department of Land Resource Management*, viewed 20 Jan 2016, <http://www.lrm.nt.gov.au/__data/assets/pdf_file/0003/10866/paintedsnipe_vu.pdf>.

Thomson SA, White A & Georges A 1997, Re-evaluation of *Emydura lavarackorum*: identification of a living fossil, *Memoirs of the Queensland Museum,* 4291), pp 327-336.

Threatened Species Scientific Committee (TSSC), 2015, Approved Conservation Advice for *Grantiella picta* (Painted Honeyeater), Commonwealth of Australia.

Threatened Species Scientific Committee (TSSC), 2012, Commonwealth Listing Advice on Acanthophis hawkei (Plains Death Adder), [Conservation Advice]

Tidemann, SC 1996, 'Causes of the decline of the Gouldian Finch Erythrura gouldiae', *Biological Conservation International*, vol. 6, pp. 49-61.

Ward, S 2012a, 'Threatened Species of the Northern Territory- Grey Falcon: *Falco hypoleucos'*, *Northern Territory Department of Land Resource Management*, viewed 20 Jan 2016, <http://lrm.nt.gov.au/__data/assets/pdf_file/0014/143114/Grey_falcon_VU_FINAL.pdf>.

Ward, S 2012b, 'Threatened Species of the Northern Territory – Painted Honeyeater: Grantiella picta, *Northern Territory Department of Land Resource Management*, viewed 24 Jan 2016, < https://nt.gov.au/__data/assets/pdf_file/0020/206363/painted-honeyeater.pdf>.

Webb, JK, Christian, KA & Fisher, P 2002, 'Fast growth and early maturation in a viviparous sit-and-wait predator, the northern death adder (*Acanthophis praelongus*) from tropical Australia', *Journal of Herpetology*, vol. 36, no. 3, pp. 505-509.

Wilson, C, Woinarski, J, Kessner, V & Braby, M 2006, 'Threatened Species of the Northern Territory, Spencers Land Snail, *Bothriembryon spenceri'*, *Northern Territory Parks and Wildlife Commission*, viewed 10 Feb 2016, <http://www.lrm.nt.gov.au/__data/assets/pdf_file/0015/10914/Bothriembryon_spenceri_VU.pdf>

Woinarski, JCZ 2004, 'National Multi-species Recovery Plan for the Carpentarian Antechinus Pseudantechinus mimulus, Butler's Dunnart Sminthopsis butleri and Northern Hopping-mouse Notomys aquilo, 2004 – 2009', *Northern Territory Department of Infrastructure Planning and Environment*, Darwin, viewed 20 Jan 2016, <http://www.environment.gov.au/biodiversity/threatened/publications/recovery/p-mimulus-s-butleri-n-aquilo/pubs/p-mimulus-s-butleri-n-aquilo.pdf>.

Woinarski J 2006, 'Threatened Species of the Northern Territory, Gulf Snapping Turtle, *Elseya lavarackorum*', *Northern Territory Parks and Wildlife Commission*, viewed 18 Jan 2016, <http://www.lrm.nt.gov.au/__data/assets/pdf_file/0003/10884/gulf_snapping_turtle_lc.pdf>

Woinarski, JCZ & Ward, S 2006, 'Threatened Species of the Northern Territory-Masked Owl (north Australian mainland subspecies) *Tyto novaehollandiae kimberli*', *Northern Territory Department of Land Resource Management*, viewed 20 Jan 2016, <http://www.nretas.nt.gov.au/__data/assets/pdf_file/0020/10856/masked_owl_tiwi_en.pdf>.

Woinarski, JCZ & Ward, S 2012, 'Threatened Species of the Northern Territory-Carpentarian Antechinus *Pseudantechinus mimulus*', *Northern Territory Department of Land Resource Management*, viewed 20 Jan 2016, <http://www.lrm.nt.gov.au/__data/assets/pdf_file/0011/10820/Carpentarian-antechinus_NT_FINAL.pdf>.