



Australian Government

Department of the Environment

Referral of proposed action

What is a referral?

The *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) provides for the protection of the environment, especially matters of national environmental significance (NES). Under the EPBC Act, a person must not take an action that has, will have, or is likely to have a significant impact on any of the matters of NES without approval from the Australian Government Environment Minister or the Minister's delegate. (Further references to 'the Minister' in this form include references to the Minister's delegate.) To obtain approval from the Environment Minister, a proposed action should be referred. The purpose of a referral is to obtain a decision on whether your proposed action will need formal assessment and approval under the EPBC Act.

Your referral will be the principal basis for the Minister's decision as to whether approval is necessary and, if so, the type of assessment that will be undertaken. These decisions are made within 20 business days, provided sufficient information is provided in the referral.

Who can make a referral?

Referrals may be made by or on behalf of a person proposing to take an action, the Commonwealth or a Commonwealth agency, a state or territory government, or agency, provided that the relevant government or agency has administrative responsibilities relating to the action.

When do I need to make a referral?

A referral must be made for actions that are likely to have a significant impact on the following matters protected by Part 3 of the EPBC Act:

- World Heritage properties (sections 12 and 15A)
- National Heritage places (sections 15B and 15C)
- Wetlands of international importance (sections 16 and 17B)
- Listed threatened species and communities (sections 18 and 18A)
- Listed migratory species (sections 20 and 20A)
- Protection of the environment from nuclear actions (sections 21 and 22A)
- Commonwealth marine environment (sections 23 and 24A)
- Great Barrier Reef Marine Park (sections 24B and 24C)
- A water resource, in relation to coal seam gas development and large coal mining development (sections 24D and 24E)
- The environment, if the action involves Commonwealth land (sections 26 and 27A), including:
 - o actions that are likely to have a significant impact on the environment of Commonwealth land (even if taken outside Commonwealth land);
 - o actions taken on Commonwealth land that may have a significant impact on the environment generally;
- The environment, if the action is taken by the Commonwealth (section 28)
- Commonwealth Heritage places outside the Australian jurisdiction (sections 27B and 27C)

You may still make a referral if you believe your action is not going to have a significant impact, or if you are unsure. This will provide a greater level of certainty that Commonwealth assessment requirements have been met.

To help you decide whether or not your proposed action requires approval (and therefore, if you should make a referral), the following guidance is available from the Department's website:

- the Policy Statement titled *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance*. Additional sectoral guidelines are also available.

- the Policy Statement titled Significant Impact Guidelines 1.2 - Actions on, or impacting upon, Commonwealth land, and actions by Commonwealth agencies.
- the Policy Statement titled Significant Impact Guidelines: Coal seam gas and large coal mining developments—Impacts on water resources.
- the interactive map tool (enter a location to obtain a report on what matters of NES may occur in that location).

Can I refer part of a larger action?

In certain circumstances, the Minister may not accept a referral for an action that is a component of a larger action and may request the person proposing to take the action to refer the larger action for consideration under the EPBC Act (Section 74A, EPBC Act). If you wish to make a referral for a staged or component referral, read 'Fact Sheet 6 Staged Developments/Split Referrals' and contact the Referrals Gateway (1800 803 772).

Do I need a permit?

Some activities may also require a permit under other sections of the EPBC Act or another law of the Commonwealth. Information is available on the Department's web site.

Is your action in the Great Barrier Reef Marine Park?

If your action is in the Great Barrier Reef Marine Park it may require permission under the *Great Barrier Reef Marine Park Act 1975* (GBRMP Act). If a permission is required, referral of the action under the EPBC Act is deemed to be an application under the GBRMP Act (see section 37AB, GBRMP Act). This referral will be forwarded to the Great Barrier Reef Marine Park Authority (the Authority) for the Authority to commence its permit processes as required under the Great Barrier Reef Marine Park Regulations 1983. If a permission is not required under the GBRMP Act, no approval under the EPBC Act is required (see section 43, EPBC Act). The Authority can provide advice on relevant permission requirements applying to activities in the Marine Park.

The Authority is responsible for assessing applications for permissions under the GBRMP Act, GBRMP Regulations and Zoning Plan. Where assessment and approval is also required under the EPBC Act, a single integrated assessment for the purposes of both Acts will apply in most cases. Further information on environmental approval requirements applying to actions in the Great Barrier Reef Marine Park is available from <http://www.gbrmpa.gov.au/> or by contacting GBRMPA's Environmental Assessment and Management Section on (07) 4750 0700.

The Authority may require a permit application assessment fee to be paid in relation to the assessment of applications for permissions required under the GBRMP Act, even if the permission is made as a referral under the EPBC Act. Further information on this is available from the Authority:

Great Barrier Reef Marine Park Authority

2-68 Flinders Street PO Box 1379

Townsville QLD 4810

AUSTRALIA

Phone: + 61 7 4750 0700

Fax: + 61 7 4772 6093

www.gbrmpa.gov.au

What information do I need to provide?

Completing all parts of this form will ensure that you submit the required information and will also assist the Department to process your referral efficiently. If a section of the referral document is not applicable to your proposal enter N/A.

You can complete your referral by entering your information into this Word file.

Instructions

Instructions are provided in blue text throughout the form.

Attachments/supporting information

The referral form should contain sufficient information to provide an adequate basis for a decision on the likely impacts of the proposed action. You should also provide supporting documentation, such as environmental reports or surveys, as attachments.

Coloured maps, figures or photographs to help explain the project and its location should also be submitted with your referral. Aerial photographs, in particular, can provide a useful perspective and context. Figures should be good quality as they may be scanned and viewed electronically as black and white documents. Maps

should be of a scale that clearly shows the location of the proposed action and any environmental aspects of interest.

Please ensure any attachments are below three megabytes (3mb) as they will be published on the Department's website for public comment. To minimise file size, enclose maps and figures as separate files if necessary. If unsure, contact the Referrals Gateway (email address below) for advice. Attachments larger than three megabytes (3mb) may delay processing of your referral.

Note: the Minister may decide not to publish information that the Minister is satisfied is commercial-in-confidence.

How do I pay for my referral?

From 1 October 2014 the Australian Government commenced cost recovery arrangements for environmental assessments and some strategic assessments under the EPBC Act. If an action is referred on or after 1 October 2014, then cost recovery will apply to both the referral and any assessment activities undertaken. Further information regarding cost recovery can be found on the [Department's website](#).

Payment of the referral fee can be made using one of the following methods:

- EFT Payments can be made to:

BSB: 092-009

Bank Account No. 115859

Amount: \$7352

Account Name: Department of the Environment.

Bank: Reserve Bank of Australia

Bank Address: 20-22 London Circuit Canberra ACT 2601

Description: The reference number provided (see note below)

- Cheque - Payable to "Department of the Environment". Include the reference number provided (see note below), and if posted, address:

The Referrals Gateway

Environment Assessment Branch

Department of the Environment

GPO Box 787

Canberra ACT 2601

- Credit Card

Please contact the Collector of Public Money (CPM) directly (call (02) 6274 2930 or 6274 20260 and provide the reference number (see note below).

Note: in order to receive a reference number, submit your referral and the Referrals Gateway will email you the reference number.

How do I submit a referral?

Referrals may be submitted by mail or email.

Mail to:

Referrals Gateway

Environment Assessment Branch

Department of Environment

GPO Box 787

CANBERRA ACT 2601

- If submitting via mail, electronic copies of documentation (on CD/DVD or by email) are required.

Email to: epbc.referrals@environment.gov.au

Clearly mark the email as a 'Referral under the EPBC Act'.

Attach the referral as a Microsoft Word file and, if possible, a PDF file.

[Follow up with a mailed hardcopy including copies of any attachments or supporting reports.](#)

What happens next?

Following receipt of a valid referral (containing all required information) you will be advised of the next steps in the process, and the referral and attachments will be published on the Department's web site for public comment.

The Department will write to you within 20 business days to advise you of the outcome of your referral and whether or not formal assessment and approval under the EPBC Act is required. There are a number of possible decisions regarding your referral:

The proposed action is NOT LIKELY to have a significant impact and does NOT NEED approval

No further consideration is required under the environmental assessment provisions of the EPBC Act and the action can proceed (subject to any other Commonwealth, state or local government requirements).

The proposed action is NOT LIKELY to have a significant impact IF undertaken in a particular manner

The action can proceed if undertaken in a particular manner (subject to any other Commonwealth, state or local government requirements). The particular manner in which you must carry out the action will be identified as part of the final decision. You must report your compliance with the particular manner to the Department.

The proposed action is LIKELY to have a significant impact and does NEED approval

If the action is likely to have a significant impact a decision will be made that it is a *controlled action*. The particular matters upon which the action may have a significant impact (such as World Heritage values or threatened species) are known as the *controlling provisions*.

The controlled action is subject to a public assessment process before a final decision can be made about whether to approve it. The assessment approach will usually be decided at the same time as the controlled action decision. (Further information about the levels of assessment and basis for deciding the approach are available on the Department's web site.)

The proposed action would have UNACCEPTABLE impacts and CANNOT proceed

The Minister may decide, on the basis of the information in the referral, that a referred action would have clearly unacceptable impacts on a protected matter and cannot proceed.

Compliance audits

If a decision is made to approve a project, the Department may audit it at any time to ensure that it is completed in accordance with the approval decision or the information provided in the referral. If the project changes, such that the likelihood of significant impacts could vary, you should write to the Department to advise of the changes. If your project is in the Great Barrier Reef Marine Park and a decision is made to approve it, the Authority may also audit it. (See "*Is your action in the Great Barrier Reef Marine Park*," p.2, for more details).

For more information

- call the Department of the Environment Community Information Unit on 1800 803 772 or
- visit the web site <http://www.environment.gov.au/topics/about-us/legislation/environment-protection-and-biodiversity-conservation-act-1999>

All the information you need to make a referral, including documents referenced in this form, can be accessed from the above web site.

Referral of proposed action

Project title: Darwin Refinery

1 Summary of proposed action

1.1 Short description

TNG Limited (TNG, the proponent), proposes to establish and operate a refinery at Darwin. The Refinery will process magnetite concentrate from TNG's Mount Peake Project and produce vanadium pentoxide, titanium dioxide pigment and pig iron that will be exported through the Port of Darwin's East Arm Wharf to international customers.

1.2 Latitude and longitude

ID	LatDMS	LongDMS
1	12° 32' 27.896"" S	130° 57' 31.849"" E
2	12° 33' 7.451"" S	130° 57' 36.223"" E
3	12° 33' 21.658"" S	130° 57' 52.088"" E
4	12° 32' 44.659"" S	130° 58' 15.170"" E
5	12° 32' 31.448"" S	130° 58' 9.184"" E

1.3 Locality and property description

The Refinery is proposed to be located on Lot 1817, Hundred of Ayers, Middle Arm Peninsula of Darwin Harbour, located adjacent to Elizabeth River, near the Elizabeth River Bridge.

Access to the site is via Channel Island Road. The site is approximately 30 km by road from Darwin, 9 km from Palmerston and 22 km by road or rail from East Arm Wharf (Figure 1 and Figure 2).

High voltage power lines, the Amadeus Gas Pipeline, a water supply pipeline and the Alice Springs to Darwin railway line are in close proximity to the site's southern boundary.

1.4 Size of the development footprint or work area (hectares)

In total, Lot 1817 covers 507 ha. The Refinery will be located on the north eastern portion of the lot. Its footprint is expected to be approximately 140 ha, and within that 105 ha will be cleared. The south western portion of Lot 1817 is available to accommodate the rail spur, easements for services and ancillary refinery-related infrastructure. A final disturbance footprint for this area is not currently available.

1.5 Street address of the site

Lot 1817, Hundred of Ayers, Middle Arm Peninsula, Darwin

1.6

Lot description

The Project site is contained within the proposed 1,000 ha Middle Arm Industrial Precinct, a Land Development Corporation initiative that provides access to industrial and commercial land under the Land Development Corporation Act. The Precinct is designed to accommodate large strategic industrial lots for downstream gas processing and gas related industry with access to an extensive corridor network to carry utilities, gas, feedstock and products.

The Draft Darwin Regional Land Use Plan 2014 (NT Planning Commission 2014) identifies land on Middle Arm as an area with potential for strategic industrial development including additional deep water port development.

Land to the east of Lot 1817 is zoned Utilities, Main Roads, Proposed Main Roads and Railway. Land to the north, south and west contains intertidal areas and mangrove forests that connect the site to the Elizabeth River and Darwin Harbour, and has been zoned for Conservation (Figure 3) (Department of Lands, Planning and the Environment 2015). The proposed Refinery is consistent with the industrial nature of the Middle Arm Industrial Precinct. However, under the Zone FD general industry and light industry are prohibited (although the Refinery is consistent with the purpose of Zone FD). A rezoning application may therefore be required. Mangroves will not be cleared for the Project, and thus the Proposal is consistent with the objective of Zone CN - Conservation.

Development of the Refinery will be confined to the area of Lot 1817 adjacent to Channel Island Road (Figure 2). Land Development Corporation has advised that a subdivision application would be submitted to separate the titles of the western section of Lot 1817 that follows the coastal perimeter of Lot 1902.

The Register of Native Title Claims, Register of Indigenous Land Use agreements, Native Title Register and unregistered applications indicate that Section 1817, Hundred of Ayers was assessed under Native Title application DC96/4 Darwin Larrakia. It was determined that 'Native Title does not exist'.

The site is currently leased from the NT Government by private companies under extractive resources licence(s) for quarrying activities. In total, five licenses have been granted over the proposed Refinery footprint (Figure 4).

1.7

Local Government Area and Council contact (if known)

Litchfield

1.8

Time frame

Construction of the Refinery is scheduled to commence in late 2016 with first production in late 2018, subject to statutory approvals.

The construction period is anticipated to be 24 months. The design life of the Refinery will be 40 years.

1.9

Alternatives to proposed action		No
	✓	Yes, you must also complete section 2.2

1.10

Alternative time frames etc	✓	No
		Yes

1.11

State assessment		No
	✓	Yes, you must also complete Section 2.5

1.12

Component of larger action	✓	No
		Yes, you must also complete Section 2.7

1.13

Related actions/proposals		No
	✓	Yes, provide details: The Refinery is dependent on the Mount Peake mining project which is being separately assessed.

1.14

Australian Government funding	✓	No
		Yes, provide details:

1.15

Great Barrier Reef Marine Park	✓	No
		Yes, you must also complete Section 3.1 (h), 3.2 (e)

2 Detailed description of proposed action

2.1 Description of proposed action

Extent of the proposed action

The proposed action is the construction and operation of the Darwin Refinery and associated activities on Lot 1817.

Third parties will provide services external to the Lot boundary including concentrate transport to the Refinery, the transport of products by rail from the Refinery to East Arm Wharf, port activities including the unloading, storage, handling and export of products, port importing activities for consumables such as coke and limestone, and the transport of consumables by rail to the Refinery. Third party services will assume responsibility for environmental management measures associated with their activities covering potential impacts such as spill management, air emissions and noise emissions.

Processing capacity and products

The Refinery will process 894,000 tonnes per annum (tpa) of magnetite concentrate during years 1 – 4 with process capacity doubling to 1,788,000 tpa from year 5. At full production the refinery complex will produce:

- 19,700 tpa of vanadium pentoxide (V_2O_5) flake
- 292,000 tpa of pigment grade titanium dioxide (TiO_2)
- 856,000 tpa of 95% pig iron ingots.

Development footprint

In total, Lot 1817 covers 507 ha. The Refinery will be located on the north eastern portion of the lot. Its footprint is expected to be approximately 140 ha, and within that 105 ha will be cleared. The south western portion of Lot 1817 is available to accommodate the rail spur, easements for services and ancillary refinery-related infrastructure. A final disturbance footprint for this area is not currently available.

No mangrove areas or intertidal vegetation will be cleared.

Processing

Processing involves reduction, followed by an iron selective ferric chloride leach, vanadium selective TIVAN[®] leach, and a solvent extraction process. The three products result from the vanadium precipitation process, and pig iron and titanium dioxide pigment plants. A simplified process diagram is provided in Figure 6 with the process outlined below based on the Refinery operating at full production.

Train unloading

On average one train load of concentrate per day will be delivered to the refinery from Mount Peake. Each train will have a capacity of 5,520 tonnes of concentrate. Concentrate will be unloaded via bottom discharge rail wagons and conveyed to the Roaster Feed Stockpile.

Iron reduction circuit

The Roaster Feed Stockpile will be housed in a shed to minimise the addition of water to the feed due to rainfall and to reduce dust generation from wind erosion. Concentrate is loaded onto a conveyor with the conveyor also receiving carbon in the form of coke. This mixture of coke and concentrate is fed into the Reduction Roast Rotary Kiln where approximately 50% of the contained iron in the feed is metallised. The reduced solids are directed from the kiln and cooled, with the cooled solids conveyed to the ferric chloride leaching circuit.

Ferric leach circuit and acid / ferric regeneration

The cooled kiln product is fed to a series of agitated leach tanks to reduce the load of iron entering the TIVAN[®] leach. After leaching, the solution is transferred to the Ferric Leach Thickener to increase the solids content. The thickener overflow, which is a solution of ferrous chloride, is sent to the acid / ferric regeneration process to be converted to iron oxide and back to ferric chloride before recycling back to the ferric leach. The thickener underflow is dewatered on belt filters and the filtrate is sent with the thickener overflow to the acid / ferric regeneration plant.

Iron reduction and pig iron production

The acid / ferric regeneration process generates an iron oxide powder, that is further processed to create metallic iron and pig iron ingots. A small split stream of this intermediate iron oxide product will be reduced using coke in a small multiple hearth furnace to generate metallic iron which is fed to the redox reduction tank located after the TIVAN[®] leach circuit. The remainder of the iron oxide, generated by the acid / ferric regeneration process, is fed to a shaft furnace where it reacts with a reducing gas, made up of CO and H₂ produced from reforming a combination of natural gas and off gas with a catalyst. This results in Direct-Reduced Iron (DRI) as an intermediate product. Upon exiting the shaft furnace the hot DRI is fed into an Electric Arc Furnace where the DRI melts to produce pig iron and slag. The slag is disposed of as tailings, and the molten pig iron is poured into casts and cooled to produce ingots.

TIVAN® leach circuit

The TIVAN® leach circuit extracts the vanadium from the ferric leach residue using hydrochloric acid. Washed ferric leach residue, as filter cake, is conveyed to the first tank in a train of leach tanks where it is mixed with the hydrochloric acid to form a slurry and initiate the leaching process. The slurry flows along the tank train and exits to a thickener after it has completed leaching. The slurry is thickened to a target solids concentration for filtration. The thickener overflow, which comprises pregnant leach solution (PLS), bypasses the filter and is sent directly to the post filtration surge tank. Thickener underflow is pumped into a surge tank before filtering.

Thickened leach residue is filtered to separate the leach residue from the PLS and to wash the leach residue before it undergoes further processing to produce the titanium pigment product. The thickener underflow slurry is pumped into a pressure filter, where it is filtered and the resulting filter cake undergoes a wash cycle. The washed filter cake drops into a hopper before being fed into a flash dryer in the titanium pigment production area and the filtrate is combined with the thickener overflow in the post filtration surge tank. The PLS is then subjected to a reduction and pH adjustment tank where the ferric ions are reduced to ferrous ions via metallic iron addition and the solution is set, using magnesium oxide, to the desired pH value for the solvent extraction circuit.

Solvent extraction and vanadium precipitation

The purpose of the solvent extraction is to selectively remove the vanadium from the PLS produced in the TIVAN® leach circuit. Upon exiting the pH adjustment tank, the PLS solution is filtered, to remove any remaining solids. Once filtered the PLS is pumped to the Vanadium Extraction Circuit where vanadium transfers from the aqueous to the organic phase. The aqueous stream, depleted in vanadium, is then subjected to acid recovery in the acid / ferric regeneration circuit. From the Vanadium Extraction Circuit, the organic phase matter flows to the Organic Stripping Circuit where vanadium is stripped from the organic phase into a hydrochloric acid based strip liquor and emerges as loaded strip liquor (LSL). The stripped organic phase is cleaned and recycled through the solvent extraction circuit. The LSL is pumped to a vanadium oxidation tank and, following precipitation, the product is pumped to a product hopper. Filtered solids precipitate is conveyed to a rotary dryer to remove moisture. The resultant dried vanadium pentoxide is conveyed to a fusion furnace and flaking wheel to melt the vanadium and solidify it into flakes for packaging. Flakes will be passed through a crusher to ensure correct product size and then packaged into drums.

Titanium pigment plant

The purpose of the titanium pigment process is to upgrade the titanium dioxide from the leach residue, to pigment grade titanium dioxide, increasing the value of the product. The leach residue is dried, with the dried solids fed to the chlorinator. Chlorination is carried out in a fluidised bed reactor in the presence of coke. The resulting gas stream contains titanium tetrachloride (TiCl_4), oxides of carbon and all the impurity metals from the feedstock in the form of metal chlorides. The gas stream is cooled to a level at which the other metal chlorides separate out as solids. The TiCl_4 gas is cooled further, in a secondary and tertiary condenser and condenses as crude TiCl_4 . This liquid is scrubbed to remove any remaining metal chloride impurities and, once purified, is reacted with oxygen in a burner to reform titanium dioxide and release the chlorine which is recycled back to the beginning of the reaction. The products from the burner are cooled and then filtered to recover the titanium dioxide. The raw pigment is repulped with water and then milled. The resulting slurry is classified and any undersize titanium dioxide particles are filtered and recycled back to chlorination. Titanium dioxide particles of the correct size are subjected to a range of chemical surface treatments, followed by drying and milling.

Product handling and export

Vanadium pentoxide will be sealed in 200 L drums and exported inside sea containers. Titanium dioxide will be packaged into two tonne bulk bags. Pallets of both products will be loaded on to flat-bed wagons by forklift and railed to East Arm Wharf. Pig iron ingots will be loaded into open rail cars by front-end loader and railed to East Arm Wharf for export as a loose bulk commodity. The three products will be stored at the Darwin Port Corporation's nominated storage areas either in the open or within an existing shed. Product handling at the Wharf will be undertaken using existing facilities by the Corporation's nominated stevedores. The Project is expected to result in one ship movement per week.

Reagents and waste streams

A number of liquid and solid reagents will be stored onsite in tanks, drums, stockpiles etc. for use in processing. Volumes of hydrochloric acid, ammonia and liquid chlorine will likely require the refinery to be licensed as a major hazard facility.

Identified waste streams include:

- process solid wastes - filter cake (filtered solid waste-pig iron slag, iron residue, insoluble salts and coke rich solids). Stockpiled under cover to dry. Non-toxic waste to be used on-site for construction purposes, supplied to concrete manufacturers or disposed of on-site
- process liquid wastes (spent organic solution, titanyl chloride solution, vanadium bearing mineral oil, titanium waste solution, and titanium waste water. Stored in separate storage tanks, before being transferred to separate isocontainers for transportation from site by a third party for disposal at a licenced disposal facility
- non-process solid wastes. Inert solid waste will be collected regularly by a waste disposal company and disposed off-site at an appropriately licenced landfill. Recyclables will be collected and transported by a waste disposal company to an offsite recycling facility

- non-process liquid wastes. Waste oils will be stored in bulk tanks or drums for collection and recycling. Other hydrocarbons and chemicals will be stored in sealed containers for collection, treatment and disposal. An oily water separator will be installed to handle water from equipment wash-down. Waste recovered from this system will be sealed in drums and removed from site for recycling or disposal. The offices, mess, administration and first aid areas will be connected to existing main sewer lines
- dust and atmospheric emissions (carbon dioxide CO₂, water vapour H₂O, oxygen O₂ and nitrogen N₂).

Infrastructure and services

The Refinery will need a variety of infrastructure and services, all of which are available at the site boundary, including:

- road access from the existing Channel Island Road
- natural gas (12.7 PJpa) supplied from the Amadeus gas pipeline
- power (approximately 82 MW) provided from via an existing power line
- communications
- water from the Palmerston zone pipeline
- a 4 km rail siding running parallel to the Adelaide-Darwin rail line.

Workforce

The construction and operational workforce is expected to peak at 500 and 100 personnel respectively.

It is expected that permanent operations staff will live in existing residential accommodation in the Darwin/Palmerston area. Construction personnel will reside in either rental properties or hotel accommodation. An option to consider existing construction camps will also be considered however it would be a service provided by a third party.

2.2 Alternatives to taking the proposed action

The Refinery will value-add to the magnetite concentrate that will produced at Mount Peake.

The proposed refinery will allow Australia to supply an international market where the products are in high demand. Vanadium pentoxide is a strategic metal used as a strengthening additive in steel and other iron and titanium alloys. Vanadium is also used as an additive in high carbon steel applications such as high speed power tools. A rapidly growing market is the use in Vanadium Redox Batteries (VRB) technology. Vanadium is expected to grow rapidly in demand and price as the above markets grow.

Titanium dioxide is also a strategic metal used in pigments and, because of its high strength to weight ratio, is used in many high strength alloy applications including the high technology and aerospace industry.

Hematite is a high quality iron product produced in a very pure form (69.2% Fe at 99.9% purity) and will be marketed in the pigment industry as red ochre and also as a feedstock for blast furnaces.

Not developing the project will result in the loss of opportunity to strengthen the local economy through construction and operational expenditure, employment, the provision of services, and the loss of taxes and royalties to the Northern Territory economy.

2.3 Alternative locations, time frames or activities that form part of the referred action

Locations

No alternative locations are being considered.

Timeframes

No alternative timeframes are being considered.

Activities

No alternative activities are being considered.

2.4 Context, planning framework and state /local government requirements

Commonwealth

Environment Protection and Biodiversity Conservation Act 1999.

Northern Territory

The Project will require approvals, permits and licences for various components, including:

- an approval under the *Northern Territory Environmental Assessment Act 1982*
- an approval under the *Northern Territory Planning Act 2009* for the NT Planning Scheme
- *Waste Management and Pollution Control Act 1998* (WMPC Act) – The Project will generate waste which falls under Schedule 2 Activities of the WMPC Act. The Project will generate waste for disposal by burial (off site) (Part 1 of Schedule 2 that requires an Environment Protection Approval) or onsite (Part 2 of Schedule 2 that requires an Environment Protection Licence) prior to Project commencement
- *Work Health and Safety (National Uniform Legislation Act 2011* (WHS Act)) and Work Health Safety (National Uniform Legislation) Regulations (WHS Regulations) - related to storage of reagents at the Project site which potentially requires approval and a licence under this Act. The Refinery is likely to be classified as a Major Hazardous Facility due to onsite storage of hydrochloric acid, ammonia, liquid chlorine (and potentially other hazardous chemicals subject to further concept design) above threshold limits specified in Schedule 15 NT WHS Regulations and Control Of Major Hazardous Facilities National Standard 1014(2002) and National Code of Practice 2016(1996) (National Occupational Health and Safety Commission 2002) related national standards.
- *Northern Territory Aboriginal Sacred Sites Act 1989* - Aboriginal Areas Protection Authority Certificate prior to any works commencing. The Certificate will include information on the presence of any registered sacred site or archaeological sites within the area and any conditions of use such as restricted works areas.

2.5 Environmental impact assessments under Commonwealth, state or territory legislation

A Notice of Intent for the development of the Refinery was submitted in October 2015 to the Northern Territory Environment Protection Authority to determine whether formal assessment of the project will occur under the Northern Territory *Environment Assessment Act 1982*. A decision on assessment is pending.

The assessment officer is:

Michael Browne
Environmental Officer
Environmental Assessment Unit
Northern Territory Environment Protection Authority
p: (08) 8924 4149
e: michael.browne@nt.gov.au

2.6 Public consultation (including with Indigenous stakeholders)

Lot 1817 has been assessed under Native Title application DC96/4 Darwin Larrakia and was determined that 'Native Title does not exist'. Consultation will be undertaken with Larrakia Traditional Owners recognising the significance of Darwin Harbour.

Stakeholder consultation has commenced with the following groups:

- NT Environment Protection Authority
- Department of Mines and Energy
- Darwin Port Corporation
- Land Development Corporation
- Worksafe
- Utility providers.

TNG has not yet commenced consultation with the community. A program of consultation will be prepared and implemented as a component of the assessment process being undertaken in the NT.

2.7 A staged development or component of a larger project

The Refinery will receive magnetite concentrate from TNG's proposed Mount Peake Project. The mine is undergoing separate assessment under NT and Commonwealth legislation.

Whilst the Refinery and the mine are being pursued by the same proponent, the Refinery is considered to be a separate proposal and should be assessed separately. There are a number of reasons for this including:

- the Mount Peake Project is a project in its own right and not dependent on the refinery for its progress
- the two projects are at different stages of their respective assessment processes and are progressing on different timelines
- the two projects are 1,400 km apart, in different biogeographical regions, and not connected to each other by ancillary infrastructure. Environmental issues relevant to the two projects are different.

3 Description of environment & likely impacts

3.1 Matters of national environmental significance

3.1 (a) World Heritage Properties

Description

There are no World Heritage Properties near the proposed Refinery. The nearest World Heritage Property is the Kakadu National Park which is over 100 km from the proposed development area.

Nature and extent of likely impact

No impact will occur.

3.1 (b) National Heritage Places

Description

There are no National Heritage Place directly adjacent to the proposed footprint area.

Nature and extent of likely impact

No impact will occur.

3.1 (c) Wetlands of International Importance (declared Ramsar wetlands)

Description

The Ramsar listed wetland titled 'Port of Darwin' fringes all coastal headlands within the Port of Darwin limits, including the wetlands surrounding Lot 1817.

Nature and extent of likely impact

There are no anticipated impacts. There will be no dewatering during construction, clearing of wetland habitat or operational waste discharges to the harbour.

3.1 (d) Listed threatened species and ecological communities

Using the online Protected Matters Search Tool (PMST), a search of the EPBC Act Protected Matters Database did not identify the presence of any Threatened Ecological Communities within 10 km of the proposed Refinery footprint (PMST report attached).

A total of 31 individual species listed as Threatened under the EPBC Act were identified as potentially occurring within 10 km of the proposed footprint (Figure 7, Table 1). The likelihood of their occurrence within Project Area is discussed in Table 1. No species are known from the Refinery site.

Table 1 EPBC Act Threatened species potentially found within project area

Group	Common Name	Scientific Name	Migratory	Listed Threatened Status			Likelihood of Occurrence in Project Area	Likelihood of being affected by Project
				CR	En	Vu		
Plants	-	<i>Atalaya brevialata</i>		✓			Highly unlikely. Positive identifications are infrequent and records indicate a preference to different slope, associated vegetation and soil types. No records within 5 km.	Highly unlikely due to likelihood of occurrence.
	-	<i>Typhonium taylori</i>			✓		Highly unlikely. Positive identifications are infrequent and records indicate a preference to different associated vegetation and soil types. No records within 5 km.	Highly unlikely due to likelihood of occurrence.
Birds	Curlew sandpiper	<i>Calidris ferruginea</i>	M	✓			Possible. May transit over Project area to surrounding immediately adjacent intertidal mudflats. Numerous records within 5 km.	Unlikely due to the Project area not disturbing any coastal/riverine interface.
	Yellow chat	<i>Epthianura crocea tunneyi</i>		✓			Highly unlikely. Records indicate a preference to different associated vegetation and on flood plains. No records within 5 km.	Highly unlikely due to likelihood of occurrence and the Project area not disturbing any floodplains.
	Red goshawk	<i>Erythrotriorchis radiatus</i>				✓	Highly unlikely. Records indicate a preference for different associated vegetation and with tree-lined waterways. No records within 5 km.	Highly unlikely due to likelihood of occurrence and the Project area not disturbing any waterways.
	Gouldian finch	<i>Erythrura gouldiae</i>)			✓		Highly unlikely. Records indicate a preference for different associated vegetation. No records within 5 km.	Highly unlikely due to likelihood of occurrence.
	Partridge pigeon	<i>Geophaps smithii smithii</i>				✓	Highly unlikely. Records indicate a preference for different associated vegetation. No records within 5 km.	Highly unlikely due to likelihood of occurrence.
	Eastern curlew	<i>Numenius madagascariensis</i>	M	✓			Possible. May transit over Project area to surrounding immediately adjacent mangroves and intertidal flats. Numerous records nearby.	Unlikely due to the Project area not disturbing any coastal/riverine interface.
	Australian painted snipe	<i>Rostratula australis</i>			✓		Unlikely. May transit over Project area to surrounding intertidal and swampy areas. No records within 5 km.	Unlikely due to the Project area not disturbing any coastal/riverine interface.
	Masked owl (northern)	<i>Tyto novaehollandiae kimberli</i>				✓	Highly unlikely. Records indicate a preference for different associated vegetation. No records within 5 km.	Highly unlikely due to likelihood of occurrence.
Mammals (marine)	Blue whale	<i>Balaenoptera musculus</i>	M		✓		Highly unlikely. There are no records of habitat usage within 5 km of the Project. There are no Project interactions with the marine environment.	Highly unlikely due to likelihood of occurrence and no marine interactions of the Project.
	Humpback whale	<i>Megaptera novaeangliae</i>	M			✓	Highly unlikely. There are no records of habitat usage within 5 km of the Project. There are no Project interactions with the marine environment.	Highly unlikely due to likelihood of occurrence and no marine interactions of the Project.

Group	Common Name	Scientific Name	Migratory	Listed Threatened Status			Likelihood of Occurrence in Project Area	Likelihood of being affected by Project
				CR	En	Vu		
Mammals (terrestrial)	Brush-tailed rabbit-rat	<i>Conilurus penicillatus</i>				✓	Highly unlikely. Records indicate a preference for different associated vegetation. No records within 5 km.	Highly unlikely due to likelihood of occurrence.
	Northern quoll	<i>Dasyurus hallucatus</i>			✓		Unlikely. Records indicate a preference for different associated vegetation and geology, but could utilise sub-optimum habitats within the Project Area. Recent cane toads likely to have reduced local populations	Unlikely due to likelihood of occurrence and mobility of species.
	Black-footed tree-rat	<i>Mesembriomys gouldii</i>			✓		Possible. One record in similar habitat nearby.	Unlikely due to lack of records.
	Northern brush-tailed phascogale	<i>Phascogale pirata</i>				✓	Highly unlikely. Records indicate a preference for different associated vegetation. No records within 5 km.	Highly unlikely due to likelihood of occurrence.
	Bare-rumped sheath-tail bat	<i>Saccolaimus saccolaimus nudicluniatus</i>		✓			Highly unlikely. Records indicate a preference for different associated vegetation. No records within 5 km.	Highly unlikely due to likelihood of occurrence.
	Water mouse	<i>Xeromys myoides</i>				✓	Unlikely. Records indicate a preference for mangroves, which occurs in the immediately adjacent area. No record within 5 km.	Unlikely due to the Project area not disturbing any mangrove area.
Reptiles (terrestrial)	Plains death adder	<i>Acanthophis hawkei</i>				✓	Highly unlikely. Records indicate a preference for different associated vegetation and dry floodplains. No records within 5 km.	Highly unlikely due to likelihood of occurrence and the Project area not disturbing any waterways.
Reptiles (marine)	Loggerhead turtle	<i>Caretta caretta</i>	M		✓		Highly unlikely. There are no Project interactions with the marine environment or known nesting areas.	Highly unlikely due to likelihood of occurrence and no marine/beach interactions of the Project.
	Green turtle	<i>Chelonia mydas</i>	M			✓	Highly unlikely. There are no Project interactions with the marine environment or known nesting areas.	Highly unlikely due to likelihood of occurrence and no marine/beach interactions of the Project.
	Leatherback turtle	<i>Dermochelys coriacea</i>	M		✓		Highly unlikely. There are no Project interactions with the marine environment or known nesting areas.	Highly unlikely due to likelihood of occurrence and no marine/beach interactions of the Project.
	Hawksbill turtle	<i>Eretmochelys imbricate</i>	M			✓	Highly unlikely. There are no Project interactions with the marine environment or known nesting areas.	Highly unlikely due to likelihood of occurrence and no marine/beach interactions of the Project.
	Olive Ridley turtle	<i>Lepidochelys olivacea</i>	M		✓		Highly unlikely. There are no Project interactions with the marine environment or	Highly unlikely due to likelihood of occurrence and no

Group	Common Name	Scientific Name	Migratory	Listed Threatened Status			Likelihood of Occurrence in Project Area	Likelihood of being affected by Project
				CR	En	Vu		
							known nesting areas.	marine/beach interactions of the Project.
	Flatback turtle	<i>Natator depressus</i>	M			✓	Highly unlikely. There are no Project interactions with the marine environment or known nesting areas.	Highly unlikely due to likelihood of occurrence and no marine/beach interactions of the Project.
Fish	Great white shark	<i>Carcharodon carcharias</i>	M			✓	Highly unlikely. There are no records of habitat usage within 5 km of the Project. There are no Project interactions with the marine environment.	Highly unlikely due to likelihood of occurrence and no marine interactions of the Project.
	Northern river shark	<i>Glyphis garricki</i>			✓		Highly unlikely. There are no records of habitat usage within 5 km of the Project. There are no Project interactions with the marine environment.	Highly unlikely due to likelihood of occurrence and no marine interactions of the Project.
	Dwarf sawfish	<i>Pristis clavata</i>				✓	Highly unlikely. There are no records of habitat usage within 5 km of the Project. There are no Project interactions with the marine environment.	Highly unlikely due to likelihood of occurrence and no marine interactions of the Project.
	Freshwater sawfish	<i>Pristis pristis</i>				✓	Highly unlikely. There are no records of habitat usage within 5 km of the Project. There are no Project interactions with the marine or freshwater environments.	Highly unlikely due to likelihood of occurrence and no marine of freshwater interactions of the Project.
	Green sawfish	<i>Pristis zijsron</i>				✓	Highly unlikely. There are no records of habitat usage within 5 km of the Project. There are no Project interactions with the marine environment.	Highly unlikely due to likelihood of occurrence and no marine interactions of the Project.
	Whale shark	<i>Rhincodon typus</i>	M		✓		Highly unlikely. There are no records of habitat usage within 5 km of the Project. There are no Project interactions with the marine environment.	Highly unlikely due to likelihood of occurrence and no marine interactions of the Project.

Notes: Cr: Critically Endangered, En: Endangered, Vu: Vulnerable

Likelihood of occurrence of fauna is assessed on a 3-tier scale:

- 1: Possible - suitable habitat occurs within the Project Area, and site is within species' normal range;
- 2: Unlikely - suitable habitat does not occur within the Project Area, or suitable habitat present but substantially modified or degraded;
- 3: Highly unlikely – no suitable habitat within the Project Area and site is outside species' normal range.

Nature and extent of likely impact

The nature of any impact to listed species is likely to be behavioural at most, and limited to immediately surrounding the proposed footprint, and not in the marine environment. The proposed footprint is entirely land-based and does not impact any marine, intertidal, estuarine, or riverine environment during construction or operations.

The footprint land is currently under a number of extractive licences and is disturbed. Whilst it is possible that some of these species may be observed during construction or operational activities they will tend to avoid the site.

The activities do not block or disturb any migration routes or access to roosting areas, feeding grounds or breeding grounds. The impact to migratory species is expected to be limited to passing infrequent individuals who may alter their path to avoid the disturbance. There is no expected impact upon their habitat for feeding or breeding.

An assessment of impacts on endangered and vulnerable ecological communities has been undertaken against the Significant Impact Guidelines and presented in Table 2 and Table 3. This project has been assessed as unlikely to have significant impact on any Critically Endangered, Endangered or Vulnerable species. This assessment is based upon available data and information from the region. A report from the PMST (attached) has primarily been used with supplementary survey data, namely DLRM.

Table 2: Significant Impact Criteria for Critically Endangered and Endangered Species

Significant Impact Criteria	Impact Outcome
<i>An action is likely to have a significant impact on an endangered species if there is a real chance or possibility that it will:</i>	
Lead to a long-term decrease in the size of an important population of a species	Fish, Marine Mammals and Marine Reptiles The project footprint does not impact any marine, intertidal, estuarine, or riverine environment during construction or operations. There are no marine discharges from the project. Land-based noise may be audible in surface waters that could cause a short-term behavioural response. Therefore there will be no mortality to any endangered species, and therefore no decrease in any marine populations.
	Plants The PMST records no known Threatened Ecological Communities within the proposal footprint. One critically endangered (<i>A. brevialata</i>) and one endangered (<i>T. taylori</i>) plant species are unlikely to be found within the Project Area. Outcome - Unlikely
	Birds The PMST lists five endangered species that may be present within the search areas. Of these bird species, only the curlew sandpiper and eastern curlew have been assessed as possibly to be observed in the project area; other species are not likely to be present due to unsuitable habitat within the Project footprint. Use of the project footprint is likely to be confined to traversing over the footprint to access adjacent intertidal feeding areas. The project will not disturb intertidal habitat. There is no known habitat within the project footprint for any of these endangered species and therefore no population change is likely. Outcome - Unlikely
	Terrestrial Mammals Three endangered terrestrial mammal species were identified by the PMST that could potentially utilise the Project area. However, due to the site being previously disturbed for extractive industries, there is limited habitat available of which none is known to be suitable for these endangered terrestrial mammals. There are no known populations within or directly adjacent to the footprint, therefore no population change is likely. Outcome - Unlikely
Reduce the area of occupancy of the species	Fish, Marine Mammals and Marine Reptiles The project footprint does not impact any marine, intertidal, estuarine, or riverine environment. The project is not anticipated to reduce the area of occupancy of critically endangered or endangered marine species.
	Plants, Birds and Terrestrial Mammals The site has been previously disturbed for extractive industries and there is limited habitat available to support endangered species. The refinery is not likely to decrease the occupancy of any critically endangered or endangered species. Outcome - Unlikely
Fragment an existing important population into two or more populations	Fish, Marine Mammals and Marine Reptiles The project footprint does not impact any marine, intertidal, estuarine, or riverine environment during construction or operations. There will be no fragmentation of aquatic habitats.
	Plants, Birds and Terrestrial Mammals The site has been previously disturbed for extractive industries and there is limited habitat

	available to fragment. There are no known populations of any endangered plants, birds or terrestrial mammals in the area and therefore there are no populations to fragment. Outcome - Unlikely
Adversely affect habitat critical to the survival of a species	Fish, Marine Mammals and Marine Reptiles The project footprint does not impact any marine, intertidal, estuarine, or riverine environment during construction or operations. Specifically, there are no known turtle nesting beaches near to the project site. No habitat critical to the survival of a species will be impacted.
	Plants, Birds and Terrestrial Mammals There are no known populations of any endangered plants, birds or terrestrial mammals in the area. The project footprint is largely disturbed and does not offer suitable habitat to support these species. Outcome - Unlikely
Disrupt the breeding cycle of a population	Fish, Marine Mammals and Marine Reptiles The project footprint does not impact any marine, intertidal, estuarine, or riverine environment during construction or operations. There will be no disruption of breeding cycles. Further, there will be no disruption to any beaches that may act as nesting grounds for turtles or roosting grounds for marine birds.
	Plants, Birds and Terrestrial Mammals The works associated with the Project are unlikely to disrupt the breeding cycle of any of the species. These species are not known to breed or roost within the Project area, and the activities will not prevent movement to breeding or roosting grounds. Outcome - Unlikely
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Fish, Marine Mammals and Marine Reptiles The project footprint does not impact any marine, intertidal, estuarine, or riverine environment during construction or operations. There will be no damage or impact to any marine habitats, or habitats such as mangroves or riparian areas that indirectly effect marine habitats.
	Plants, Birds and Terrestrial Mammals Constructing the refinery will involve the clearing of around 105 ha. Any remaining habitat within this area will be lost. The majority of remaining vegetation in the footprint is described as mid-high open woodland of <i>Eucalyptus</i> spp. <i>Woodland</i>. However, this is very sparse as much of the area has been previously cleared and / or is heavily degraded and frequently burnt. The impact of losing these low quality and highly disturbed woodlands is low and unlikely to cause the decline of any species. Outcome - Unlikely
Result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat	Marine and Aquatic The project footprint does not impact any marine, intertidal, estuarine, or riverine environment during construction or operations, and marine vessels will not be used at the site during construction activities. There is no chance of a marine or aquatic invasive species being translocated to this area. Outcome - Unlikely
	Terrestrial The area is already disturbed and it is likely that invasive species are already established. Endangered species are unlikely to be present within the refinery footprint. The refinery footprint will be cleared to allow construction, therefore resulting in the removal of any invasive species from this area. It is unlikely that this development will result in the introduction of invasive species to the area. Outcome - Unlikely
Introduce disease that may cause the species to decline	Fish, Marine Mammals and Marine Reptiles The project footprint does not impact any marine, intertidal, estuarine, or riverine environment during construction or operations. There will be no possible introduction of aquatic diseases. Outcome - Unlikely
	Plants, Birds and Terrestrial Mammals This activity will not lead to an introduction of disease. Outcome - Unlikely
Interfere with the recovery of the species.	Fish, Marine Mammals and Marine Reptiles The project footprint does not impact any marine, intertidal, estuarine, or riverine environment during construction or operations. There will be no interference with the recovery of any marine or aquatic species. Outcome - Unlikely
	Plants, Birds and Terrestrial Mammals The project is unlikely to interfere with the recovery of any of these species. These species are unlikely to occur within the refinery footprint due to its already degraded nature. Outcome - Unlikely

Table 3: Significant Impact Criteria for Vulnerable Species

Significant Impact Criteria	Impact Outcome
<i>An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:</i>	
Lead to a long-term decrease in the size of an important population of a species	Fish, Marine Mammals and Marine Reptiles The project footprint does not impact any marine, intertidal, estuarine, or riverine environment during construction or operations, therefore there will be no impacts to an important population. There are no marine discharges from the project.
	Birds Three vulnerable bird species have been identified that could potentially live within the search area. However, there is no suitable habitat within the footprint to support these species. Use of the project footprint is likely to be confined to traversing the footprint to access adjacent intertidal feeding areas. The project will not disturb intertidal habitat. There is no known habitat within the project footprint for any of these endangered species and therefore no population change is likely. Outcome - Unlikely
	Terrestrial Mammals and Reptiles The site has been previously disturbed for extractive industries and there is limited habitat available to support vulnerable terrestrial mammals. There are no known populations within or directly adjacent to the footprint, therefore no population change is likely. Outcome - Unlikely
Reduce the area of occupancy of an important population of a species	Fish, Marine Mammals and Marine Reptiles The project footprint does not impact any marine, intertidal, estuarine, or riverine environment during construction or operations. Species occupancy will not be affected.
	Birds, Terrestrial Mammals and Reptiles The site has been previously disturbed for extractive industries and there is limited habitat available to support vulnerable species. The refinery is not likely to decrease the occupancy of any vulnerable species. Outcome - Unlikely
Fragment an existing important population into two or more populations	Fish, Marine Mammals and Marine Reptiles The project footprint does not impact any marine, intertidal, estuarine, or riverine environment during construction or operations. There will be no fragmentation of aquatic habitats.
	Birds, Terrestrial Mammals and Reptiles The site has been previously disturbed for extractive industries and there is limited habitat available to fragment. There are no known populations of any vulnerable birds, terrestrial mammals or reptiles in the area and therefore there are no populations to fragment. Outcome - Unlikely
Adversely affect habitat critical to the survival of a species	Fish, Marine Mammals and Marine Reptiles The project footprint does not impact any marine, intertidal, estuarine, or riverine environment during construction or operations. Specifically, there are no known turtle nesting beaches near to the project site and there will be no impacts to any beaches. No habitat critical to the survival of a species will be impacted.
	Birds, Terrestrial Mammals and Reptiles There are no known existing populations of any vulnerable birds, terrestrial mammals or reptiles in the area. The footprint is largely disturbed and does not offer suitable habitat to support these species. Outcome - Unlikely
Disrupt the breeding cycle of an important population	Fish, Marine Mammals and Marine Reptiles The project footprint does not impact any marine, intertidal, estuarine, or riverine environment during construction or operations. There will be no disruption of breeding cycles. Further, there will be no disruption to any beaches that may act as nesting grounds for turtles.
	Birds, Terrestrial Mammals and Reptiles The works associated with the Project are unlikely to disrupt the breeding cycle of any of the species. These species are not known to breed or roost within the Project area, and the activities will not prevent movement to breeding or roosting grounds. Outcome - Unlikely
Modify, destroy, remove or isolate or decrease the availability or quality of habitat	Fish, Marine Mammals and Marine Reptiles The project footprint does not impact any marine, intertidal, estuarine, or riverine environment during construction or operations. There will be no damage or impact to

to the extent that the species is likely to decline	any marine habitats, or habitats such as mangroves or riparian areas that indirectly effect marine habitats.
	Birds, Terrestrial Mammals and Reptiles Constructing the refinery will involve the clearing of around 105 ha. Any remaining habitat within this area will be lost. The majority of remaining vegetation in the footprint is described as mid-high open woodland of <i>Eucalyptus</i> spp. <i>Woodland</i>. However, this is very sparse as much of the area has been previously cleared and / or is heavily degraded and frequently burnt. The impact of losing these low quality and highly disturbed woodlands is low and unlikely to cause the decline of any species. Outcome - Unlikely
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Marine and Aquatic The project footprint does not impact any marine, intertidal, estuarine, or riverine environment during construction or operations, and marine vessels will not be used at the site during construction activities. There is no chance of a marine or aquatic invasive species being translocated to this area. Outcome - Unlikely
	Terrestrial The area is already disturbed and it is likely that invasive species are already established. Endangered species are unlikely to be present within the refinery footprint. The refinery footprint will be cleared to allow construction, therefore resulting in the removal of any invasive species from this area. It is unlikely that this development will result in the introduction of invasive species to the area. Outcome - Unlikely
Introduce disease that may cause the species to decline	Fish, Marine Mammals and Marine Reptiles The project footprint does not impact any marine, intertidal, estuarine, or riverine environment during construction or operations. There will be no possible introduction of aquatic diseases. Outcome - Unlikely
	Birds, Terrestrial Mammals and Reptiles This activity will not lead to an introduction of disease. Outcome - Unlikely
Interfere with the recovery of the species.	Fish, Marine Mammals and Marine Reptiles The project footprint does not impact any marine, intertidal, estuarine, or riverine environment during construction or operations. There will be no interference with the recovery of any marine or aquatic species. Outcome - Unlikely
	Plants, Birds and Terrestrial Mammals The project is unlikely to interfere with the recovery of any of these species. These species are unlikely to occur within the refinery footprint due to its already degraded nature. Outcome - Unlikely

3.1 (e) Listed migratory species

Description

A total of 37 other migratory species were recorded in the PMST report that includes birds, marine mammals, marine reptiles and fish.

Nature and extent of likely impact

As described in Section 3.1 (d), the nature of any impact to fauna (protected or not) is likely to be behavioural and limited to the immediate vicinity surrounding the development. The development footprint is across an already disturbed environment with a small area of low quality remnant Eucalypt woodland.

It is possible that some of these species may be observed during construction and operations; however they are likely to avoid the area if audible disturbance occurs. The activities do not block or disturb any migration routes or access to roosting areas, feeding grounds or breeding grounds.

3.1 (f) Commonwealth marine area

(If the action is in the Commonwealth marine area, complete 3.2(c) instead. This section is for actions taken outside the Commonwealth marine area that may have impacts on that area.)

Description

No Commonwealth marine areas occur near to the project site.

Nature and extent of likely impact

No impact will occur.

3.1 (g) Commonwealth land

(If the action is on Commonwealth land, complete 3.2(d) instead. This section is for actions taken outside Commonwealth land that may have impacts on that land.)

Description

No Commonwealth land occurs near the Project Area; however there are a number of Commonwealth lands in the area. The nearest properties are the Kowandi South Repeating Station approximately 15 km east, and the Kowandi North Communication Station approximately 15 km to the northeast of the Project Area.

Nature and extent of likely impact

No impact will occur.

3.1 (h) The Great Barrier Reef Marine Park

Description

This proposal is not in the vicinity of the Great Barrier Reef Marine Park.

Nature and extent of likely impact

No impact will occur.

3.1 (i) A water resource, in relation to coal seam gas development and large coal mining development

Description

This project is not related to a coal seam gas or coal mining development.

Nature and extent of likely impact

No impact will occur.

3.2 Nuclear actions, actions taken by the Commonwealth (or Commonwealth agency), actions taken in a Commonwealth marine area, actions taken on Commonwealth land, or actions taken in the Great Barrier Reef Marine Park

3.2 (a)	Is the proposed action a nuclear action?	☒	No
			Yes (provide details below)
If yes, nature & extent of likely impact on the whole environment			
3.2 (b)	Is the proposed action to be taken by the Commonwealth or a Commonwealth agency?	☒	No
			Yes (provide details below)
If yes, nature & extent of likely impact on the whole environment			
3.2 (c)	Is the proposed action to be taken in a Commonwealth marine area?	☒	No
			Yes (provide details below)
If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(f))			
3.2 (d)	Is the proposed action to be taken on Commonwealth land?	☒	No
			Yes (provide details below)

If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(g))

3.2 (e)

Is the proposed action to be taken in the Great Barrier Reef Marine Park?

✓

No

Yes (provide details below)

If yes, nature & extent of likely impact on the whole environment (in addition to 3.1(h))

3.3 Other important features of the environment

3.3 (a) Flora and fauna

Other than EPBC Act listed species, the NT Flora Atlas lists a number of other species protected under the *Territory Parks and Wildlife Conservation Act 2006* (TPWC Act) that may occur in the vicinity of the Project Area. As discussed in Table 4, the NT Flora Atlas listed a single flora species under the TPWC Act. This species, the cycad *Cycas armstrongii*, is listed as 'vulnerable'.

Table 4: Threatened Plants Species

Species	TPWC Act	Source	Most recent record	Likelihood within the Project Area	Comments
Cycad (<i>Cycas armstrongii</i>)	VU	DLRM	2011	Possible	There are numerous records of cycads within 5 km of the Project Area. It occurs mainly in open grassy woodland on yellow and red earths, limited in the area by drainage. <i>Cycas armstrongii</i> is endemic to the NT and is abundant across the western Top End region, the Cobourg Peninsula and the Tiwi Islands. It is listed as Vulnerable due to its poor representation in Conservation Reserves (approximately 1%), and because its preferred habitat of deep loamy soils is favoured for agriculture, horticulture and forestry (GHD 2009). Supplementary to land clearing, the most significant threat to the population of <i>C. armstrongii</i> is fire. Adult stems suffer mortality in fires with higher than average temperatures (i.e. those fuelled by high litter loads produced by introduced grass species such as <i>Andropogon gayanus</i> (Gamba Grass) and <i>Pennisetum polystachion</i> (Mission Grass)).

Intertidal areas surrounding the site contain mangrove communities. These areas are zoned for Conservation under the NT Planning Scheme and are outside the Project development footprint.

Mangroves are an important ecological component of the marine and coastal environment. They are a food resource for a range of species and their root system acts as a breeding ground and nursery for crustacean, mollusc and fish species. Their extensive root system reduces water velocity and energy causing entrapment and deposition of suspended sediments, thereby providing stability and protection of coastlines. Mangroves form as a buffer zone attenuating wave energy and current flow, and reduce erosion and storm surge damage in coastal areas.

Other than EPBC Act listed species, the DLRM lists a number of other fauna species protected under the TPWC Act that may occur in the vicinity of the Project Area. As discussed in Table 5, a further five bird species, a single terrestrial mammal, two terrestrial reptiles and a single amphibian could in the vicinity of the Project Area.

The habitat requirements for each of these threatened species were assessed against the extent and quality of vegetation types identified in the Project Area. These considerations are summarised in Table 5. Species classified as 'data deficient', 'not evaluated' or 'near threatened' were not assessed. There are no records of any threatened species within the Project Area boundary.

Table 5: Threatened fauna

Species	TPWC Act	Source	Most recent record	Likelihood within Project Area	Comments
BIRDS					
Red knot (<i>Calidris canutus</i>)	VU	DLRM	2005	Unlikely	There are two records of this species at the Palmerston Sewage Ponds.
Great knot (<i>Calidris tenuirostris</i>)	VU	DLRM	2003	Unlikely	There are two records of this species at the Palmerston Sewage Ponds. Suitable habitat is not likely to be present within the Project Area.
Greater sand plover (<i>Charadrius leschenaultia</i>)	VU	DLRM	1998	Possible	There are numerous records of these species from the Palmerston Sewage Ponds. Chatto's long term study of shorebird distribution and abundance along the entire NT coastline demonstrated significant areas for shorebirds east from Darwin to Tree Point, and on islands off Bynoe Harbour. No significant areas for shorebirds were identified within Darwin Harbour. The site is not important habitat for shorebirds.
Lesser sand plover (<i>Charadrius mongolus</i>)	VU	DLRM	2008	Possible	
Bar-tailed godwit (<i>Limosa lapponica</i>)	VU	DLRM	1994	Possible	
TERRESTRIAL MAMMALS					
Fawn antechinus (<i>Antechinus bellus</i>)	EN	DLRM	2001	Possible	Suitable habitat may be present within the Project Area. The cane toad is currently well established, occurring in most habitats within the study area. The mobile nature of this species will allow them to inhabit similar or more suitable habitat within the Darwin Harbour area.
TERRESTRIAL REPTILES					
Mertens' water monitor (<i>Varanus mertensi</i>)	VU	DLRM	2007	Unlikely	There is one record of this species within 5 km of the Project Area. The future conservation status of the monitors will be dictated by the evolutionary interaction with the cane toad, and is not expected to be affected by the development. There are no fresh water sources running through the Project Area.
Floodplain monitor (<i>Varanus panoptes</i>)	VU	DLRM	1996	Possible	
AMPHIBIANS					
Howard Springs toadlet (<i>Uperoleia daviesae</i>)	VU	DLRM	2012	Unlikely	This species has been recorded within 5 km of the Project Area, though it is highly specific to its recorded location and has not been recorded outside of its recorded location at Weddell.

Key to Table:

EN Endangered

VU Vulnerable

Likelihood of occurrence of fauna is assessed on a 3-tier scale:

- 1: Possible - suitable habitat occurs within the Project Area, and site is within species' normal range;
- 2: Unlikely - suitable habitat does not occur within the Project Area, or suitable habitat present but substantially modified or degraded;
- 3: Highly unlikely – no suitable habitat within the Project Area and site is outside species' normal range.

Other than the listed Threatened species, the EPBC Act Protected Matters Report identified a further 37 migratory species listed under the EPBC Act as possibly occurring within 10 km of the Project Area. The NT Fauna Atlas has records of 50 migratory species occurring within 5 km of the Project Area. These species are listed in Table 6. Of the 50 migratory species, 12 are also threatened fauna and are discussed above. The proposed Project Area is not a known breeding or feeding ground for any migratory species. The majority of these migratory species are birds, which may traverse over the Project Area towards the coastal interface which is not disturbed by the Projects footprint. Further, there is no disturbance, usage or discharge into the marine/estuarine/riverine environment for this Project and there will therefore be no impacts to any marine mammals, marine reptiles or fish (sharks and rays).

Table 6: Migratory species

Species	Source
Birds	
Common sandpiper (<i>Actitis hypoleucos</i>)	PMST / DLRM
Fork-tailed swift (<i>Apus pacificus</i>)	PMST / DLRM
Great Egret (<i>Ardea alba</i>)	PMST
Cattle Egret (<i>Ardea ibis</i>)	PMST / DLRM
Eastern Great Egret (<i>Ardea modesta</i>)	DLRM
Ruddy Turnstone (<i>Arenaria interpres</i>)	PMST / DLRM
Sharp-tailed Sandpiper (<i>Calidris acuminata</i>)	PMST / DLRM
Sanderling (<i>Calidris alba</i>)	PMST / DLRM
Baird's Sandpiper (<i>Calidris bairdii</i>)	DLRM
Red Knot (<i>Calidris canutus</i>)	PMST / DLRM
Pectoral Sandpiper (<i>Calidris melanotos</i>)	DLRM
Little Stint (<i>Calidris minuta</i>)	DLRM
Red-necked Stint (<i>Calidris ruficollis</i>)	PMST / DLRM
Long-toed Stint (<i>Calidris subminuta</i>)	DLRM
Great Knot (<i>Calidris tenuirostris</i>)	PMST / DLRM
Little ringed plover (<i>Charadrius dubius</i>)	DLRM
Greater Sand Plover (<i>Charadrius leschenaultii</i>)	PMST / DLRM
Lesser Sand Plover (<i>Charadrius mongolus</i>)	PMST / DLRM
Oriental Plover (<i>Charadrius veredus</i>)	PMST / DLRM
White-winged Black Tern (<i>Chlidonias leucopterus</i>)	DLRM
Oriental Cuckoo (<i>Cuculus optatus</i>)	DLRM
Eastern Reef Egret (<i>Egretta sacra</i>)	DLRM
Swinhoe's Snipe (<i>Gallinago megala</i>)	PMST / DLRM
Pin-tailed Snipe (<i>Gallinago stenura</i>)	PMST / DLRM
Oriental Pratincole (<i>Glareola maldivarum</i>)	PMST / DLRM
White-bellied Sea-eagle (<i>Haliaeetus leucogaster</i>)	DLRM
Grey-tailed Tattler (<i>Heteroscelus brevipes</i>)	PMST
Barn Swallow (<i>Hirundo rustica</i>)	PMST / DLRM
Caspian tern (<i>Hydroprogne caspia</i>)	DLRM
Broad-billed Sandpiper (<i>Limicola falcinellus</i>)	DLRM
Bar-tailed Godwit (<i>Limosa lapponica</i>)	PMST / DLRM
Black-tailed Godwit (<i>Limosa limosa</i>)	PMST / DLRM
Rainbow Bee-eater (<i>Merops ornatus</i>)	PMST / DLRM
Little Curlew (<i>Numenius minutus</i>)	PMST / DLRM
Whimbrel (<i>Numenius phaeopus</i>)	PMST / DLRM
Osprey (<i>Pandion haliaetus</i>)	PMST / DLRM
Red-necked Phalarope (<i>Phalaropus lobatus</i>)	DLRM
Glossy ibis (<i>Plegadis falcinellus</i>)	DLRM
Pacific Golden Plover (<i>Pluvialis fulva</i>)	PMST / DLRM
Grey Plover (<i>Pluvialis squatarola</i>)	PMST / DLRM
Rufous Fantail (<i>Rhipidura rufifrons</i>)	PMST
Little Tern (<i>Sterna albifrons</i>)	PMST / DLRM
Common tern (<i>Sterna hirundo</i>)	DLRM
Grey-tailed Tattler (<i>Tringa brevipes</i>)	DLRM
Wood Sandpiper (<i>Tringa glareola</i>)	DLRM
Common greenshank (<i>Tringa nebularia</i>)	DLRM
Marsh Sandpiper (<i>Tringa stagnatilis</i>)	DLRM
Common redshank (<i>Tringa totanus</i>)	DLRM
Terek Sandpiper (<i>Xenus cinereus</i>)	PMST / DLRM
Marine Mammals	
Bryde's Whale (<i>Balaenoptera edeni</i>)	PMST
Dugong (<i>Dugong dugon</i>)	PMST
Humpback whale (<i>Megaptera novaeangliae</i>)	PMST
Irrawaddy dolphin (<i>Orcaella brevirostris</i>)	PMST
Killer whale (<i>Orcinus orca</i>)	PMST
Indo-pacific humpback dolphin (<i>Sousa chinensis</i>)	PMST / DLRM

Species	Source
Spotted bottlenose dolphin (<i>Tursiops aduncus</i>) (Arafura/Timor Sea populations)	PMST
Marine Reptiles	
Estuarine Crocodile (<i>Crocodylus porosus</i>)	PMST / DLRM
Sharks and Rays	
Giant Manta Ray (<i>Manta birostris</i>)	PMST

3.3 (b) Hydrology, including water flows

Lot 1817 occurs within a Primary Storm surge and a Secondary Storm Surge Area. Based on interpretation of the storm surge map and concept layout, no infrastructure will be sited in these areas. Infrastructure is sited in the Extreme Storm Surge Event (10,000 year ARI). Earthworks will be required to site infrastructure above the extreme storm surge area.

No major drainage lines, creeks, wetlands or rivers are present on site.

3.3 (c) Soil and Vegetation characteristics

The Project area lies almost entirely within an area of lateritic plains and rises, and borders tidal flats. The predominant soil type is gravelly red and brown kandosols with minor yellow kandosols. Supratidal and intertidal hydrosol soils occur in the intertidal area covered by mangroves.

Figure 8 indicates that Potentially Acid Sulphate Soils (PASS) in the vicinity of the site is associated with mangroves, and PASS is therefore less likely to be present in the area in which the Refinery is proposed. All civil works to be undertaken for this Project will occur on land above 5 m AHD, where there is either no or low potential for the occurrence of PASS.

DLRM mapping shows the proposed site encompassing two vegetation communities. The predominant vegetation community is mid-high open woodland of *Eucalyptus tetradonta*, *Eucalyptis miniata*, *Corymbia foelsheana*, *Eucalyptus tectifica*, *Corymbia ferruginea* over *Heteropogon* spp., *Chrysopogon fallax*, *Sehima nervosum* and borders with the samphire, sedgeland, or mangrove low closed forest community (Figure 9).

A brief site visit conducted in August 2015 confirmed that much of the proposed Project area is cleared and / or heavily degraded and frequently burnt; and a large portion of the site has been cleared for previous land uses including extractive industries.

3.3 (d) Outstanding natural features

There are no outstanding natural features on the proposed project site.

3.3 (e) Remnant native vegetation

The majority of the site is disturbed and cleared, with some remaining Eucalypt woodland that is degraded by burning and weeds.

3.3 (f) Gradient (or depth range if action is to be taken in a marine area)

Middle Arm Peninsula is generally flat and rises to approximately 10 m AHD at its highest point. The project site is generally flat.

3.3 (g) Current state of the environment

A majority of the site is disturbed with significant areas of vegetation cleared or degraded. The frequency of fires on site appears to have been relatively high, likely exacerbated by the density of grassy weeds on the site.

3.3 (h) Commonwealth Heritage Places or other places recognised as having heritage values

No Commonwealth Heritage Places occur at the refinery site.

A search of Lot 1817 Hundred of Ayers of the NT Heritage Register was conducted on the 27 September 2015. The results indicated no known heritage items or places are present on site.

Sites related to Word War II activities have been recorded on Middle Arm Peninsula. Given the site is already heavily disturbed it is unlikely that there are any heritage items present.

An unidentified shipwreck called Elizabeth River – unidentified wreck (identification no. 3435) is located in Darwin Harbour immediately to the north west of the Project site at Latitude -12.53655, Longitude 130.95666. No additional detail is known. The Catalina 1 (RAAF) flying –boat wreck is located near Blaydin Point, north west of the Project site.

No sites of known heritage significance will be impacted by the proposed development.

3.3 (i) Indigenous heritage values

The Register of Native Title Claims, Register of Indigenous Land Use agreements, Native Title Register and unregistered applications indicate that Section 1817, Hundred of Ayers was assessed under Native Title application DC96/4 Darwin Larrakia. It was determined that 'Native Title does not exist'. Archaeological items and sacred sites are not anticipated on site due to the current quarrying activities however an AAPA certificate application will be submitted.

3.3 (j) Other important or unique values of the environment

As well as being listed as a Ramsar listed wetland, Darwin Harbour is also listed as a Site of Conservation Significance by the NT Government. This includes the large indented embayments within the three main arms. The Project Site is within this area. The Project site will not reduce the conservation values as the footprint is largely on already disturbed land and does not impact any marine/riverine/estuarine areas.

3.3 (k) Tenure of the action area (e.g. freehold, leasehold)

Lot 1817 is vacant Crown Land that is currently leased by private companies under extractive resources licenses for quarrying activities.

3.3 (l) Existing land/marine uses of area

The majority of the proposed footprint area is utilised for extractive quarrying activities. Immediately outside the Project Area, there are varied land uses such as shipping, recreational boating and fishing, rail transport and other industrial areas.

3.3 (m) Any proposed land/marine uses of area

None are proposed.

4 Environmental outcomes

Provide descriptions of the proposed environmental outcomes that will be achieved for matters of national environmental significance as a result of the proposed action. Include details of the baseline data upon which the outcomes are based, and the confidence about the likely achievement of the proposed outcomes. Where outcomes cannot be identified or committed to, provide explanatory details including any commitments to identify outcomes through an assessment process.

If a proposed action is determined to be a controlled action, the Department may request further details to enable application of the draft *Outcomes-based Conditions Policy 2015* and *Outcomes-based Conditions Guidance 2015* (<http://www.environment.gov.au/epbc/consultation/policy-guidance-outcomes-based-conditions>), including about environmental outcomes to be achieved, details of baseline data, milestones, performance criteria, and monitoring and adaptive management to ensure the achievement of outcomes. If this information is available at the time of referral it should be included.

General commitments to achieving environmental outcomes, particularly relating to beneficial impacts of the proposed action, CANNOT be taken into account in making the initial decision about whether the proposal is likely to have a significant impact on a matter protected under the EPBC Act. (But those commitments may be relevant at the later assessment and approval stages, including the appropriate level of assessment, and conditions of approval, if your proposal proceeds to these stages).

The preceding sections of the referral provide an overview of the proposed Darwin Refinery and assess the potential for the refinery to have a significant impact on a Matter of National Environmental Significance.

The action is the construction and operation of a refinery on Lot 1817, Hundred of Ayers, Middle Arm Peninsula of Darwin Harbour. Lot 1817 is vacant Crown Land. The majority of the Lot is zoned Future Development and is within the proposed Middle Arm Industrial Precinct.

The Lot is degraded with portions currently used for extractive industry. Vegetation remaining on site is degraded, weed infested and has been subjected to regular disturbance from fire.

The refinery will be developed landward of the high tide mark. No physical disturbance to the marine environment or intertidal areas is proposed and no mangroves will be cleared. There will be no process waste streams discharged to Darwin Harbour.

An assessment of the action against Matters of National Environmental Significance concluded the following:

- no impact to World Heritage Properties
- no impact to National Heritage Places
- no impact to Wetlands of International Importance. There will be no dewatering during construction, clearing of wetland habitat or operational waste discharges to the harbour
- low likelihood of impact to Listed Threatened Species and Ecological Communities. The nature of any impact to listed species is likely to be behavioural at most, and limited to immediately surrounding the proposed footprint. The proposed footprint is entirely land-based and does not impact any marine, intertidal, estuarine, or riverine environment during construction or operations. The land is currently under a number of extractive licences and is disturbed. Whilst it is possible that some threatened species may be observed during construction or operational activities they will tend to avoid the site. The activities do not block or disturb any migration routes or access to roosting areas, feeding grounds or breeding grounds. The impact to migratory species is expected to be limited to passing infrequent individuals who may alter the path to avoid the disturbance. There is no expected impact upon their habitat for feeding or breeding
- low likelihood of impact to Migratory Species. The nature of any impact to fauna is likely to be behavioural and limited to immediately surrounding the development. The development footprint is across an already disturbed environment with a small area of low quality remnant Eucalypt woodland. It is possible that some species may be observed during construction and operations; however they are likely to avoid the area if audible disturbance occurs. The activities do not block or disturb any migration routes or access to roosting areas, feeding grounds or breeding grounds
- no impact to Commonwealth Marine Areas
- no impact to Commonwealth Land
- no impact to the Great Barrier Reef Marine Park
- this project is not related to a coal seam gas or coal mining development.

5 Measures to avoid or reduce impacts

The impact assessment undertaken in the preceding sections identifies that the construction and operation of the Darwin Refinery is unlikely to significantly impact a Matter of National Environmental Significance.

Notwithstanding this conclusion the project will implement a number management measures to manage environmental risks.

The impact assessment process will continue during detailed design and construction and include an environmental impact identification (ENVID) workshop that considers both construction and operational phases of the Refinery. The ENVID will define detailed management measures to reduce the risk of potential impacts to As Low as Reasonably Possible (ALARP). The detailed impact management measures will be collated in a Construction Environmental Management Plan (CEMP) for the Project.

As part of the CEMP, a monitoring program will be developed which will aim to:

- identify environmental change, and in particular changes that have occurred as a result of Project development
- contribute to reviews of environmental management procedures
- provide data that will be used to assess adherence to and compliance with licence conditions.

Indicators to be monitored will be determined based on the extent and nature of potential environmental impacts identified. Each of the monitoring programs will be conducted by appropriately qualified personnel in a systematic and scientifically rigorous manner.

Table 7 describes potential impacts to the physical environment from activities associated with construction and operation of the proposed Refinery.

Table 7: Potential impacts and measures to avoid or reduce impacts

Environmental Aspect	Impact Description	Proposed Mitigation Controls and Monitoring
Land use	Changes to land titles and zoning will be required for development of the Project. Subdivision will be required to remove the area of Lot 1817 Zoned CN surrounding Lot 1902 from the remainder of Lot 1817. The Project land use is consistent with zoning purposes and area plans.	Subdivision in accordance with NT Planning Regulations. Crown Lease Agreement between NTG and TNG.
Cyclones and storm surge during construction	Development will occur outside of the primary and secondary storm surge areas but within the extreme storm surge area. Dependent upon the size and path of a storm cell such events can result in damage to the facilities and consequent pollution of surrounding and marine environment.	Hazardous materials will be stored under cover in sealed and secured containers. Storage areas covered and bunded. The available bund capacity will be equal to at least 100% of the capacity of the largest container of hazardous goods, plus 10% of the capacity of the second largest container. All buildings, storage facilities and other structures designed and constructed in compliance with the relevant Australian building codes and standards. If construction occurs in the wet season, a procedure will be developed for management of activities in cyclonic or severe storm conditions.
Cyclones and storm surge during operations	Cyclones and storm surge (or sea level rise) results in damage to the Refinery including process dam areas and reagent storage resulting in pollution of the marine environment.	Raise the ground surface level so that infrastructure is sited above/outside an extreme storm surge level. All buildings, storage facilities and other structures will be designed and constructed in compliance with the relevant Australian building codes and standards. A management procedure will be developed for management of activities in cyclonic or severe storm conditions. Compliance with Major Hazardous Facility licence and other environment licence/s.

Environmental Aspect	Impact Description	Proposed Mitigation Controls and Monitoring
Water (Pollution) Storage and/or use of hazardous materials during construction and operation.	Reduction in estuarine/marine water quality as a result of leaks and spills contaminating water ways or surface run off.	No direct discharge of untreated liquids from the site (e.g. untreated stormwater runoff) to the marine environment. Sizing of ponds to accommodate extreme rainfall events. Design of stormwater drains to cater for storm events and unplanned discharge/overflow. Compliance with Major Hazardous Facility licence and environment licence/s.
Water (Flooding) Operation of Refinery	Without engineering controls, the site is likely to be poorly drained and prone to localised flooding due to proximity to storm surge areas, flat grades and poorly drained soils. Groundwater rising close to the surface during the wet season would limit access to the site and damage sealed and gravelled surfaces.	Design of the refinery will incorporate both surface and subsurface drainage. Design of stormwater drains will cater for storm events and unplanned discharge/overflow. The surface drainage system will be designed for a 1 in 5 year storm event and comprise unlined trapezoid open drains that will discharge to sediment ponds. A subsoil drainage system will be implemented to ensure the integrity of sealed areas and that the site is operational during the wet season. It is proposed to provide subsoil drains comprised of a geofabric lined trench and aggregate surrounding a slotted subsoil pipe installed at 20 m spacing discharging directly into the open surface drains. The open drains and subsoil drainage systems will flow into sedimentation basins 20 x 4 x 1 m deep located on either side of the Refinery. This design will need to be confirmed in detailed design. Compliance with Major Hazardous Facility licence and environment licence/s.
Soil (Pollution) Storage and use of machinery that contains hazardous materials such as petrol, oils and lubricants	Localised impact to soil and potential localised impact to surface water and/or groundwater as a result of run off/leaching of contaminated soils from the Refinery.	All spills (any uncontrolled release of hydrocarbon, chemicals, liquid waste or other hazardous substance) will be reported and cleaned up in a timely manner. Spill-response materials and equipment (including personal protective equipment and Safety Data Sheets (SDS) will be made available at all times and will be appropriate to the substances being stored on site. Contaminated soils will be contained and placed in red contamination bins with covers that will be provided onsite. These will be moved offsite and disposed of appropriately.
Soil (Pollution) Ground disturbance and construction earthworks	Earthworks will be undertaken in areas that contain soils that are unlikely to be PASS. If PASS are disturbed, potential impacts include: • oxidation leading to ASS and generation of sulfuric acid • potential acidification and heavy-metal contamination of surrounding soil, surface water and groundwater • potential impact on growth and health of vegetation due to modified pH levels in the soil, surface water and groundwater • impact on the productivity of the local soils due to pH change and increased bioavailability of metals within the soil profile.	Soil tests to determine presence/absence of PASS and to ensure that compaction meet soil permeability targets for preventing groundwater intrusion and leaching of contaminants into the groundwater.

Environmental Aspect	Impact Description	Proposed Mitigation Controls and Monitoring
Soil (Erosion and Sedimentation) Dust and soils disturbance and relocation due to vegetation clearing, ground disturbance and construction earthworks	Short term decrease in water quality, which may or may not be localised, as a result of discharge or overflow of (potentially contaminated) sediment or soil into waterways and loss of top soil/subsoil exposure on site.	A sediment and erosion control plan will be developed and implemented for the site construction and operation by a suitably qualified practitioner. Sedimentation basins will be provided. The basins will be sized based on the International Erosion Control Association Best Practice Erosion and Sediment Control. During the construction phase silt fences and other sediment control devices will be constructed around disturbed areas during periods of wet weather. Water trucks will be used for dust suppression during the construction phase. Hose-down of hard stand areas will occur during the operational phase to avoid the potential for dust build up.
Soil (Compaction) Movement of vehicles and heavy machinery and sitting of heavy equipment around the site.	Localised soil compaction which may result in water pooling on site after rainfall.	Design of the refinery incorporates both surface and subsurface drainage as described above. Therefore, any localised increase in surface water caused by soil compaction will be collected by a drainage system.
Air (Noise and Vibration) Use of heavy machinery and equipment during construction e.g. earthmovers, trucks, compactors, etc.	Short-term and localised disturbance to fauna in adjacent bushland. Short-term and localised nuisance, disturbance or health impacts to local community.	Construction activities will be managed consistent with: - AS 2436:2010, Guide to noise and vibration control on construction, maintenance and demolition sites - Noise guidelines for development sites in the Northern Territory. There is, however, the potential for unexpected delays in the construction schedule to be addressed via extended work hours. As a consequence of works occurring outside of "standard" hours, mitigation measures consistent with the Noise guidelines for development sites in the NT will be implemented on the site.
Air (Emissions) Movement of an increased number of heavy vehicles on site and on un-formed roads during construction Emissions from Refinery process	Short-term and localised loss of air quality from dust generated during construction. Further work is required to understand air emissions from the Refinery process.	Where practicable, construction activities will be planned, scheduled and carried out to avoid the generation of dust. Dust-suppression techniques to protect vegetation, worker health and amenity will be implemented and may include spraying surfaces with water trucks, irrigation or stabilisation of cleared areas. On-site access roads will be mostly sealed. For unpaved road sections, the periodic application of water will be used for dust suppression. Undertake an air emissions assessment including modelling to address NT EPA and other applicable standards and identify mitigation measures and treatments that may be required.
Biodiversity (Fauna) Vegetation clearing Use of heavy machinery and equipment during construction e.g. earthmovers and trucks etc.	Localised disturbance and/or damage to native fauna in surrounding environment.	Limit vegetation clearing footprint as per project approvals.

Environmental Aspect	Impact Description	Proposed Mitigation Controls and Monitoring
Biodiversity (Flora) Vegetation clearing Use of heavy machinery and equipment during vegetation clearing e.g. earthmovers and trucks	Vegetation clearing. Localised disturbance and/or damage to native vegetation in surrounding environment. Regional impacts on vegetation from the proposed development are likely to be minimal. None of the vegetation communities known from the site are threatened.	Areas of vegetation to be removed will be marked to avoid clearing unintended areas. GPS equipment or flagging will be used to verify areas to be cleared. Large-scale vegetation clearing and earthworks will be planned to be undertaken in dry-season conditions where practicable. If further clearing is required during the wet-season, it will be undertaken in accordance with the mitigation measures outlined in an Erosion and Sediment Control Plan.
Biodiversity (Threatened Species) Disturbance of habitat areas and/or individual plants/animals during infrastructure development activities	No clearing of threatened species is proposed. The only threatened plant species that may occur, <i>Cycas armstrongii</i>, is regionally common. Its conservation status, and the local Darwin population, is unlikely to be impacted by the development.	Relocate <i>Cycas armstrongii</i> in consultation with Greening Australia and/or replant in landscaping works on site.
Pest Species (Weeds) Spread of weeds/weed seed onto and off site through movement of machinery; and delivery/removal of materials	Introduction of new weed species to the area and/or localised spread of existing weed populations to new locations.	Infestations of declared weeds will be controlled on site and along access roads to avoid contamination to vehicles and machinery during roadwork and grading activities. Machinery will be cleaned prior to entering the site. Vehicles will be inspected for weeds before entering the site. Cleared areas will be managed to control weed infestation. Any weeds will be controlled as soon as practicable.
Pest Species (Biting Insects) Accumulation of water in open containers, and in machinery capable of holding water Water ponding in blocked culverts and drainage lines, and upstream of erosion prevention structures	Localised breeding sites created for mosquitoes and other biting insects that may carry disease, and increase in likelihood of workforce being bitten whilst on site.	Surface and subsurface drainage designed to minimise water ponding. Request Department of Health, Entomology Branch review the drainage plan and dam concepts for the site. Staff will be made aware of the risk and recommend they use personal protective equipment. Equipment and materials will be stored to minimise localised breeding sites, e.g. open containers, storage of machinery that may carry water in the Wet Season.
Heritage (Archaeology) and Sacred Sites Excavation, ground disturbance and other construction activities including simple access	Exposure of, or damage to Aboriginal or cultural heritage artefacts such as sacred rocks, middens, skeletal remains, World War II artefacts, etc.	An AAPA certificate will be obtained before any construction works commence. In the event that an archaeological item is located, all works will cease in that area until approval to continue is granted from the relevant authority.
Human Health and Transport Transportation of hazardous goods on public roads and increased traffic combined with existing and future traffic.	In the event of an unplanned accident or incident, transportation of hazardous chemicals via rail and road may contaminate the nearby environment and be a health risk to human and wildlife receptors.	Compliance with Major Hazardous Facility licence and environment licence/s. Third Party transport services operational requirements and procedures. Transport Management Plan

Environmental Aspect	Impact Description	Proposed Mitigation Controls and Monitoring
Community - Access (Security) Excavation and construction activities, stockpiles and stock storage on site, access roads and general site housekeeping	Risk of unlawful access to construction site or operating refinery which may result in safety risks to intruders and damage to site equipment.	Fencing is proposed for the entire refinery with provision of a vehicle entry gate and a pedestrian gate. It is intended to challenge vehicles at the entry to the refinery. Signage will be provided to minimise the entry of unauthorised vehicles onto the site.
Community concern of a hazardous facility adjacent to Darwin Harbour	The siting of a major hazardous facility adjacent to Darwin Harbour is potentially a major concern to the community.	Development and implementation of a community consultation plan to inform the community of the Project, project controls, monitoring and corrective action in place for the Project; and to seek input on potential community concerns for further consideration. Compliance with Major Hazardous Facility licence and environment licence/s.
Waste Management	Liquid wastes generated during the refinery process will be disposed offsite at a licenced facility provided by a third party. Further work is required to understand potential impacts on solid waste for the onsite land disposal options.	A waste inventory, volumes and potential landfill concept design will be developed to gain a detailed understanding of potential waste impacts and mitigation. Compliance with Major Hazardous Facility licence and environment licence/s.

6 Conclusion on the likelihood of significant impacts

6.1 Do you THINK your proposed action is a controlled action?

- ☒ No, complete section 6.2
- ☐ Yes, complete section 3.3

6.2 Proposed action IS NOT a controlled action.

The proposed action is not expected to have a significant impact on a Matter of National Environmental Significance and is not anticipated to be "controlled action" under the EPBC Act as:

- development activities will be limited to the land based part of the site which is disturbed (from previous extractive industry activities on site)
- there will be no large scale clearing of threatened species habitat
- there will be no clearing of mangroves or discharge of process water streams to the marine area.

Specifically, an assessment of the action against Matters of National Environmental Significance concluded the following:

- no impact to World Heritage Properties
- no impact to National Heritage Places
- no impact to Wetlands of International Importance. There will be no dewatering during construction, clearing of wetland habitat or operational waste discharges to the harbour
- no impact to Listed Threatened Species and Ecological Communities. Any impact to listed species is likely to be behavioural at most, and limited to immediately surrounding the proposed footprint. The proposed footprint is entirely land-based and does not impact any marine, intertidal, estuarine, or riverine environment during construction or operations. The land is currently under a number of extractive licences and is disturbed. Whilst it is possible that some threatened species may be observed during construction or operational activities they will tend to avoid the site. The activities do not block or disturb any migration routes or access to roosting areas, feeding grounds or breeding grounds. The impact to migratory species is expected to be limited to passing infrequent individuals who may alter the path to avoid the disturbance. There is no expected impact upon their habitat for feeding or breeding
- no impact to Migratory Species. The nature of any impact to fauna is likely to be behavioural and limited to immediately surrounding the development. The development footprint is across an already disturbed environment with a small area of low quality remnant Eucalypt woodland. It is possible that some species may be observed during construction and operations; however they are likely to avoid the area if audible disturbance occurs. The activities do not block or disturb any migration routes or access to roosting areas, feeding grounds or breeding grounds
- no impact to Commonwealth Marine Areas
- no impact to Commonwealth Land
- no impact to the Great Barrier Reef Marine Park
- this project is not related to a coal seam gas or coal mining development.

6.3 Proposed action IS a controlled action

Matters likely to be impacted

- | | |
|--------------------------|---|
| ☐ | World Heritage values (sections 12 and 15A) |
| ☐ | National Heritage places (sections 15B and 15C) |
| ☐ | Wetlands of international importance (sections 16 and 17B) |
| ☐ | Listed threatened species and communities (sections 18 and 18A) |
| ☐ | Listed migratory species (sections 20 and 20A) |
| ☐ | Protection of the environment from nuclear actions (sections 21 and 22A) |
| ☐ | Commonwealth marine environment (sections 23 and 24A) |
| ☐ | Great Barrier Reef Marine Park (sections 24B and 24C) |
| ☐ | A water resource, in relation to coal seam gas development and large coal mining development (sections 24D and 24E) |
| ☐ | Protection of the environment from actions involving Commonwealth land (sections 26 and 27A) |
| ☐ | Protection of the environment from Commonwealth actions (section 28) |
| ☐ | Commonwealth Heritage places overseas (sections 27B and 27C) |

7 Environmental record of the responsible party

NOTE: If a decision is made that a proposal needs approval under the EPBC Act, the Environment Minister will also decide the assessment approach. The EPBC Regulations provide for the environmental history of the party proposing to take the action to be taken into account when deciding the assessment approach.

	Yes	No
7.1 Does the party taking the action have a satisfactory record of responsible environmental management? Provide details All exploration work undertaken to date has been the subject of environmental conditions associated with exploration licences. There have been no breaches of these conditions.	X	
7.2 Has either (a) the party proposing to take the action, or (b) if a permit has been applied for in relation to the action, the person making the application - ever been subject to any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources? If yes, provide details		X
7.3 If the party taking the action is a corporation, will the action be taken in accordance with the corporation's environmental policy and planning framework? If yes, provide details of environmental policy and planning framework TNG has in place an Environmental Policy which applies to activities undertaken by the Company and its employees, including contractors. The policy commits to minimising the impact of all aspects of operations on the environment to a statutory and socially acceptable level through the pro-active implementation, maintenance and continuous improvement of the Company's Environmental Management Plan.	X	
7.4 Has the party taking the action previously referred an action under the EPBC Act, or been responsible for undertaking an action referred under the EPBC Act? Provide name of proposal and EPBC reference number (if known) EPBC 2013/7027 TNG Ltd/Mining/280kms north-northwest Alice Springs/NT/Mt Peake iron, vanadium and titanium mining project & assoc infrastructure.	X	

8 Information sources and attachments

(For the information provided above)

8.1 References

- Draft Darwin Regional Land Use Plan 2014. NT Planning Commission, 2014.
- Department of Lands, Planning and the Environment (Land Services) 2015. NT Planning Scheme. Viewed online on 26th August 2015: <http://lands.nt.gov.au/__data/assets/pdf_file/0018/25164/DARWIN_AND_SURROUNDS.pdf>.
- Department of Natural Resources, Environment, the Arts and Sport 2011. Spatial Data and Mapping Unit, Natural Resources Division, Department of Natural Resources, Environment, the Arts and Sport. Viewed online on 2nd September 2015: <<http://lrm.nt.gov.au/water/surface/flooding/inundationmaps>>.

8.2 Reliability and date of information

Information that is available is relatively recent and is expected to be reliable.

8.3 Attachments

Indicate the documents you have attached. All attachments must be less than three megabytes (3mb) so they can be published on the Department's website. Attachments larger than three megabytes (3mb) may delay the processing of your referral.

		✓ attached	Title of attachment(s)
You must attach	figures, maps or aerial photographs showing the project locality (section 1)	✓	Figure 1 and 2
	GIS file delineating the boundary of the referral area (section 1)	✓	Shape file_Development Footprint
	figures, maps or aerial photographs showing the location of the project in respect to any matters of national environmental significance or important features of the environment (section 3)	✓	Figure 7
If relevant, attach	copies of any state or local government approvals and consent conditions (section 2.5)		
	copies of any completed assessments to meet state or local government approvals and outcomes of public consultations, if available (section 2.6)		
	copies of any flora and fauna investigations and surveys (section 3)		
	technical reports relevant to the assessment of impacts on protected matters that support the arguments and conclusions in the referral (section 3 and 4)		
	report(s) on any public consultations undertaken, including with Indigenous stakeholders (section 3)		

9 Contacts, signatures and declarations

NOTE: Providing false or misleading information is an offence punishable on conviction by imprisonment and fine (s 489, EPBC Act).

Under the EPBC Act a referral can only be made by:

- the person proposing to take the action (which can include a person acting on their behalf); or
- a Commonwealth, state or territory government, or agency that is aware of a proposal by a person to take an action, and that has administrative responsibilities relating to the action¹.

Project title:

9.1 Person proposing to take action

This is the individual, government agency or company that will be principally responsible for, or who will carry out, the proposed action.

If the proposed action will be taken under a contract or other arrangement, this is:

- the person for whose benefit the action will be taken; or
- the person who procured the contract or other arrangement and who will have principal control and responsibility for the taking of the proposed action.

If the proposed action requires a permit under the Great Barrier Reef Marine Park Act², this is the person requiring the grant of a GBRMP permission.

The Minister may also request relevant additional information from this person.

If further assessment and approval for the action is required, any approval which may be granted will be issued to the person proposing to take the action. This person will be responsible for complying with any conditions attached to the approval.

If the Minister decides that further assessment and approval is required, the Minister must designate a person as a proponent of the action. The proponent is responsible for meeting the requirements of the EPBC Act during the assessment process. The proponent will generally be the person proposing to take the action³.

Name	Paul Burton
Title	Managing Director
Organisation	TNG Ltd
ACN / ABN	12 000 817 023
Postal address	PO Box 1126, Subiaco, WA 6904
Telephone	+61 8 9327 0900
Email	peb@tngltd.com.au

COMPLETE THIS SECTION ONLY IF YOU QUALIFY FOR EXEMPTION FROM THE FEE(S) THAT WOULD OTHERWISE BE PAYABLE

I qualify for exemption from fees under section 520(4C)(e)(v) of the EPBC Act because I am:	☐	an individual; OR
	☒	a small business entity (within the meaning given by section 328-110 (other than subsection 328-119(4)) of the <i>Income Tax Assessment Act 1997</i>); OR
	☐	not applicable

¹ If the proposed action is to be taken by a Commonwealth, state or territory government or agency, section 8.1 of this form should be completed. However, if the government or agency is aware of, and has administrative responsibilities relating to, a proposed action that is to be taken by another person which has not otherwise been referred, please contact the Referrals Gateway (1800 803 772) to obtain an alternative contacts, signatures and declarations page.

² If your referred action, or a component of it, is to be taken in the Great Barrier Reef Marine Park the Minister is required to provide a copy of your referral to the Great Barrier Reef Marine Park Authority (GBRMPA) (see section 73A, EPBC Act). For information about how the GBRMPA may use your information, see http://www.gbrmpa.gov.au/privacy/privacy_notice_for_permits.

³ If a person other than the person proposing to take action is to be nominated as the proponent, please contact the Referrals Gateway(1800 803 772) to obtain an alternative contacts, signatures and declarations page.

If you are small business entity you must provide the Date/Income Year that you became a small business entity: 30 June 2003, 2003/04,

Note: You must advise the Department within 10 business days if you cease to be a small business entity. Failure to notify the Secretary of this is an offence punishable on conviction by a fine (regulation 5.23B(3) Environment Protection and Biodiversity Conservation Regulations 2000 (Cth)).

COMPLETE THIS SECTION ONLY IF YOU WOULD LIKE TO APPLY FOR A WAIVER

I would like to apply for a waiver of full or partial fees under Schedule 1, 5.21A of the [EPBC Regulations](#). Under sub regulation 5.21A(5), you must include information about the applicant (if not you) the grounds on which the waiver is sought and the reasons why it should be made:

Declaration

I declare that to the best of my knowledge the information I have given on, or attached to this form is complete, current and correct.
I understand that giving false or misleading information is a serious offence.
I agree to be the proponent for this action.
I declare that I am not taking the action on behalf of or for the benefit of any other person or entity.

Signature



9.2 Person preparing the referral information (if different from 8.1)
[Individual or organisation who has prepared the information contained in this referral form.](#)

Name Ian McCardle
Title Principal Environmental Scientist
Organisation GHD Pty Ltd
ACN / ABN 39 008 488 373
Postal address PO Box 3106, Adelaide Terrace, Perth, WA 6832
Telephone +61 8 6222 8995
Email ian.mccardle@ghd.com

Declaration

I declare that to the best of my knowledge the information I have given on, or attached to this form is complete, current and correct.
I understand that giving false or misleading information is a serious offence.

Signature



Date 11/11/2015

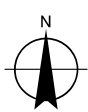
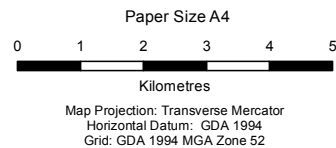
REFERRAL CHECKLIST

NOTE: This checklist is to help ensure that all the relevant referral information has been provided. It is not a part of the referral form and does not need to be sent to the Department.

HAVE YOU:

- ✓ Completed all required sections of the referral form?
- ✓ Included accurate coordinates (to allow the location of the proposed action to be mapped)?
- ✓ Provided a map showing the location and approximate boundaries of the project area?
- ✓ Provided a map/plan showing the location of the action in relation to any matters of NES?
- ✓ Provided a digital file (preferably ArcGIS shapefile, refer to guidelines at [Attachment A](#)) delineating the boundaries of the referral area?
- ✓ Provided complete contact details and signed the form?
- ✓ Provided copies of any documents referenced in the referral form?
- ✓ Ensured that all attachments are less than three megabytes (3mb)?
- ✓ Sent the referral to the Department (electronic and hard copy preferred)?

Figures



Legend

 Project area



Darwin Refinery NOI

Job Number	61-32573
Revision	A
Date	23 Oct 2015

Project Area and Surrounds

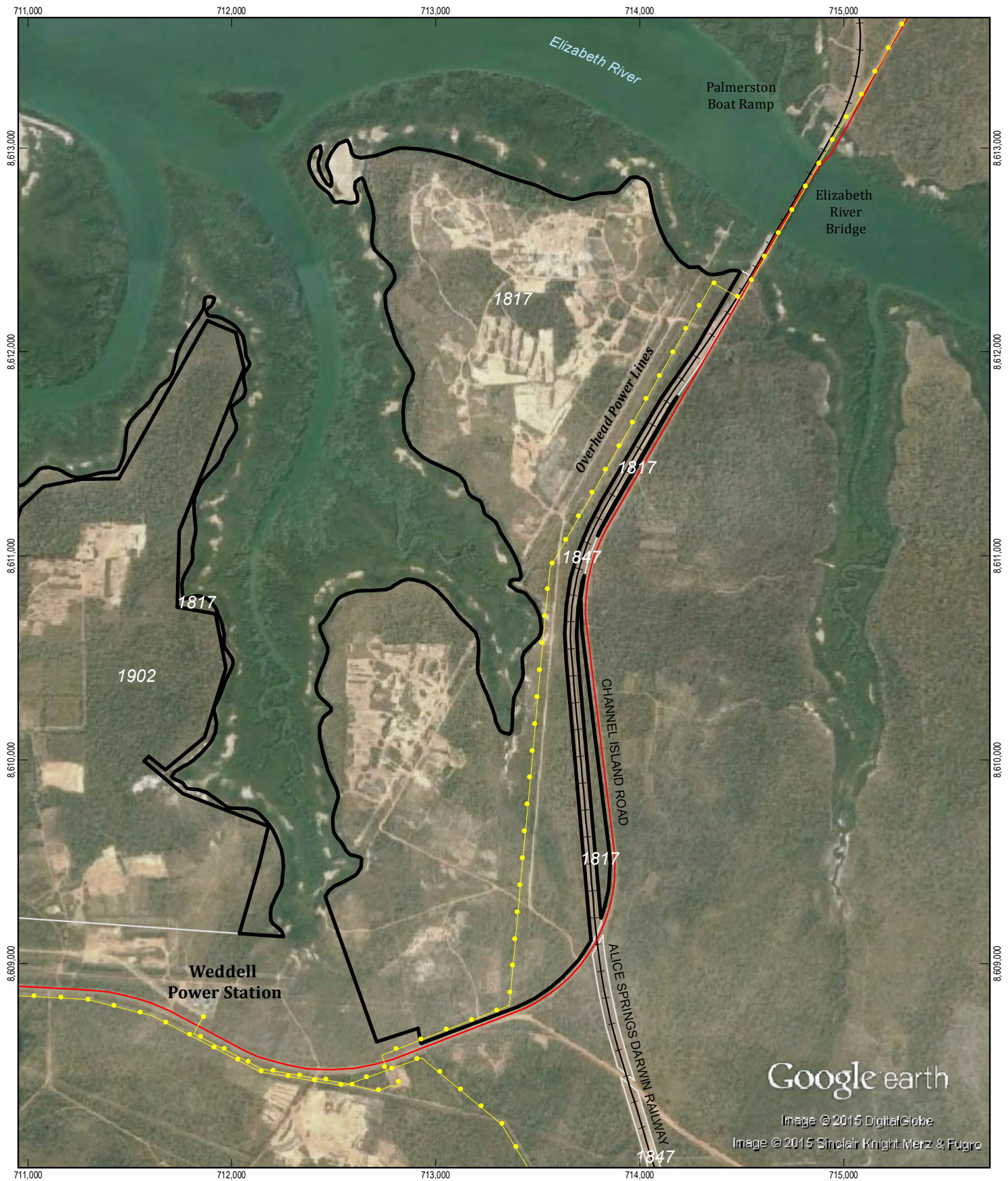
Figure 1

G:\61\32573\04 GIS\Maps\MXD\6132573_002_RevA_Fig2-1ProjectAreaAndSurrounds.mxd

239 Adelaide Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com.au W www.ghd.com.au

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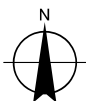
Data source: Data Custodian, Data Set Name/Title, Version/Date. Created by:rbannister



LEGEND

- Road
- Gas pipeline
- +— Railway
- Cadastre

Paper Size A4
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 Metres
 Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 52



TNG LIMITED

Darwin Refinery NOI

Job Number 61-32573
 Revision A
 Date 23 Oct 2015

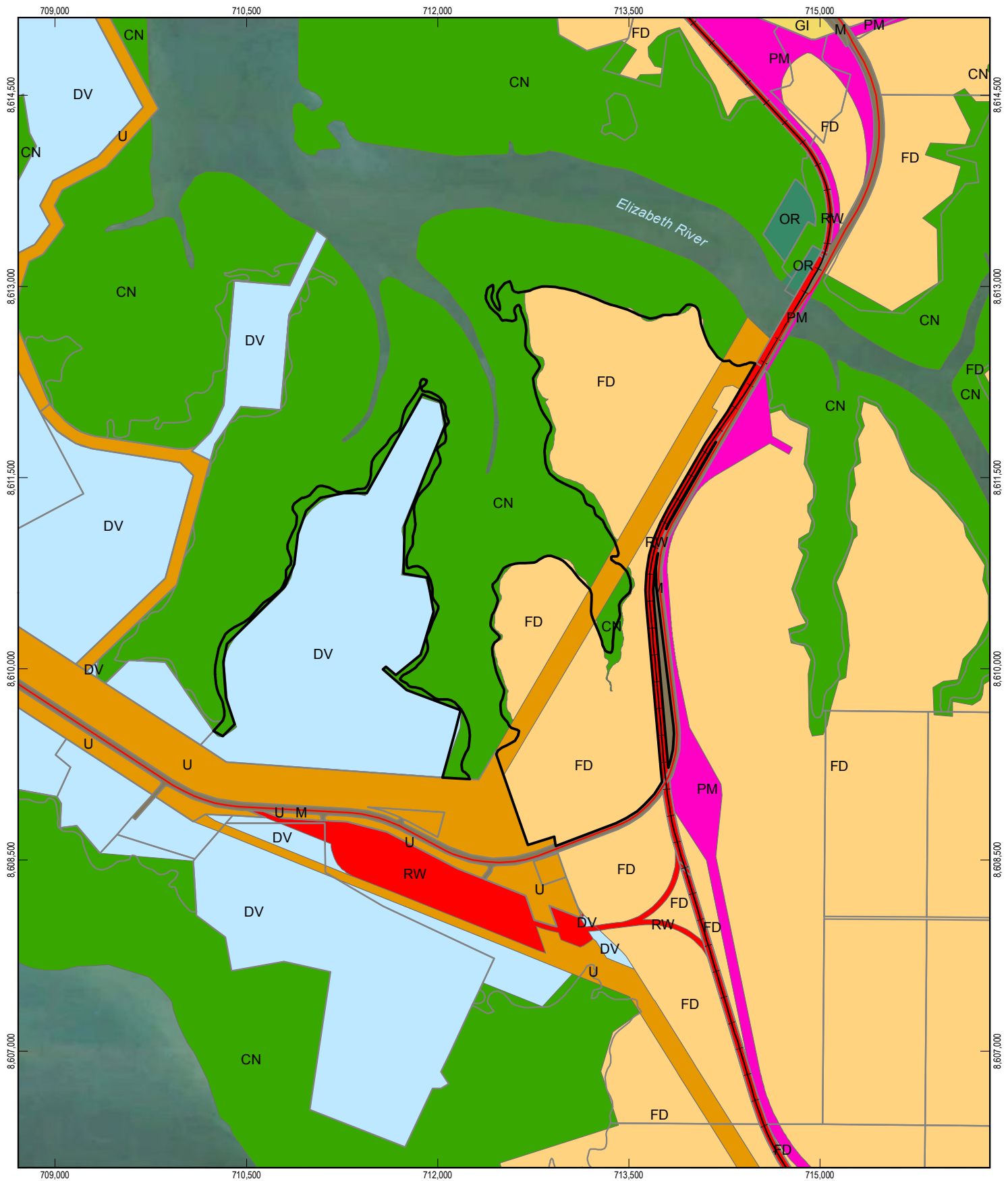
Project Site

Figure 2

G:\61\32573\04 GIS\Maps\IMXD\6132573_003_RevA_Fig2-2ProjectSite.mxd

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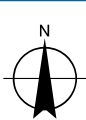
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 Data source: DLRM: Cadastre, Roads, Rail; Nearmap: Imagery (4th July 2015) - 20150825. Created by:rbannister



LEGEND

Road	Town Planning Scheme	GI, General Industry	PM, Proposed Main Road
Railway	CN, Conservation	M, Main Road	RW, Railways
Project site	DV, Development	OR, Organised Recreation	U, Utilities
Cadastre	FD, Future Development		

Paper Size A4
 0 0.5 1 1.5
 Kilometers
 Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 52



TNG LIMITED

Darwin Refinery NOI

Job Number 61-32573
 Revision A
 Date 23 Oct 2015

Land Use Zoning

Figure 3

G:\61\32573\04 GIS\Maps\MXD\6132573_004_RevA_Fig2-3LandUseZoning.mxd

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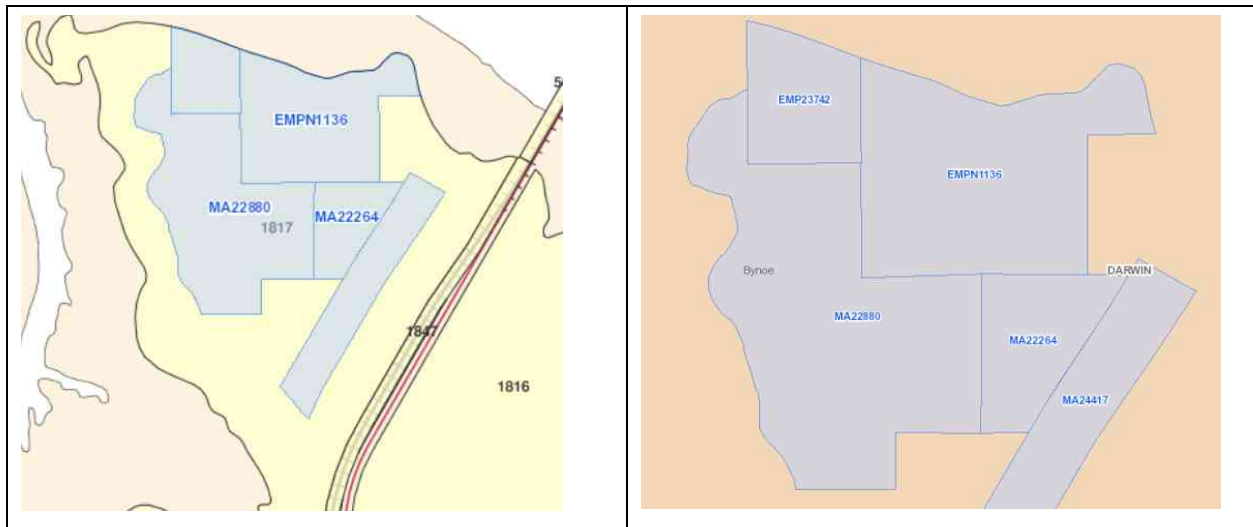
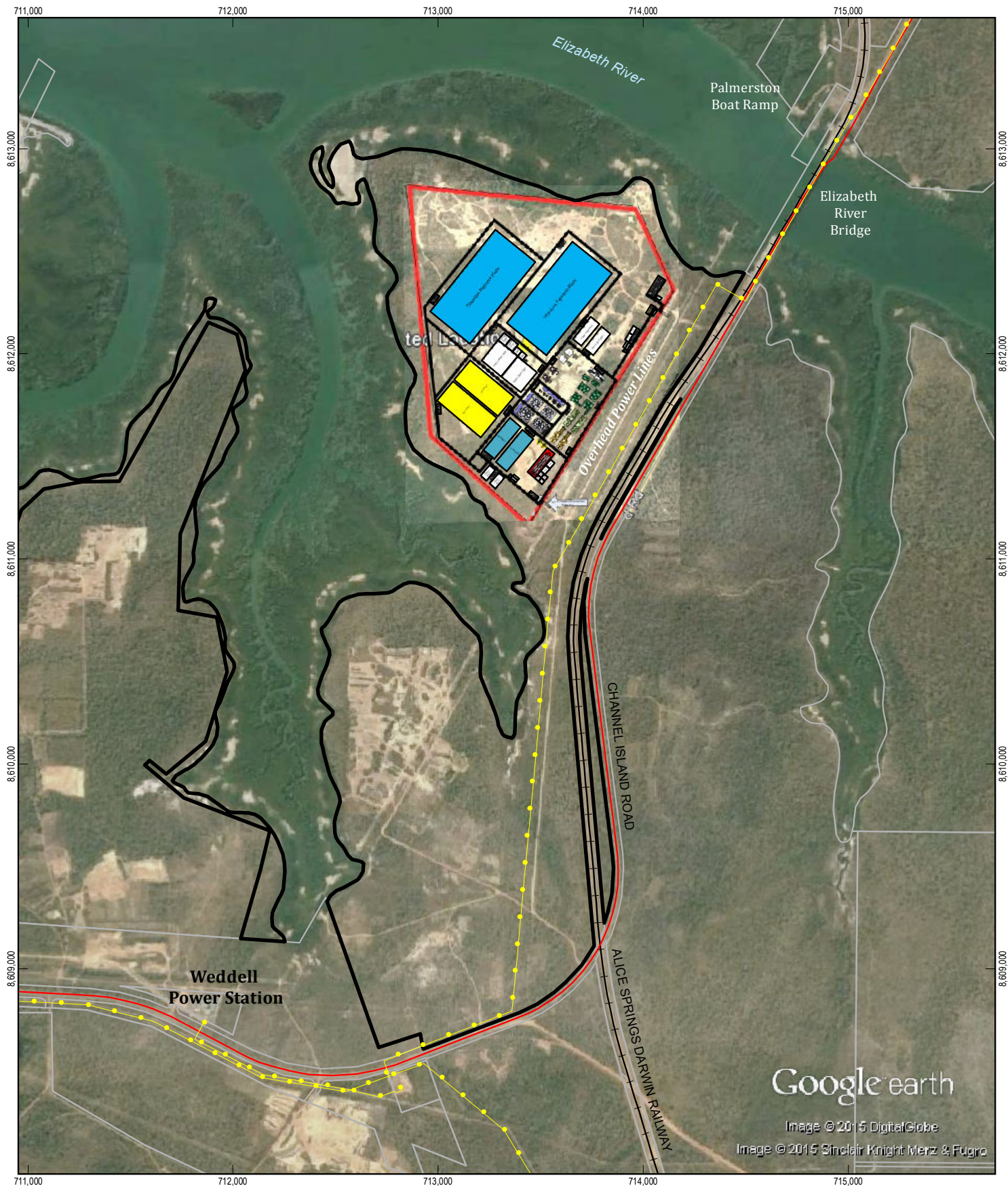


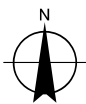
Figure 4 Strike database of current site use



LEGEND

- Road
- Lot 1817
- - - Gas pipeline
- + + + Railway
- Cadastre

Paper Size A4
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 Metres
 Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 52



TNG LIMITED

Darwin Refinery NOI

Job Number 61-32573
 Revision A
 Date 23 Oct 2015

Site Preliminary Concept Layout **Figure 5**

G:\61\32573\04 GIS\Maps\MXD\6132573_006_RevB_Fig4-2SitePreliminaryConceptLayout.mxd

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 Data source: DLRM: Cadastre, Roads, Rail; Nearmap: Imagery (4th July 2015) - 20150825. Created by:rbannister

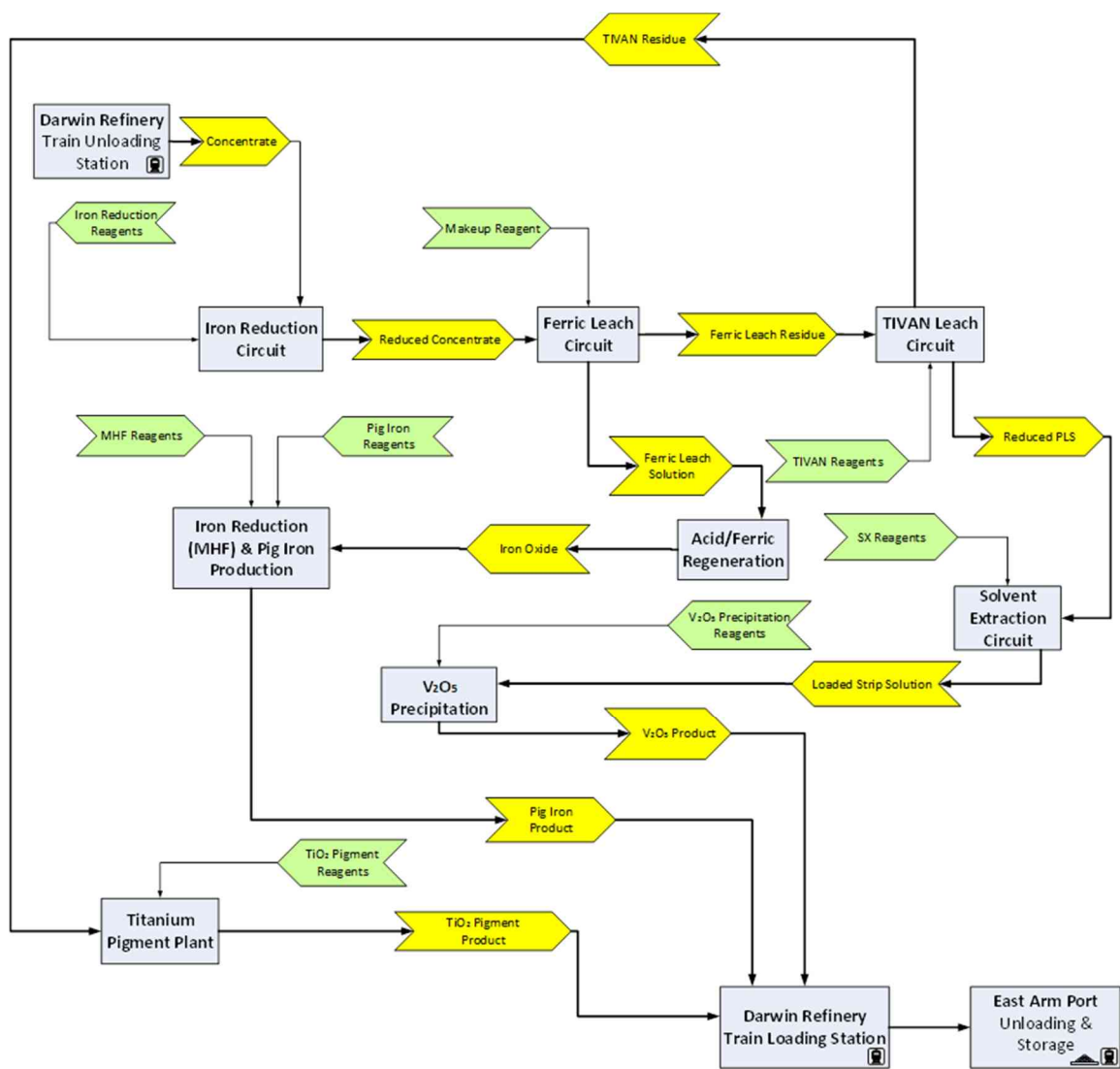
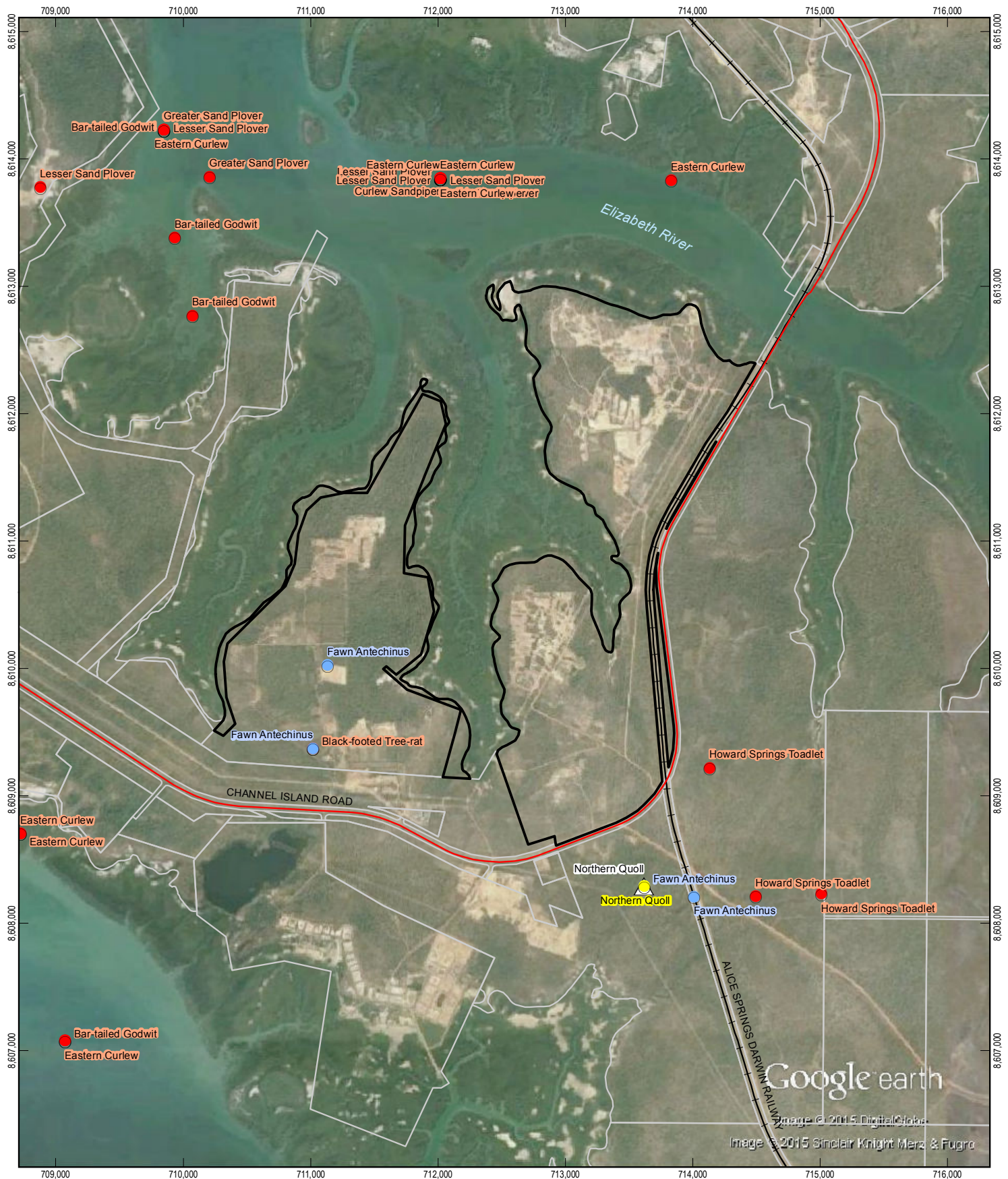
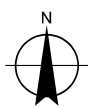
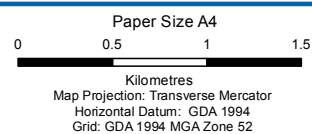


Figure 6 Simplified process block diagram



LEGEND

Fauna Species - TPWC Act	Fauna Species - EPBC Act	Road	Project site
● Critically Endangered	△ Endangered	— Road	 Project site
● Endangered		—+— Railway	 Cadastre
● Vulnerable			



TNG LIMITED

Darwin Refinery NOI

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Revision A
Date 23 Oct 2015

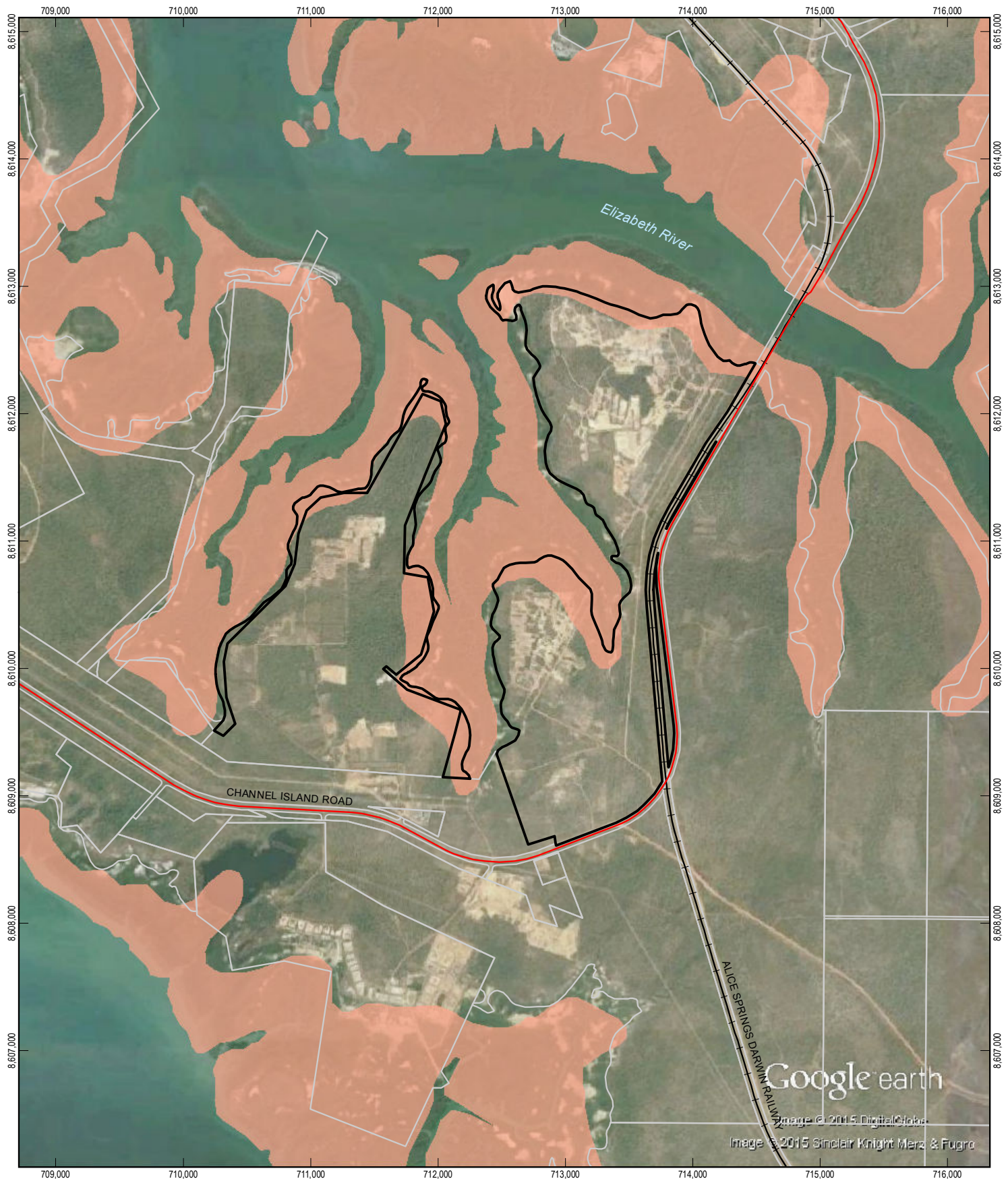
Threatened Fauna
Records within 5km

Figure 7

G:\61\32573\04 GIS\Maps\MXD\6132573_010_RevA_Fig6-4ThreatenedFauna.mxd

239 Adelaide Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com.au W www.ghd.com.au

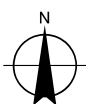
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Data source: DLRM: Cadastre, Roads, Rail; Nearmap: Imagery (4th July 2015) - 20150825. Created by:rbannister



LEGEND

- | | | |
|--|--|--|
|  Road |  Project site |  Potential acid sulfate soils |
|  Railway |  Cadastre | |

Paper Size A4
 0 0.5 1 1.5
 Kilometres
 Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 52



TNG LIMITED

Darwin Refinery NOI

Job Number	61-32573
Revision	A
Date	23 Oct 2015

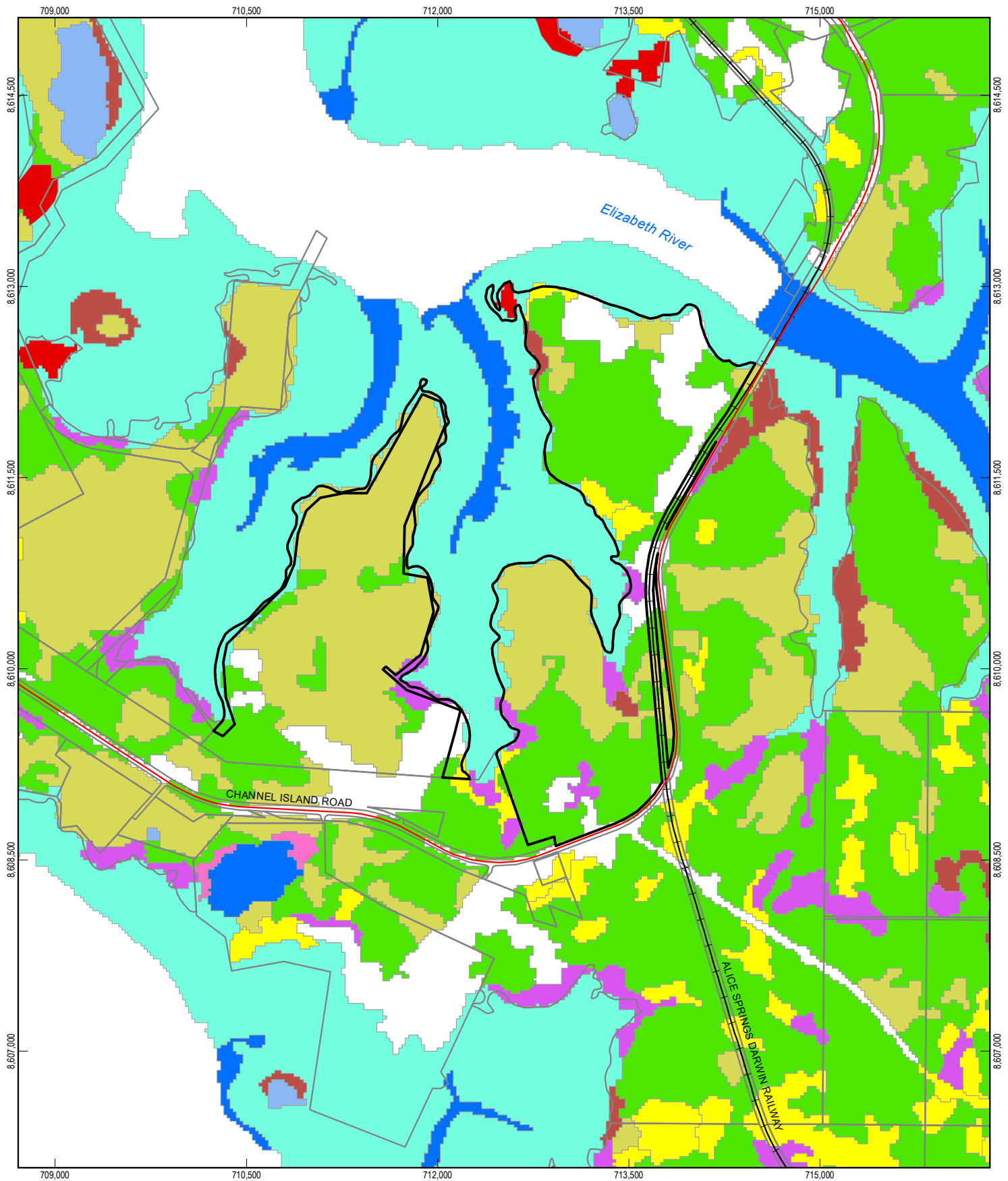
Potential Acid Sulfate Soils

Figure 8

G:\61\32573\04 GIS\Maps\MXD\6132573_007_RevA_Fig6-1PotentialAcidSulfateSoil.mxd

239 Adelaide Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com.au W www.ghd.com.au

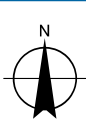
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LEGEND

Road	Project site	Landcover (Community Name)	Dry Rainforest	Eucalypt woodland	Riparian open forest
Railway	Cadastre	Cleared land	Eucalypt open forest	Mangrove forest	Samphire
		Drainage open woodland	Eucalypt open woodland	Melaleuca swamp	Water

Paper Size A4
 0 0.5 1 1.5
 Kilometres
 Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 52



TNG LIMITED

Darwin Refinery NOI

Job Number 61-32573
 Revision A
 Date 23 Oct 2015

Vegetation Communities

Figure 9

G:\61\32573\04 GIS\Maps\MXD\6132573_009_RevA_Fig6-3VegetationCommunities.mxd

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PMST Report



EPBC Act Protected Matters Report

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

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

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

Report created: 25/08/15 16:35:46

[Summary](#)

[Details](#)

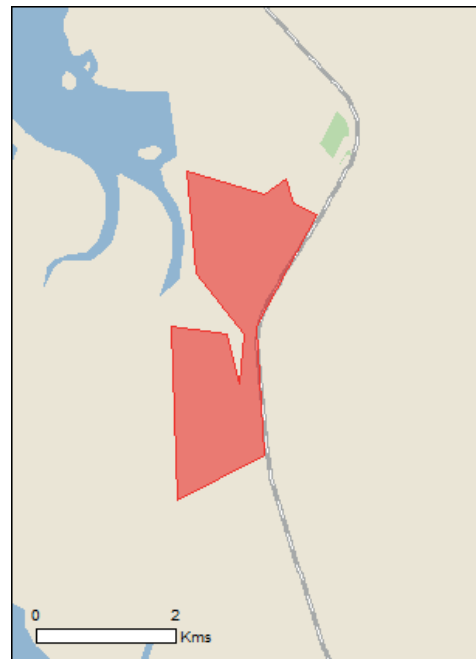
[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)



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

[Coordinates](#)

Buffer: 10.0Km



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:	31
Listed Migratory Species:	49

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/index.html>

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:	6
Commonwealth Heritage Places:	None
Listed Marine Species:	90
Whales and Other Cetaceans:	12
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:	1
Regional Forest Agreements:	None
Invasive Species:	31
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Foraging, feeding or related behaviour known to occur within area
Epthianura crocea tunneyi Yellow Chat (Alligator Rivers) [67089]	Endangered	Species or species habitat may occur within area
Erythroriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat known to occur within area
Erythrura gouldiae Gouldian Finch [413]	Endangered	Species or species habitat known to occur within area
Geophaps smithii smithii Partridge Pigeon (eastern) [64441]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew [847]	Critically Endangered	Foraging, feeding or related behaviour known to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Tyto novaehollandiae kimberli Masked Owl (northern) [26048]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
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 [331]	Endangered	Species or species habitat known to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Mesembriomys gouldii gouldii Black-footed Tree-rat (Kimberley and mainland Northern Territory), Djintamoonga [87618]	Endangered	Species or species habitat known to occur within area
Phascogale pirata Northern Brush-tailed Phascogale [82954]	Vulnerable	Species or species habitat likely to occur within area
Saccolaimus saccolaimus nudicluniatus Bare-rumped Sheathtail Bat [66889]	Critically Endangered	Species or species habitat likely to occur within area
Xeromys myoides Water Mouse, False Water Rat, Yirrkoo [66]	Vulnerable	Species or species habitat likely to occur within area
Plants		
Atalaya brevialata [86125]	Critically Endangered	Species or species habitat known to occur within area
Typhonium taylori a herb [65904]	Endangered	Species or species habitat likely to occur within area
Reptiles		
Acanthophis hawkei Plains Death Adder [83821]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sharks		
Carcharodon carcharias Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Glyphis garricki Northern River Shark, New Guinea River Shark [82454]	Endangered	Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis 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	Vulnerable	Species or species

Name	Status	Type of Presence
[68442]		habitat known to occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Sterna albifrons		
Little Tern [813]		Species or species habitat may occur within area
Migratory Marine Species		
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		
Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Crocodylus porosus		
Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Dugong dugon		
Dugong [28]		Species or species habitat known to occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Lepidochelys olivacea		
Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour known to occur within area
Manta 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 likely to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Name	Threatened	Type of Presence	
Orcaella brevirostris Irrawaddy Dolphin [45]		Species or species habitat known to occur within area	
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area	
Rhincodon typus Whale Shark [66680]		Vulnerable	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]			Breeding known to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]			Species or species habitat likely to occur within area
Migratory Terrestrial Species			
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	
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area	
Migratory Wetlands Species			
Actitis hypoleucos Common Sandpiper [59309]	Critically Endangered	Foraging, feeding or related behaviour known to occur within area	
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area	
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area	
Arenaria interpres Ruddy Turnstone [872]		Foraging, feeding or related behaviour known to occur within area	
Calidris acuminata Sharp-tailed Sandpiper [874]		Foraging, feeding or related behaviour known to occur within area	
Calidris alba Sanderling [875]		Foraging, feeding or related behaviour known to occur within area	
Calidris canutus Red Knot, Knot [855]		Foraging, feeding or related behaviour known to occur within area	
Calidris ferruginea Curlew Sandpiper [856]		Foraging, feeding or related behaviour known to occur within area	
Calidris ruficollis Red-necked Stint [860]		Foraging, feeding or related behaviour known to occur within area	
Calidris tenuirostris Great Knot [862]		Foraging, feeding or related behaviour likely to occur within area	

Name	Threatened	Type of Presence
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]		Foraging, feeding or related behaviour known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]		Foraging, feeding or related behaviour known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Foraging, feeding or related behaviour may occur within area
Gallinago megala Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area
Glareola maldivarum Oriental Pratincole [840]		Foraging, feeding or related behaviour may occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Foraging, feeding or related behaviour known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Foraging, feeding or related behaviour likely to occur within area
Numenius madagascariensis Eastern Curlew [847]	Critically Endangered	Foraging, feeding or related behaviour known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area
Numenius phaeopus Whimbrel [849]		Foraging, feeding or related behaviour known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Foraging, feeding or related behaviour known to occur within area
Pluvialis squatarola Grey Plover [865]		Foraging, feeding or related behaviour known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Foraging, feeding or related behaviour known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land

[\[Resource Information \]](#)

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

Name

Commonwealth Land -
Commonwealth Land - Australian Government Solicitor
Commonwealth Land - Director of Property Services Defence Estate
Defence - KOWANDI NORTH COMMUNICATION STATION
Defence - KOWANDI SOUTH REPEATING STATION
Defence - ROBERTSON BARRACKS (Waler Barracks)

Listed Marine Species

[\[Resource Information \]](#)

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

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Foraging, feeding or related behaviour known to occur within area
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]		Foraging, feeding or related behaviour known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Foraging, feeding or related behaviour known to occur within area
Calidris alba Sanderling [875]		Foraging, feeding or related behaviour known to occur within area
Calidris canutus Red Knot, Knot [855]		Foraging, feeding or related behaviour known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Foraging, feeding or related behaviour known to occur within area
Calidris ruficollis Red-necked Stint [860]		Foraging, feeding or related behaviour known to occur within area
Calidris tenuirostris Great Knot [862]		Foraging, feeding or related behaviour likely to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]		Foraging, feeding or related behaviour known

Name	Threatened	Type of Presence
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Critically Endangered	to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Foraging, feeding or related behaviour known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area
Glareola maldivarum Oriental Pratincole [840]		Foraging, feeding or related behaviour may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Foraging, feeding or related behaviour known to occur within area
Hirundo 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]		Foraging, feeding or related behaviour likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew [847]		Foraging, feeding or related behaviour known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area
Numenius phaeopus Whimbrel [849]		Foraging, feeding or related behaviour known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Foraging, feeding or related behaviour known to occur within area
Pluvialis squatarola Grey Plover [865]		Foraging, feeding or related behaviour known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Sterna albifrons Little Tern [813]		Species or species habitat may occur within area
Xenus cinereus Terek Sandpiper [59300]		Foraging, feeding or related behaviour known to occur within area
Fish		
Campichthys tricarinatus Three-keel Pipefish [66192]		Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
Corythoichthys haematopterus Reef-top Pipefish [66201]		Species or species habitat may occur within area
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 Ribbioned Pipehorse, Ribbioned Seadragon [66226]		Species or species habitat may occur within area
Hippichthys cyanospilos Blue-speckled Pipefish, Blue-spotted Pipefish [66228]		Species or species habitat may occur within area
Hippichthys parvicarinatus Short-keel Pipefish, Short-keeled Pipefish [66230]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus spinosissimus Hedgehog Seahorse [66239]		Species or species habitat may occur within area
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Solenostomus paegnius Rough-snout Ghost Pipefish [68425]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Mammals		
Dugong dugon Dugong [28]		Species or species habitat known to occur within area
Reptiles		
Acalyptophis peronii Horned Seasnake [1114]		Species or species habitat may occur within area
Aipysurus duboisii Dubois' Seasnake [1116]		Species or species habitat may occur within area
Aipysurus eydouxii Spine-tailed Seasnake [1117]		Species or species habitat may occur within area
Aipysurus laevis Olive Seasnake [1120]		Species or species habitat may occur within

Name	Threatened	Type of Presence area
Astrotia stokesii Stokes' Seasnake [1122]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Crocodylus johnstoni Freshwater Crocodile, Johnston's Crocodile, Johnston's River Crocodile [1773]		Species or species habitat may occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Disteira kingii Spectacled Seasnake [1123]		Species or species habitat may occur within area
Disteira major Olive-headed Seasnake [1124]		Species or species habitat may occur within area
Enhydrina schistosa Beaked Seasnake [1126]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Hydrelaps darwiniensis Black-ringed Seasnake [1100]		Species or species habitat may occur within area
Hydrophis atriceps Black-headed Seasnake [1101]		Species or species habitat may occur within area
Hydrophis coggeri Slender-necked Seasnake [25925]		Species or species habitat may occur within area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area
Hydrophis inornatus Plain Seasnake [1107]		Species or species habitat may occur within area
Hydrophis mcdowelli null [25926]		Species or species habitat may occur within area
Hydrophis ornatus Spotted Seasnake, Ornate Reef Seasnake [1111]		Species or species habitat may occur within area
Hydrophis pacificus Large-headed Seasnake, Pacific Seasnake [1112]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Lapemis hardwickii Spine-bellied Seasnake [1113]		Species or species habitat may occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Parahydrophis mertoni Northern Mangrove Seasnake [1090]		Species or species habitat may occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans [Resource Information]

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

Extra Information

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

Invasive Species [\[Resource Information \]](#)

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

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat 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

Name	Status	Type of Presence
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Plants		
Andropogon gayanus Gamba Grass [66895]		Species or species habitat likely to occur within area
Annona glabra Pond Apple, Pond-apple Tree, Alligator Apple, Bullock's Heart, Cherimoya, Monkey Apple, Bobwood, Corkwood [6311] Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171] Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area
Dolichandra unguis-cati Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Hymenachne amplexicaulis Hymenachne, Olive Hymenachne, Water Stargrass, West Indian Grass, West Indian Marsh Grass [31754]		Species or species habitat likely to occur within area
Jatropha gossypifolia Cotton-leaved Physic-Nut, Bellyache Bush, Cotton-leaf Physic Nut, Cotton-leaf Jatropha, Black Physic Nut [7507] Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892] Mimosa pigra Mimosa, Giant Mimosa, Giant Sensitive Plant, Thorny Sensitive Plant, Black Mimosa, Catclaw Mimosa, Bashful Plant [11223] Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
Pennisetum polystachyon Mission Grass, Perennial Mission Grass, Missiongrass, Feathery Pennisetum, Feather		Species or species habitat likely to occur

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

Reptiles

Hemidactylus frenatus		
Asian House Gecko [1708]		Species or species habitat likely to occur within area
Lepidodactylus lugubris		
Mourning Gecko [1712]		Species or species habitat likely to occur within area
Ramphotyphlops braminus		
Flowerpot Blind Snake, Brahminy Blind Snake, Cacing Besi [1258]		Species or species habitat likely to occur within area

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

Caveat

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

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

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

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

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-12.544758 130.974203,-12.558628 130.966383,-12.574639 130.967527,-12.580317 130.956369,-12.558628 130.955511,-12.559559 130.962663,-12.565889 130.964189,-12.559652 130.964952,-12.552112 130.958658,-12.539266 130.957514,-12.542152 130.967432,-12.54029 130.970293,-12.543362 130.971246,-12.544735 130.974084,-12.544758 130.974155,-12.544758 130.974155,-12.544758 130.974203

Acknowledgements

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- [Department of Environment, Climate Change and Water, New South Wales](#)
- [Department of Sustainability and Environment, Victoria](#)
- [Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [Department of Environment and Natural Resources, South Australia](#)
- [Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts](#)
- [Environmental and Resource Management, Queensland](#)
- [Department of Environment and Conservation, Western Australia](#)
- [Department of the Environment, Climate Change, Energy and Water](#)
- [Birds Australia](#)
- [Australian Bird and Bat Banding Scheme](#)
- [Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [Museum Victoria](#)
- [Australian Museum](#)
- [SA Museum](#)
- [Queensland Museum](#)
- [Online Zoological Collections of Australian Museums](#)
- [Queensland Herbarium](#)
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- [Tasmanian Herbarium](#)
- [State Herbarium of South Australia](#)
- [Northern Territory Herbarium](#)
- [Western Australian Herbarium](#)
- [Australian National Herbarium, Atherton and Canberra](#)
- [University of New England](#)
- [Ocean Biogeographic Information System](#)
- [Australian Government, Department of Defence](#)
- [State Forests of NSW](#)
- [Geoscience Australia](#)
- [CSIRO](#)
- 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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GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111