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Chapter Ten

Commonwealth Government Matters

Winchelsea Island
(Akwamburkba)
Manganese Mine: Draft
Environmental Impact
Statement



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Key Project Terms

Term	Definition or Elaboration
Adaptive Management	Systematic process for incrementally improving management practices by learning from the outcomes of past and current practices.
AUS China International Mining	AUS China International Mining Pty Ltd
CDM Smith	CDM Smith Australia Pty Ltd
Disturbance Envelope	Defined as the maximum area within which the Project disturbance could occur. The disturbance envelope for the Project encompasses 739 ha, inclusive of the terrestrial mining area and infrastructure, marine infrastructure, dredge spoil disposal area and transshipment area.
Environmental Aspect	An element of the Winchelsea Minings activities, products or services that can interact with the environment.
Environmental Impact	Change to the environment whether adverse or beneficial, wholly or partially resulting from Winchelsea Mining's environmental aspects. Environmental impacts can be caused directly or indirectly from a Project activity or cumulatively with other non-Project related activities in a set area.
Environmental Factor	The NT EPA listed environmental objectives to identify environmental matters that have value to the Northern Territory and that need to be protected; and to state the objective to be achieved for each matter. The NT EPA has prepared these environmental objectives and organised these in structured divisions of the environment, called environmental factors.
GHAC	Groote Holdings Aboriginal Corporation
Infrastructure Footprint	Defined as the area subject to direct placement of infrastructure and material inclusive of the terrestrial and wharf components. This area excludes the dredge spoil disposal area and transshipment area as no permanent physical infrastructure will be placed in these areas. The infrastructure footprint encompasses 339 ha within the Project area.
Project	The Project refers to the Winchelsea Island Manganese Mine Project. The Project includes establishment of a manganese mine extracting from nine separate extraction areas covering, associated terrestrial infrastructure, wharf and barge loading facility, dredged access channel, dredge spoil disposal, transshipment and cyclone moorings. The Project is inclusive of all infrastructure within the nominated Project area and directly associated activities occurring outside that area.
Project Area	The Project area is defined as wholly including mineral lease for exploration activities 32704, coastal and marine areas adjacent and connecting to mineral lease 32704, the dredge spoil disposal area and transshipment area. The entire Project area covers 1,680 ha.
Significant Impact	A significant impact of an action is an impact of major consequence having regard to: (a) the context and intensity of the impact; and (b) the sensitivity, value and quality of the environment impacted on and the duration, magnitude and geographic extent of the impact.
Sitzler	Sitzler Pty Ltd
Study Area	Refers to the area of survey or investigation for a specific study. This area may be beyond the Project area or disturbance envelope.
Tailings Storage Facility	A specially engineered and constructed impoundment into which tailings (residue) from the ore processing plant are deposited for placement in perpetuity. The storage facility is constructed with confining embankments consisting of earthen material (e.g., rock and soil) and capped following closure.
Winchelsea Island	Akwamburrkba

Term	Definition or Elaboration
Winchelsea Mining	Winchelsea Mining Pty Ltd
Xenith	Xenith Consulting Pty Ltd

Acronyms, Abbreviations and Units

Abbreviation, Acronym or Unit	Definition
AAAC	Anindilyakwa Advancement Aboriginal Corporation
AAPA	Aboriginal Areas Protection Authority
ABS	Australian Bureau of Statistics
AFANT	Armature Fisherman's Association Northern Territory
ALARP	As Low As Reasonably Practicable
Al ₂ O ₃	Aluminium Oxide
ANC	Acid Neutralising Capacity
ARC	Arnhem Coast
ASRIS	Australian Soil Resource Information System
ASS	Acid Sulfate Soils
CAN	Australian Company Numbers
ADT	Articulated Dump Truck
ALC	Anindilyakwa Land Council
Al ₂ O ₃	Aluminium Oxide
ALRA	<i>Aboriginal Land Rights (Northern Territory) Act 1976</i>
Bcm	Bank Cubic Meter
BLF	Barge Loading Facility
BLM	Blue Mud Land System
BoM	Bureau of Meteorology
BWM	International Convention for the Control and Management of Ships' Ballast Water and Sediments
CD	Chart Datum
CEO	Chief Executive Officer
CP	Cemented Pisolite
CNZ	Central North Mineralisation Zone
CMZ	Central Main Mineralisation Zone
Cth	Commonwealth
CSD	Cutter Suction Dredge
CSZ	Central South Mineralisation Zone
DAFF	Department of Agriculture, Fisheries and Forestry
DAWE	Department of Agriculture, Water and the Environment
DCCEEW	Department of Climate Change, Energy, the Environment and Water

Abbreviation, Acronym or Unit	Definition
DEPWS	Department of Environment, Parks and Water Security
DIPL	Department of Infrastructure, Planning and Logistics
DITT	Department of Industry, Tourism and Trade
Dmt	Dry Metric Tonne
DWCD	Declared Water Control District
DWT	Dead Weight Tonne
EIS	Environmental Impact Statement
EIL	Ecological Investigation Level
EL	Exploration Licence
EMP	Environmental Management Plan
EMS	Environmental Management System
EP Act	<i>Environmental Protection Act 2019</i>
EPBC Act	<i>Environmental Protection and Biosecurity Conservation Act 1999</i>
EPL	Environment Protection Licence
ERA	Environmentally Restricted Area
EV	Electric Vehicle
ESC	Erosion and Sediment Control
ESCP	Erosion and Sediment Control Plan
Fe	Iron
FIFO	Fly-In Fly-Out
g/cc	Gram per Cubic Centimetre
GDE	Groundwater Dependand Ecosystem
GEMCO	Groote Eylandt Mining Company
GHG	Greenhouse Gas
Grt	Groote land
ha	Hectares
HDPE	High Density Polyethylene
hp	Horsepower
HVAS	High-Volume Air Sampler
IAP2	International Association for Public Participation
IBRA	Interim Biogeographic Regionalisation for Australia
IEA	International Energy Agency
IECA	International Erosion Control Association

Abbreviation, Acronym or Unit	Definition
ILUA	Indigenous Land Use Agreement
IPA	Indigenous Protection Area
IUCN	International Union for Conservation of Nature
JORC	Joint Ore Reserve Committee
Kfh	Keepers Hut Land System
kg	Kilogram
km	Kilometres
ktpa	Kilo tonnes per annum
kW	KiloWatt
LA	Los Angeles
LAT	Lowest astronomical tide
LDMA	Local Decision-Making Agreements
Lit1	Littoral 1 Land System
LOM	Life of Mine
LWM	Low Water Mark
m	Metre
m ³	Cubic meter
m ³ /hr	Cubic meter per hour
MagL	Manganiferous Laterite
mbgl	metres below ground level
MIA	Mine Infrastructure Area
ML	Megalitres
MLWM	Mean Low Water Mark
ML/yr	Megalitres per year
MMP	Mining Management Plans
MMZ	Main Mineralised Zone
MN	Mangcrete
Mn	Manganese
MNES	Matters of National Environmental Significance
MP	Member of Parliament
MRCP	Mine Rehabilitation and Closure Plan
MSL	Mean Sea Level
Mt	Million Tonnes

Abbreviation, Acronym or Unit	Definition
mtpa	Million Tonnes per Annum
MW	Megawatt
NAF	Non-Acid Forming
NAGD	National Assessment Guidelines for Dredging
NEZ	North East Mineralised Zone
NEPM	Nation Environment Protection Measure
NLC	Northern Land Council
NT	Northern Territory
NT EPA	Northern Territory Environment Protection Authority
NW	North West
OGV	Ocean going vessel
P	Phosphorus
P ₂ O ₅	Phosphorus Pentoxide
PC	Personal Computer
PCS	Process Control System
PID	Proportional-Integral-Derivative
PLT	Point Load Result
ppt	Parts per Thousand
PM	Pisolitic Manganese
PMLU	Post-Mining Land use
PM _{2.5}	Particulate Matter 2.5 micrometres or less
PM ₁₀	Particulate Matter 10 micrometres or less
PSU	Practical Salinity Units
Pty Ltd	Propriety Limited
Que	Queue Land System
RC	Reverse Circulation
RMP	Risk Management Plan
ROM	Run of Mine
RDU	Royalties Development Unit
RORO	Roll-on Roll-off
RUSLE	Revised Universal Soil Loss Equation
Sea Dumping Act	<i>Environmental Protection (Sea Dumping) Act 1981</i>
SEP	Stakeholder Engagement Plan

Abbreviation, Acronym or Unit	Definition
SiO ₂	Silicon Dioxide
SOP	Standard Operating Procedures
SM	Silicious Manganese
SSC	Suspended Sediment Concentration
SSTV	Site-Specific Trigger Values
TEC	Threatened Ecological Communities
t	Tonnes
ToR	Terms of Reference
TPWC Act	<i>Territory Parks and Wildlife Conservation Act 2000</i>
TSF	Tailings storage facility
TSP	Total Suspended Particulates
USGS	United States Geological Survey
WA	Western Australia
WMP	Water Management Plan
WDL	Waste Discharge Licence

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We acknowledge and thank the Anindilyakwa Land Council and the Traditional Owners of Winchelsea Island, for providing permission to access survey areas and collect data for the Winchelsea Island (Akwanburrkba) Manganese Mine Project Environmental Impact Statement and supporting studies.

Section 10 Commonwealth Government Matters

This section has been prepared to address the ToR requirements to appropriately consider potential impacts to Matters of National environmental Significance (MNES) and builds upon the content included in Section 9.3- Terrestrial Ecosystems and Section 9.9- Marine Ecosystems addressing threatened species listed under the *Environment Protection and Biosecurity Conservation Act 1999* (EPBC Act).

10.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act is the Australian Government's central piece of environmental legislation that provides a legal framework to protect and manage nationally and international important flora, fauna, ecological communities and heritage places – defined in the EPBC Act as MNES. Protected matters under the EPBC Act include:

- World heritage properties;
- National heritage properties;
- Wetlands of international importance (RAMSAR wetlands);
- Nationally threatened species and ecological communities;
- Migratory species protected under international agreements;
- Commonwealth marine areas;
- Great Barrier Reef Marine Park;
- Nuclear actions; and
- A water resource in relation to coal seam gas and large coal mining development.

Under the EPBC Act, any action that is likely to have a significant impact on MNES must be:

- Undertaken in accordance with an approval from the Minister for the Environment; or
- Approved through a process accredited by the Minister for the Environment, such as approval through a bilateral agreement with a State or Territory.

Under the EPBC Act and in accordance with the '*Matters of National Environmental Significance, Significant Impact Guidelines 1.1* (Significant Impact Guidelines 1.1)' (DoE, 2013), a proponent who proposes to take an action is only required to refer the matter for consideration under the EPBC Act where the action will or is likely to have a significant impact on MNES. The threshold test of a 'significant impact' is held to mean an impact that is important, notable or of consequence having regard to its context or intensity⁵⁴. Winchelsea Mining referred the action to the Commonwealth Government for consideration under the EPBC Act on 4 April 2021 (reference EPBC 2019/8877). On 23 June 2021 the Department of Climate Change, Energy, the Environment and Water (DCCEEW) determined the Project had potential to cause significant impacts to MNES and deemed it a controlled action requiring assessment and approval under the EPBC Act (refer to Section 10.2 for the controlling provisions). On 20 August 2021, the delegate for the Minister for the

⁵⁴ Booth v Bosworth (2001) 114 FCR 39 "The Flying Fox Case" considering the operation of s43A and s43B of the EPBC Act.

Environment made an Assessment Approach Decision and decided the Project would be assessed by accredited assessment under the EP Act at the level of an EIS.

10.2 Matters of National Environmental Significant

10.2.1 Overview

The following section addresses potential significant impacts of the Project to each of the nine MNES listed under the EPBC Act, as per the *Significant Impact Guidelines 1.1* (DoE, 2013). Table 10.2-1 lists the MNES that have been identified as relevant to the Project. These MNES align with the controlling provisions that were deemed relevant by the DCCEEW:

- Listed threatened species and communities (sections 18 & 18A); and
- Listed migratory species (sections 20 & 20A).

The Commonwealth Government Department of Climate Change, Energy, the Environment and Water (DCCEEW) Protected Matters Search Tool (PMST) identifies MNES that may occur in a given area. The PMST is based on predicted distributions of EPBC listed flora and fauna species and communities and/or their habitat, rather than known records. The PMST may predict the occurrence of a species or community in an area when there are no documented records from the area.

A PMST search was conducted on 22 February 2023 using a 5 km radius of the Project area. This search was supplemented by a search of records of occurrence of listed threatened species using the NT Species Atlas on NR Maps (refer to Appendix L).

Table 10.2-1 Summary of the Potential Impacts of MNES

Matters of National Environmental Significance	Relevant for consideration	Details
World Heritage Properties	X	The Project does not intersect any World Heritage Properties. The closest World Heritage Property is Kakadu, located approximately 370 km east of the Project area.
National Heritage Properties	X	The Project does not intersect any National Heritage Properties. The closest National Heritage Property is Kakadu, located approximately 370 km east of the Project area.
Wetlands of International Importance / Ramsar Wetlands	X	The Project does not intersect any Wetlands of International Importance. The closest Ramsar wetland is Kakadu, located approximately 370 km east of the Project area.
Great Barrier Reef Marine Park	X	Not applicable, the Project area is not located within the Great Barrier Reef Marine Park. The Project area is located approximately 760 km to the closest point of the Great Barrier Reef Marine Park (north-eastern coast of Cape York).
Commonwealth Marine Areas	X	There are no Commonwealth Marine Areas in close proximity to the Project area. The Project area is located approximately 50 km west of the closest Commonwealth Marine Area.
Nuclear Actions (including uranium mining)	X	Not Applicable.
A water resource, in relation to coal seam gas development and large coal mining development	X	Not Applicable.

Matters of National Environmental Significance	Relevant for consideration	Details
Threatened Ecological Communities	X	There are no Threatened Ecological Communities in the Project area and none are considered likely to occur.
Listed Threatened Species	✓	A total of 30 threatened fauna species were identified as having the potential to occur within 5 km of the Project area. Threatened species and communities were listed as a controlling provision for the action.
Listed Migratory Species	✓	The EPBC PMST search identified 46 migratory species as occurring or potentially occurring within 5 km of the Project area. Migratory species were listed as a controlling provision for the action.

PMST search results included threatened species listed under the EPBC Act as either critically endangered, endangered or vulnerable. To determine whether or not an action is likely to have significant impact on the listed species, it is necessary to consider if there is a chance the Project will:

- Adversely affect habitat critical to the survival of a species;
- Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline; or
- Introduce disease that may cause the species to decline.

Critically endangered and endangered species exhibit additional criteria to the standard criteria, including:

- A long-term decrease in the size of a population;
- Reduce the area of occupancy of the species;
- Fragment an existing population into two or more populations;
- Disrupt the breeding cycle of a population;
- Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the species habitat; or
- Interfere with the recovery of the species.

Vulnerable species also exhibit additional criteria to the standard criteria, including:

- Lead to a long-term decrease in the size of an important population of a species;
- Reduce the area of occupancy of an important population;
- Fragment an existing important population into two or more populations;
- Disrupt the breeding cycle of an important population;
- Result in invasive species that are harmful to a vulnerable species becoming established in the species habitat; or
- Interfere substantially with the recovery of the species.

Under the EPBC Act, a population is defined as ‘...an occurrence of the species in a particular area. In relation to critically endangered, endangered or vulnerable threatened species, occurrences include but are not limited to:

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

Under the EPBC Act, an important population is defined as ‘... a population that is necessary for a species’ long term survival and recovery. This may include populations identified as such in recovery plans and/or that are:

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

10.2.2 Desktop and Field Surveys Assessment

10.2.2.1 Desktop Assessment

A desktop assessment was undertaken to determine which listed threatened flora and fauna species, threatened ecological communities and migratory species had the potential to occur within and surrounding the Project area using the EPBC Act PMST. A 10 km buffer was applied to the PMST search to capture potentially occurring species within the vicinity of the Project, this search included the 5 km area utilised in the Terrestrial Ecology Report (Appendix F) and the 10 km for the Conservation Significant Marine Species Report (Appendix DD). There were no threatened flora species or threatened ecological communities identified within the 10 km radius; however, there were 30 threatened fauna species and 47 listed migratory species identified.

Searches of NT Government, Commonwealth Government and other databases were conducted to obtain information on conservation values and threatened species potentially occurring in the Project area and Study area. Fauna and flora species and migratory species known to occur on Winchelsea Island were investigated by reviewing existing reports and datasets. Data searches were conducted prior to commencement of field surveys in 2018 and again prior to the 2022 survey to inform the methodology and target threatened species. This review was repeated in the post field reporting period (February-March 2023).

10.2.2.2 Field Surveys

Field assessments of the Project area and its surrounds were undertaken on multiple occasions between 2018 and 2022. The following subsections outline the flora and fauna methodologies and results.

Terrestrial Flora

Field surveys of the Project area were first conducted in the late dry season/early wet season of 2018 to identify vegetation within the main mineral lease area. All flora assessments were undertaken by an experienced botanist between November 2018 to July 2022 (EMS, 2023a). Survey methods included 115 standard flora quadrats (20 x 20), targeted searches, transect surveys and vegetation mapping across the Project area.

Terrestrial flora surveys were undertaken between 2018 and 2022 to identify the presence of conservation significant flora on Winchelsea Island. The surveys recorded 276 plant species, however none of which are listed as conservation significant (endangered, vulnerable or threatened) under the EPBC Act (EMS, 2023a).

Terrestrial Fauna

Ecological surveys were conducted on Winchelsea Island, commencing in 2018 to provide an assessment on the coastal and saline wetland habitats and determine whether these areas provide suitable habitat for threatened fauna, migratory

shorebirds and wetland bird species. The ecological survey further informed whether the coastal and saline wetland habitats are of significance, as per the Commonwealth Government significant impact criteria (DoE, 2013).

Terrestrial fauna surveys were undertaken using a variety of methods including, diurnal bird surveys, rodent burrow spoil surveys, owl acoustic recording, owl call broadcast and habitat tree assessments, camera trapping, threatened microbat surveys and freshwater surveys. Detailed descriptions of methodology used during the terrestrial ecology surveys is presented in Appendix F.

The terrestrial fauna surveys recorded three conservation significant fauna listed under the EPBC Act, being the Northern Quoll (*Dasyurus hallucatus*) (Endangered), Northern Masked Owl (*Tyto novaehollandiae kimberli*) (Vulnerable) and Ghost Bat (*Macroderma gigas*) (Vulnerable) all of which were either recorded within the Project area or surrounds. Additionally, one terrestrial species, the Northern Blue-tongue Lizard (*Tiliqua scincoides intermedia*) was recorded within the Project area, however this species is currently under assessment for listing as threatened under the EPBC Act (DCCEEW, 2023).

The diurnal bird species detected within the terrestrial Project area are not listed as threatened (endangered or vulnerable) under relevant legislation. Two terrestrial species, the Fork-tailed Swift (*Apus pacificus*) and Arafura Fantail (*Rhipidura dryas*), both listed as migratory under the EPBC Act, were also recorded (refer to Table 10.2-7). Numerous EPBC Act listed migratory and threatened bird and marine turtle species were recorded during the survey period and are further discussed below.

The terrestrial fauna surveys also targeted other conservation significant terrestrial fauna including the Brush-tailed Rabbit-Rat, Northern Hopping-mouse and Northern Brush-tailed Possum; however, these species were not detected. The surveys further targeted the Bare-rumped Sheathtail Bat and Northern Leaf-nosed Bat; however, these species were also not detected.

Marine Turtles

The 2018 ecological survey targeting marine turtles was designed and undertaken in accordance with the NT Government and designed in consultation with the Anindilyakwa Land and Sea Rangers. The Anindilyakwa Land and Sea Rangers assisted with field surveys in 2018.

Targeted surveys were undertaken for six marine turtles based on existing data for nesting sites on Winchelsea Island, these included Hawksbill Turtle (*Eretmochelys imbricata*), Green Turtle (*Chelonia mydas*), Flatback Turtle (*Natator depressus*), Olive Ridley Turtle (*Lepidochelys olivacea*), Leatherback Turtle (*Dermochelys coriacea*) and Loggerhead Turtles (*Caretta caretta*), although Loggerhead Turtles are rarely recorded with no known nesting sites within the Groote Archipelago region. Additional surveys were undertaken in conjunction with other field surveys in July, August and October of 2022 (Appendix FF).

Aerial surveys for marine turtle nesting sites were undertaken on eight occasions during the survey period, covering a total of 374 kilometres (km) in a Robinson R44 or Jet Ranger helicopter, flying at approximately 50 nautical miles per hour (90 km/hour) at an altitude of 150 feet (45 m) above sea level (refer to Table 10.2-2 for survey effort). The entire coastline of Winchelsea Island was surveyed in November 2018 and later repeated during two transects in October and December 2021. Timing of the aerial surveys were in conjunction with a known period when important sites in Groote Eylandt are subject to high volumes of turtle nesting. All observed nesting locations were marked using a GPS and attributed to species where possible.

In addition to aerial surveys, ground-based surveys were undertaken at four principal areas of Winchelsea Island, covering a total of 8 km of coastline, with areas selected based on the known/expected high density of marine turtle nesting. Ground-based surveys of the western coastline of Winchelsea Island were undertaken in October-November 2018, January 2019 and July, August and October in 2022 using an all-terrain vehicle to survey the foreshore and rear dunes. Further opportunistic surveys were undertaken in conjunction with avian surveys surrounding the existing camp area in the south-west of the island (ERM, 2023c). Due to cultural reasons, nesting sites on Mukwenumaja Island could not be surveyed from the ground (Appendix FF).

Migratory Species

Ecology surveys were undertaken between October 2018 and November 2022 to identify the presence of migratory shorebirds and other migratory marine or wetland birds within the Project area and surrounds. The surveys studied the coastal and saline wetland habitats of Winchelsea Island through aerial surveys, ground counts, and habitat assessments. Survey methods for migratory shorebirds and other migratory and wetland bird species on Winchelsea Island are outlined in Appendix EE.

Ground counts were conducted in accessible locations on Winchelsea Island to identify the presence of migratory shorebirds and other migratory marine and wetland birds. Surveys targeted the coastal and wetland habitats on Winchelsea Island as these are considered suitable habitats for the target species, particularly tidal flats, brackish wetlands, mangroves, salt pans, reef flats and rocky shores (EMS, 2023c). Ground counts were assisted by binoculars and spotting scopes. Ground counts were undertaken in 15 minute periods at each habitat during five main survey periods, including:

- November / December 2018;
- April 2019;
- October / November 2021;
- July 2022; and
- August / October 2022.

A total of 46 x 15 minute searches were undertaken during the survey effort, totalling 11.5 survey hours. Incidence (i) was calculated by dividing the number of counts in which a species was observed (c) by the total number of samples (s) ($i = c/s$) (EMS, 2023c) and avian species accumulation curves and confidence intervals were computed using R-Studio 2022.07.2. Aerial surveys were undertaken over nine survey periods in November 2018 and October and December 2021, covering a total of 422.6 km (refer to Table 10.2-2). Aerial survey efforts are further described in Appendix EE.

Table 10.2-2 Aerial Survey Effort

Survey Date	Aerial Transect Kilometres	Season	Shorebird Migration Stage
09/11/2018	37.4	Austral Summer (wet season)	Southern hemisphere
10/11/2018	42.8	Austral Summer (wet season)	Southern hemisphere
26/10/2021	65.6	Austral Summer (wet season)	Southern hemisphere
11/12/2021	50	Austral Summer (wet season)	Southern hemisphere
21/07/2022	77	Austral Winter (dry season)	Northern hemisphere
26/07/2022	23	Austral Winter (dry season)	Northern hemisphere
31/08/2022	38.4	Austral Winter (dry season)	Northern hemisphere
01/10/2022	39.9	Austral Summer (wet season)	Southern hemisphere
15/12/2022	48.5	Austral Summer (wet season)	Southern hemisphere
Total	422.6		

10.2.3 Likelihood of Occurrence Assessment

A likelihood assessment was completed pre- and post-surveys and utilising available species records (Table 10.2-3). Species identified in the PMST searches were categorised into their likelihood to occur within the Project area following field surveys. Species were classified into the following categories:

- Known – Species confirmed during field surveys for the Project and/or from previous field surveys;
- Likely – Habitat suitable for the species was identified during field surveys and/or by previously field surveys of the area, and desktop reviews for the wider region;
- Potentially – Suitable habitat has potential to occur within the area and records of the species occurring within the wider region; and
- Unlikely – No suitable habitat identified or is not known to occur within the wider region.

The classifications in the likelihood of occurrence assessment are further supported by database records and field survey findings.

Table 10.2-3 Likelihood of Occurrence Assessment in the Project Area

Scientific Name	Common Name	Status ⁵⁵		Assessment of Likelihood of Occurrence
		EPBC	NT	
Birds				
<i>Calidris canutus</i>	Red Knot	E, M	E	Unlikely - Regional records on Groote Eylandt but present in low numbers. Could occur occasionally on marine salt pans or tidal flats on Winchelsea Island, habitat not present in the Project area.
<i>Calidris ferruginea</i>	Curllew Sandpiper	CE	V	Unlikely - Regional records on Groote Eylandt but present in low numbers. Know to occasionally occur on marine tidal flats on south-east of Winchelsea Island (EMS 2023a), habitat not present in the Project area.
<i>Erythrotriorchis radiatus</i>	Red Goshawk	V	V	Unlikely - No previous records on Groote Eylandt. Species not detected in extensive avian surveys in the Project area.
<i>Erythrura gouldiae</i>	Gouldian Finch	E	V	Unlikely - Only one historical record on Groote Eylandt dating to the early 1900s. Not detected in extensive avian surveys in the Project area.
<i>Limosa lapponica baueri</i>	Bar-tailed Godwit (baueri)	V	V	Unlikely - Regional records on Groote Eylandt but present in low numbers. Could occur occasionally on marine salt pans or tidal flats on Winchelsea Island, habitat not present in the Project area
<i>Limosa lapponica menzbieri</i>	Northern Siberian Bartailed Godwit	CE	CE	Unlikely - Regional records on Groote Eylandt but present in low numbers. Could occur occasionally on marine salt pans or tidal flats on Winchelsea Island, habitat not present in the Project area.
<i>Numenius madagascariensis</i>	Eastern Curlew	CE, M	CE	Unlikely - Small numbers on saline tidal flats on the western and southern coasts of Winchelsea Island (EMS 2023a). Numbers do not trigger MNES significance levels (DOE 2015c). Habitat not present in the Project area.

⁵⁵ Conservation status under either the Environment Protection and Biodiversity Conservation Act 1999 ('EPBC') or Territory Parks and Wildlife Conservation Act ('NT'): CE = Critically Endangered, E = Endangered, V = Vulnerable, M = Migratory, Ma = Marine, Cet = Cetacean, CD = Conservation Dependent, '-' = not listed

Scientific Name	Common Name	Status ⁵⁵		Assessment of Likelihood of Occurrence
		EPBC	NT	
<i>Charadrius mongolus</i>	Lesser Sand Plover	E	E	Unlikely - Small numbers on saline tidal flats on the western and southern coasts of Winchelsea Island (EMS 2023a). Numbers do not trigger MNES significance levels (DOE 2015c). Habitat not present in the Project area.
<i>Charadrius leschenaultii</i>	Greater Sand Plover	V, M	V	Unlikely - Small numbers on saline tidal flats on the western and southern coasts of Winchelsea Island (EMS 2023a). Numbers do not trigger MNES significance levels (DOE 2015c). Habitat not present in the Project area.
<i>Rostratula australis</i>	Australian Painted Snipe	E	E	Unlikely - No previous records on Groote Eylandt, preferred habitat is not present in the Project area.
<i>Tyto novaehollandiae kimberli</i>	Northern Masked Owl	V	V	Known - Northern Masked Owls forage across most of the Project area. Two potential roost/nest sites identified. One or two pairs occur in the local area.
Terrestrial Mammals				
<i>Dasyurus hallucatus</i>	Northern Quoll	E	CE	Known - Common across the Study area. Based on Heiniger et al., 2021, the direct Project clearance footprint (approximately 530 ha of terrestrial preferred habitat) would impact home range areas approximating 174 Northern Quolls (based on a density estimate of 0.33 quolls/ha).
<i>Trichosurus vulpecula arnhemensis</i>	Northern Brush-tailed Possum	V	E	Unlikely - Extensive camera trapping in the Project area has not detected this species. No records from other islands in the Groote Archipelago other than Groote Eylandt. Status on Groote Eylandt poorly known.
<i>Macroderma gigas</i>	Ghost Bat	V	-	Known - Detected at two locations in sandstone in the north of the island. Individuals observed foraging over escarpment areas. The Project area may represent foraging habitat for this species.
<i>Conilurus penicillatus</i>	Brush-tailed Rabbit-rat	V	E	Unlikely - Extensive camera trapping in the Project area has not detected this species. Habitat areas may not be suitable, particularly in the southern Project area. The nearest records are 8 km to the southeast on Groote Eylandt (based on data from Anindilyakwa Land and Sea Rangers monitoring 2022).
<i>Notomys aquilo</i>	Northern Hopping-mouse	E	V	Unlikely - No historical or recent records on Winchelsea Island or any other island in the Archipelago other than Groote Eylandt. Habitat within the Project area unlikely to be suitable for this species.
<i>Saccolaimus saccolaimus nudicluniatus</i>	Bare-rumped Sheath-tailed Bat	V	-	Unlikely - No previous records on Groote Eylandt, not detected in targeted surveys with specific analysis routines to detect this species (Specialised Zoological, 2023).
<i>Xeromys myoides</i>	Water Mouse	V	-	Unlikely - No previous records on Groote Eylandt, preferred habitat (mangroves and adjacent wetland habitat) is not present in the Project area.
Marine Mammals				
<i>Orcaella heinsohni</i>	Australian Snubfin Dolphin	M, Cet	-	Likely - Occurs in nearshore waters of the Groote Archipelago that overlap with marine Project elements and operations. Snubfin Dolphins have been recorded in the 10 km search area from the Project, with two records in western Bartalumba Bay and two records in North West Bay.
<i>Sousa sahalensis</i>	Australian Humpback Dolphin	M, Cet	-	Known - Occurs in nearshore waters of the Groote Archipelago that overlap with marine Project elements and operations. One record of occurrence in the proposed transshipment portion of the Project area.

Scientific Name	Common Name	Status ⁵⁵		Assessment of Likelihood of Occurrence
		EPBC	NT	
<i>Dugong dugong</i>	Dugong	M, Ma	-	Known - The Dugong is known to occur within the nearshore marine areas of the Project. Dugongs have been sighted within the Project search area, in close proximity to the marine elements and bi-annual aerial surveys for dugongs in the NT Gulf of Carpentaria confirms their presence in the Groote Eylandt area.
<i>Tursiops aduncus</i>	Indo-Pacific Bottlenose Dolphin	Cet	-	Likely - Considered likely for the nearshore waters of the Project elements and operations. They have been recorded close to the Projects marine elements.
<i>Pseudorca crassidens</i>	False Killer Whale	Cet	-	Likely - Considered likely within the marine elements of the Project. There have been multiple sightings within the Project search area and sightings nearby in Darwin.
<i>Balaenoptera musculus breviceauda</i>	Blue Whale	E, M, Cet	-	Unlikely - The Pygmy Blue Whale is considered unlikely to occur within the marine elements of the Project. The unlikely rating is because the Project does not overlap with the species mapped Biologically Important Area (BIA), the region does not represent known habitat for the species and there have been no recorded sightings of Pygmy Blue Whales in the Project search area.
Reptiles				
<i>Acanthophis hawkei</i>	Plains Death Adder	V	V	Unlikely - No previous records on Groote Eylandt, preferred habitat is not present in the Project area.
<i>Caretta caretta</i>	Loggerhead Turtle	E, M	V	Unlikely - Regional records in the Groote Archipelago, preferred beach nesting habitat is not present in the Project area. May occur in offshore marine habitats.
<i>Chelonia mydas</i>	Green Turtle	V, M	-	Unlikely - Regional records in the Groote Archipelago, preferred beach nesting habitat is not present in the Project area. May occur in offshore marine habitats. Nests identified on the northern and north-eastern coast of Winchelsea Island (EMS, 2023b).
<i>Dermochelys coriacea</i>	Leatherback Turtle	E, M	CE	Unlikely - Regional records in the Groote Archipelago, preferred beach nesting habitat is not present in the Project area. May occur in offshore marine habitats.
<i>Eretmochelys imbricata</i>	Hawksbill Turtle	V, M	V	Unlikely - Regional records in the Groote Archipelago, preferred beach nesting habitat is not present in the Project area. May occur in offshore marine habitats. Nests identified on the northern and north-eastern coast of Winchelsea Island (EMS, 2023b).
<i>Lepidochelys olivacea</i>	Olive Ridley Turtle	E, M	V	Unlikely - Regional records in the Groote Archipelago, preferred beach nesting habitat is not present in the Project area. May occur in offshore marine habitats. Possible nests identified on the northern and north-eastern coast of Winchelsea Island (EMS 2023b).
<i>Natator depressus</i>	Flatback Turtle	V, M	-	Unlikely - Regional records in the Groote Archipelago, preferred beach nesting habitat is not present in the Project area. May occur in offshore marine habitats. Nests identified on the northern and north-eastern coast of Winchelsea Island (EMS, 2023b).
<i>Crocodylus porosus</i>	Saltwater Crocodile	M, Ma	-	Known - Saltwater crocodiles have been classified known within the nearshore marine based elements of the Project. Saltwater crocodiles have been sighted within the Project search area and there are known resident crocodiles close to the Project's marine elements (Personal communications with locals).

Scientific Name	Common Name	Status ⁵⁶		Assessment of Likelihood of Occurrence
		EPBC	NT	
Fish				
<i>Carcharodon carcharias</i>	White Shark	V, M	-	Unlikely - Considered unlikely within the Project's marine elements. There have been no confirmed sightings of White Sharks in the NT. Therefore, even with potential habitat for White Sharks present throughout the region, it is unlikely that White Sharks would be present in the Project area.
<i>Glyphis glyphis</i>	Speartooth Shark	CE	V	Unlikely - There are no known populations of Speartooth Sharks surrounding the Project area. The nearest known population are in the Van Deimen Gulf, NT and Port Musgrave, Queensland (QLD). Genetic analysis found that populations greater than 100 km have little exchange indicating little connectivity between populations, and therefore is very unlikely the species would travel through the Project area.
<i>Pristis clavata</i>	Dwarf Sawfish	V, M	V	Unlikely - While there have been no recorded sightings of Dwarf Sawfish in the region, the Project area is close to suitable dwarf sawfish habitat. However, there have been no records of this species close to the Project or within the southern Gulf of Carpentaria
<i>Pristis pristis</i>	Freshwater Sawfish	V, M	V	Unlikely - There have been no confirmed sightings of freshwater sawfish in the Project search area and the surrounding environment. The Project area is not a known nursery area or defined as critical habitat for the species, and it is unlikely that Freshwater Sawfish would be present in the Project area.
<i>Pristis zijsron</i>	Green Sawfish	V, M	V	Likely - While there have been no recorded sightings of Green Sawfish close to the marine elements of the Project, the Project area is close to modelled species distributions and suitable Green Sawfish habitat. Green Sawfish have also been captured in the Gulf of Carpentaria at Groote Eylandt.
<i>Anoxypristis cuspidata</i>	Narrow Sawfish	M	-	Unlikely - Narrow Sawfish are found predominantly in deeper offshore waters, at depths greater than 40 m, and are unlikely to be present at the Project area. There have been no recorded sightings of Narrow Sawfish in the Project area. No BIAs have been identified for Narrow Sawfish around the Project area.
<i>Rhincodon typus</i>	Whale Shark	V, M	-	Possible - One reported sighting within 10 km of the Projects' marine elements, past the 10 m depth contour. Whale Sharks are infrequently sighted throughout the NT and QLD. The Project does not overlap with the species BIA and is not a recognised aggregation for Whale Sharks. Therefore, the species may infrequently be sighted travelling near the Project area.
<i>Sphyrna lewini</i>	Scalloped Hammerhead	CE	-	Possible - There has been infrequent sightings on the Scalloped Hammerhead Shark within the Project search area, however recent work completed by the Marine Biodiversity Hub on Scalloped Hammerhead Sharks identified the species presences around the Project area. The species therefore may from time to time travel through the Project area as they are travelling to adjacent deeper waters for feeding.

⁵⁶ Conservation status under either the Environment Protection and Biodiversity Conservation Act 1999 ('EPBC') or Territory Parks and Wildlife Conservation Act ('NT'): CE = Critically Endangered, E = Endangered, V = Vulnerable, M = Migratory, Ma = Marine, Cet = Cetacean, CD = Conservation Dependent, '-' = not listed

Scientific Name	Common Name	Status ⁵⁶		Assessment of Likelihood of Occurrence
		EPBC	NT	
<i>Mobula alfredi</i>	Reef Manta Ray	M	-	Possible - While there have been no recorded sightings close to the Project's marine elements, the classification is based on the migratory behaviours of Reef Manta Ray and records close to Groote Eylandt. A recent study of their distribution in Australia identified that the species occurs along the coastline of the NT.
<i>Mobula birostris</i>	Giant Manta Ray	M	-	Unlikely - Giant Manta Rays have not been sighted close to Winchelsea Island or Groote Eylandt and sightings usually occur in deeper offshore waters.

10.2.4 Nationally Threatened Species – Significant Impact Assessments

Field assessments of the Project area and its surrounds were undertaken on multiple occasions between 2018 and 2022 to identify the presence of conservation significant flora on Winchelsea Island. The surveys recorded 276 plant species, however none of which are listed as conservation significant under the EPBC Act. Based on the field surveys there are three listed threatened terrestrial species considered relevant to the Project (Appendix F):

- Northern Masked Owl - *Tyto novaehollandiae* Kimberli (Vulnerable);
- Northern Quoll - *Dasyurus hallucatus* (Endangered); and
- Ghost Bat - *Macroderma gigas* (Vulnerable).

For the marine species, a conservation significant marine species assessment was completed for the Project (Appendix DD). Considering those species assessed as having the greatest potential risk from the Project and their significance and likelihood of occurrence, ten listed marine species were considered relevant to the Project and warranting further assessment of potential impact:

- Australian Subfin Dolphin - *Orcella heinsohni* (Migratory);
- Australian Humpback Dolphin - *Sousa sahalensis* (Migratory);
- Indo-Pacific Bottlenose Dolphin - *Sousa chinensis* (Migratory);
- Dugong - *Dugong dugon* (Migratory);
- False Killer Whale - *Pseudorca crassidens* (Cetacean);
- Flatback Turtle - *Natator depressus* (Vulnerable and Migratory);
- Green Turtle - *Chelonia mydas* (Vulnerable and Migratory);
- Hawksbill Turtle - *Eretmochelys imbricata* (Vulnerable and Migratory);
- Saltwater Crocodile - *Crocodylus porosus* (Migratory); and
- Green Sawfish - *Pristis zijsron* (Vulnerable and Migratory).

The following sections provide an assessment against significant impacts guidelines⁵⁷ for each species listed above. The assessment has been completed in accordance with the significant impact guidelines 1.1 (DoE, 2013)

⁵⁷ Department of the Environment (DoE) (2013). Matters of National Environmental Significance, significant impact guidelines 1.1 *Environment Protection and Biodiversity Conservation Act 1999*. Australian Government.

Table 10.2-4 Significant Impact Assessment –Key Terrestrial Mammals

Criterion	Northern Masked Owl - <i>Tyto novaehollandiae</i> Kimberli (Vulnerable)	Northern Quoll - <i>Dasyurus hallucatus</i> (Endangered)	Ghost Bat - <i>Macroderma gigas</i> (Vulnerable)
<p>Lead to a long-term decrease in the size of a population</p>	<p>Possible. The Project will require clearing of between 50% to 100% of one Northern Masked Owl (pair) foraging/range territory. The proposed clearance area is estimated at approximately 11% of the Winchelsea Island land area. The Northern Masked Owl population on Winchelsea could include 4 (pair) territories. The Project could reduce the carrying capacity of the island by disrupting foraging habitat for 1 pair.</p> <p>In that scenario, the Project may cause the loss of one pair of masked owls from Winchelsea Island.</p> <p>The clearance area is centred on habitats that are preferred and occupied by Northern Masked Owls (open woodland and forest). However, Project impacts will be reduced if roost/nest sites can be identified and managed with associated management measures included in the EIS and management plans. There is a risk that altered fire regimes could impact prey density and reduce the availability of roost and nest sites for Northern Masked Owls. In the regional context, Barden et al., (2023) estimated 730 mature Northern Masked Owls on Groote Eylandt with the potential loss of one pair constituting 0.27% of the Groote Eylandt population. This excludes the potential Northern Masked Owl populations on other Groote Archipelago islands.</p>	<p>Possible. The clearance required for the Project will result in the reduction of the local carrying capacity by an estimated 174 Northern Quoll range areas, or 11% of the Winchelsea Island land area. The Northern Quoll are also widespread on Groote Eylandt. The Project may further result in a 10-14% decline of the Northern Quoll population on Winchelsea Island without considering other factors (e.g., roadkill). However, it is noted the Project will be developed over 11 years and progressive rehabilitation of the cleared area will occur during this period. Therefore, the rehabilitated area may provide suitable foraging habitat and the extent of habitat unavailable for use at any one time is likely to be much less than 530 ha.</p> <p>An introduction of cane toads (if any) would pose a significant threat to the entire Winchelsea Island Northern Quoll population. Similarly, any introduction of feral cats to Winchelsea Island will pose risk to the local quolls due to lack of experience with feral meso-predators. There is a risk of increased roadkill due to traffic movements, particularly during night-time or low light conditions. In acknowledgement of these risks the Project has established a dedicated Biodiversity Management Plan with quarantine measures to prevent introduction of invasive species.</p> <p>Changes in fire regimes would impact availability of cover and den sites in woodland and forest habitats, as well as altering prey density. Fire regime management commitments are included in the EIS and the regimes will</p>	<p>Unlikely. Roost habitats are not present in the Project area and these habitats are not proposed to be disturbed by the Project.</p> <p>The Project may potentially lead to a decline in available foraging areas for Ghost Bats; however, bats are likely to disperse to nearby areas for foraging. Furthermore, observations on Groote Eylandt indicate that Ghost Bats continue to forage around lights in urban areas and other infrastructure. The Project is therefore unlikely to lead to a long term decrease in the Ghost Bat population.</p> <p>There is a risk that altered fire regimes could impact prey density for Ghost Bats. Fire regime management commitments are included in the EIS and the regimes will be developed and managed in accordance with the ALC Rangers.</p>

Criterion	Northern Masked Owl - <i>Tyto novaehollandiae</i> Kimberli (Vulnerable)	Northern Quoll - <i>Dasyurus hallucatus</i> (Endangered)	Ghost Bat - <i>Macroderma gigas</i> (Vulnerable)
		be developed and managed in accordance with the ALC Rangers.	
Reduce the area of occupancy of the species	<p>Possible. The Project will require clearing of between 50% and 100% of one Northern Masked Owl (pair) foraging territory, although territory size in the Groote Archipelago is unknown. The loss of 530 ha of preferred habitat could potentially reduce the area of occupancy by one unit area (4 km²) if Northern Masked Owls are completely alienated from this area. It is noted the Project will be developed over 11 years and progressive rehabilitation of the cleared area will occur during this period. Therefore, while the rehabilitated area will not contain suitable nesting qualities for many years it may provide suitable foraging habitat and the extent of habitat unavailable for use at any one time is likely to be much less than 530 ha. Based on rehabilitation experience from GEMCO, near successful rehabilitation typically takes between 10 to 15 years, and post 15 years the primary tree species diversity and standing tree basal area fall into the upper range of successful rehabilitation (GEMCO, 2015). It is also noted that studies of tree hollows in eucalypt forests in tropical northern Australia shows that hollow formation in the eucalypt forests of northern Australia contrast substantially with forest characteristics in temperate Australia (Woinarski & Westaway, 2008). The tropical eucalypt forests typically comprise smaller trees (and total basal area), but hollow formation occurs in trees of smaller size. Despite their less substantial forest structure, the total density of hollow trees, and hollows, is greater in tropical eucalypt forests than is typical of forests in temperate Australia (Woinarski & Westaway, 2008). Therefore, while there may be limited emergence of</p>	<p>Possible. The Project has the potential to reduce the local Northern Quoll population by an estimated 174 range areas. The loss of 530 ha of species preferred habitat may reduce the area of occupancy (AOO) by one unit area (4 km²) if Northern Quolls are alienated from this area. The majority of the remaining 89% of Winchelsea Island excluded from the disturbance envelope is likely to remain as habitat for the species. Furthermore, it is noted the Project will be developed over 11 years and progressive rehabilitation of the cleared area will occur during this period. Therefore, the rehabilitated areas may provide suitable habitat and the extent of habitat unavailable for use at any one time is likely to be much less than 530 ha. Based on observations on Groote Eylandt, it is expected that Northern Quolls will continue to move into and around Project areas and re-occupy rehabilitated areas.</p>	<p>Unlikely. The Project will remove limited amount of foraging habitat for Ghost Bats (530 hectares). Based on current understanding of the distribution of Ghost bat habitats and roost sites, the AOO will not be reduced by the Project.</p>

Criterion	Northern Masked Owl - <i>Tyto novaehollandiae</i> Kimberli (Vulnerable)	Northern Quoll - <i>Dasyurus hallucatus</i> (Endangered)	Ghost Bat - <i>Macroderma gigas</i> (Vulnerable)
	<p>hollows by the 15-year completion period, Woinarski & Westaway (2008) indicate this may be up to 30 years post-disturbance.</p>		
<p>Fragment an existing population into two or more populations</p>	<p>Unlikely. The Project requires the clearance of separate components of the existing Northern Masked Owl range area, including several mining blocks in the south and north of the Project area. These areas will be surrounded by intact vegetation.</p> <p>The Winchelsea Island Northern Masked Owls are unlikely to be genetically isolated from the Groote Eylandt population. The Project is unlikely to alter the ability of Northern Masked Owls to disperse between Winchelsea Island and Groote Eylandt.</p>	<p>Unlikely. The Project requires the clearance of separate components of the existing Northern Quoll range area, including several mining blocks in the south and north of the Project area. These areas will be surrounded by intact vegetation. Remnant quoll populations are unlikely to become genetically isolated. Based on observations on Groote Eylandt, it is expected that Northern Quolls will continue to move into and around Project areas.</p>	<p>Unlikely. The Project requires development of separate component areas across a large study area. The design will not fragment local Ghost Bat populations.</p>
<p>Adversely affect habitat critical to the survival of a species</p>	<p>Unlikely. It is expected that the local Northern Masked Owl pair will continue to forage and nest in the local area as the Project progresses if critical nest/roost sites are maintained.</p> <p>Further, the potential loss of one pair of Northern Masked Owl does not pose a significant genetic risk to the Groote Eylandt masked owl population.</p>	<p>Unlikely. Critical habitat for Northern Quolls has not been identified within the Project clearance footprint. Northern Quoll will continue to forage in the local area as the Project progresses.</p> <p>The Winchelsea Island Northern Quolls are already genetically isolated from the Groote Eylandt population. The loss of approximately 11% of the habitat area for Northern Quolls on Winchelsea Island is unlikely to result in the loss of the population on the island, particularly if quarantine is maintained.</p>	<p>Unlikely. There are no identified critical habitats for Ghost Bats within the Project area footprint.</p> <p>The current Project does not pose a risk to the long-term survival and genetic diversity of the local Ghost bat population.</p>
<p>Disrupt the breeding cycle of a population</p>	<p>Unlikely. Nesting locations have not been identified within the Project area. Further research would be necessary to ensure that the breeding cycle of the Winchelsea Island Northern Masked Owls is not disrupted by the Project. However, any disruption is likely to a single pair, not a population.</p>	<p>Unlikely. It is unlikely that the Project will significantly disrupt local Northern Quoll breeding cycles.</p>	<p>Unlikely. Ghost Bat maternity sites have not been detected within the Project area.</p>

Criterion	Northern Masked Owl - <i>Tyto novaehollandiae</i> Kimberli (Vulnerable)	Northern Quoll - <i>Dasyurus hallucatus</i> (Endangered)	Ghost Bat - <i>Macroderma gigas</i> (Vulnerable)
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	<p>Possible. The Project will result in the clearing of approximately 50-100% of one Northern Masked Owl foraging/range territory. This may result in a small decline in the Northern Masked Owl populations on Winchelsea Island (reduced area of habitat on the island equivalent to the loss of 11% of the land area of the island). This may potentially reduce the carrying capacity of Winchelsea Island by one pair. The Project will be developed over 11 years and progressive rehabilitation of the cleared area will occur during this period. As such, this habitat loss would be mitigated as areas are rehabilitated following mining. The potential loss of one pair constitutes 0.27% of the Groote Eylandt population. This excludes the potential Northern Masked Owl populations on other Groote Archipelago islands.</p>	<p>Possible. The Project requires the clearance of separate components of up to 530 ha (~174 Northern Quoll range areas).</p> <p>The Project will result in a decline in the local Northern Quoll population commensurate with the area cleared (10-14% of the island population). However, it is noted the Project will be developed over 11 years and progressive rehabilitation of the cleared area will occur during this period. Therefore, the rehabilitated areas may provide suitable habitat and the extent of habitat unavailable for use at any one time is likely to be much less than 530 ha. Based on observations on Groote Eylandt, it is expected that Northern Quolls will continue to move into and around Project areas and re-occupy rehabilitated areas.</p>	<p>Unlikely. The Project will require clearing of approximately 530 ha of potential Ghost Bat foraging habitat. This is unlikely to cause a decline of the local Ghost Bat population.</p>
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	<p>Unlikely. There are currently no known threats regarding invasive species to the Northern Masked Owl in the Project area. Feral cats may occasionally predate Northern Masked Owls whilst they are feeding on the ground, although the species appears to be absent from Winchelsea Island.</p> <p>Invasive weeds such as Gamba Grass can impact Northern Masked Owl nesting trees and roost sites if fire regimes are significantly altered. The Project has a dedicated Biosecurity Management Plan with quarantine measures to prevent introduction of invasive species.</p>	<p>Unlikely. The Project has a dedicated Biosecurity Management Plan with quarantine measures to prevent introduction of invasive species. This plan covers Cane Toads, a major risk factor for Northern Quolls in the Groote Archipelago.</p> <p>The potential introduction of grass species that promote hot fires could increase risks to Northern Quoll populations from altered fire regimes. Fire regime management commitments are included in the EIS and the regimes will be developed and managed in consultation with the ALC Rangers.</p>	<p>Unlikely. There are currently no invasive species that pose a significant threat to Ghost Bats in the Project area.</p> <p>The Project has a dedicated Biosecurity Management Plan with quarantine measures to prevent introduction of invasive species.</p> <p>The potential introduction of grass species that promote hot fires could increase risks to Ghost Bat populations from altered fire regimes, potentially impacting foraging areas and prey availability. Fire regime management commitments are included in the EIS and the regimes will be developed and managed in accordance with the ALC Rangers</p>
Introduce disease that may cause the	<p>Unlikely. The Project is unlikely to introduce disease that might cause the species to decline. The quarantine</p>	<p>Unlikely. The Project is unlikely to introduce disease that might cause the species to decline. The quarantine</p>	<p>Unlikely. The Project is unlikely to introduce disease that might cause the species to decline. The quarantine</p>

Criterion	Northern Masked Owl - <i>Tyto novaehollandiae</i> Kimberli (Vulnerable)	Northern Quoll - <i>Dasyurus hallucatus</i> (Endangered)	Ghost Bat - <i>Macroderma gigas</i> (Vulnerable)
species to decline	protocols for the Project are designed to minimise associated risks.	protocols for the Project are designed to minimise associated risks.	protocols for the Project are designed to minimise associated risks.
Interfere with the recovery of the species	Unlikely. The Project will occur within the range areas of 1 or 2 Northern Masked Owl pairs. The surrounding area is within the Anindilyakwa Indigenous Protected Area, which is managed for the protection of biological resources and threatened species.	Unlikely. There are no overarching threats for Northern Quolls on Groote Eylandt other than the risk of introduction of Cane Toads to the islands and fire management.	Unlikely. The Project does not require disturbance at Ghost Bat roost sites. The surrounding area is within the Anindilyakwa IPA, which is managed for the protection of threatened species. The low number of bats detected on Winchelsea Island suggests that the Project will not interfere with the recovery of the species.

Table 10.2-5 Significant Impact Assessment – Marine Mammals

Criterion	Australian Humpback Dolphin - <i>Sousa sahulensis</i> (Migratory)	Australian Snubfin Dolphin - <i>Orcaella heinsohni</i> (Migratory)	Indo-Pacific Bottlenose Dolphin - <i>Tursiops aduncus</i> (Migratory)	Dugong - <i>Dugong dugon</i> (Migratory)	False Killer Whale - <i>Pseudorca crassidens</i> (Cetacean)
Lead to a long-term decrease in the size of a population	Unlikely. The Australian Humpback Dolphin has been recorded within offshore transshipment portion of the Project area and within Winchelsea Passage, separating Winchelsea Island and Groote Eylandt. Therefore, they are considered to have a high likelihood of occurrence. There are currently no known BIAs occurring within the Gulf of Carpentaria. However, Bartalumba Bay exhibits suitable habitat for the species. While the marine portions of the Project area (198 ha) could constitute habitat for Australian Humpback	Unlikely. The Australian Snubfin Dolphin has been recorded in the western part of Bartalumba Bay and has a high likelihood to occur within or within close proximity of Project area. Bartalumba Bay exhibits suitable habitat for the species. While the marine portions of the Project area (198 ha) could constitute habitat for Australian Snubfin Dolphins, it is likely species will be present within the Project marine elements from time to time but are not restricted to this area. Snubfin Dolphins are a mobile species not restricted to the Project area and will likely be	Unlikely. Indo-Pacific Bottlenose Dolphin have been recorded close to the Project area and have a high likelihood to occur in the waters surrounding Winchelsea Island. Due to local estimations, species is considered to be common in Australian waters, however total population estimations do not exist. Indo-Pacific Bottlenose Dolphins tend to occupy shallower waters up to 50 m deep (Palmer et al., 2014). While the marine portions of the Project area (198 ha) could constitute habitat for the species, it is likely that Indo-pacific Bottlenose Dolphin will be	Unlikely. The largest populations of Dugong found in the NT is in the Southern Gulf of Carpentaria, which is inclusive of Bartalumba Bay. The estimated population size of Dugong in the Gulf of Carpentaria is between 3,390 to 4,586. Dugongs have been recorded within 10 km of the Project area, mostly to the northeast and southeast of Winchelsea Island with several recordings in Milner Bay near Alyangula and one within close proximity of the proposed wharf and BLF. Suitable habitat is present with limited seagrass beds to the south of the wharf.	Unlikely. The False Killer Whale is highly likely to occur within the proximity of the Project and have been sighted multiple times within the Project 10 km search area. However, the species is not restricted to the area surrounding Winchelsea Island. The species is highly mobile. While the marine portions of the Project area (198 ha) could constitute habitat for the species, it is likely that False Killer Whale will be present within the Project marine elements from time to time but are not restricted to this area. Furthermore, with the exception of the minor physical

Criterion	Australian Humpback Dolphin – <i>Sousa sahalensis</i> (Migratory)	Australian Snubfin Dolphin – <i>Orcaella heinsohni</i> (Migratory)	Indo-Pacific Bottlenose Dolphin – <i>Tursiops aduncus</i> (Migratory)	Dugong – <i>Dugong dugon</i> (Migratory)	False Killer Whale – <i>Pseudorca crassidens</i> (Cetacean)
	<p>Dolphins, it is likely that Australian Humpback Dolphins will be present within the Project marine elements from time to time but are not restricted to this area. Furthermore, with the exception of the minor physical wharf infrastructure, Project activities and disturbance will be intermittent and are highly unlikely to lead to long-term decrease in the size of a population.</p>	<p>present transiting and foraging through the Project marine elements. Furthermore, with the exception of the minor physical wharf infrastructure, Project activities and disturbance will be intermittent and are highly unlikely to lead to long-term decrease in the size of a population.</p>	<p>present within the Project marine elements from time to time but are not restricted to this area. Furthermore, with the exception of the minor physical wharf infrastructure, Project activities and disturbance will be intermittent and are highly unlikely to lead to long-term decrease in the size of a population.</p>	<p>Dugongs area likely to be present, but not restricted to the Project area. Benthic video footage identified three species of seagrass, those being <i>Cymodocea serrulata</i>, <i>Enhalus acoroides</i> and <i>Halophila ovalis</i>.</p> <p>The cumulative benthic loss assessment identified benthic communities in Bartalumba Bay with seagrass totalling 436.74 ha and a predicted irreversible loss to these areas of 5.22 ha (1.2%) from the Project. Such an impact is unlikely to result in the long-term decrease of the Dugong population surrounding Groote Eylandt.</p> <p>In consideration of the observed density of seagrass, and anticipated impact area of the proposed wharf and BLF, the resultant loss of seagrass meadow would have little measurable impact to the greater seagrass community surrounding Winchelsea Island and the Groote Archipelago.</p>	<p>wharf infrastructure, Project activities and disturbance will be intermittent and are highly unlikely to lead to long-term decrease in the size of a population.</p>

Criterion	Australian Humpback Dolphin – <i>Sousa sahalensis</i> (Migratory)	Australian Snubfin Dolphin – <i>Orcaella heinsohni</i> (Migratory)	Indo-Pacific Bottlenose Dolphin – <i>Tursiops aduncus</i> (Migratory)	Dugong – <i>Dugong dugon</i> (Migratory)	False Killer Whale – <i>Pseudorca crassidens</i> (Cetacean)
Reduce the area of occupancy of the species	Unlikely. There is a high likelihood that Australian Humpback Dolphins will be present within the Project area from time to time, however the species is not restricted to this area. The species is predicted to continue to utilise Bartalumba Bay during Project operation. This is support by multiple records of the species occurring around the active GEMCO port at Milner Bay.	Unlikely. The species is not restricted to this area. While little is known on the migratory patterns and seasonal movements of this species throughout the NT, it is not restricted to Bartalumba Bay. The species may continue to utilise Bartalumba Bay during Project operation and the activities is unlikely to reduce the area of occupancy for the species.	Unlikely. In Australia the Indo-Pacific Bottlenose Dolphin mostly occupies shallow inshore regions with typically less than 50 m depth. This makes them more profound to be negatively affected by anthropogenic actions. However, they have widespread occurrence in coastal areas around oceanic islands, and they tend to forage across a wider range of habitats. Furthermore, Indo-Pacific Bottlenose Dolphins are considered to prefer deeper waters close to sloping bathymetry (Hanf et al., 2017; Hanf et al., 2022). Finer scale studies support this, with significant differences in habitat use and fine-scale habitat selection (e.g., Hunt et al., 2017). While the species may continue to utilise Bartalumba Bay during Project operation and the activities is unlikely to reduce the area of occupancy for the species.	Unlikely. The cumulative benthic loss assessment identified benthic communities in Bartalumba Bay with seagrass totalling 436.74 ha and a predicted irreversible loss to these areas of 5.22 ha (1.2%) from the Project. As such, Bartalumba Bay will retain suitable habitat for Dugong and the Project is unlikely to reduce the area of occupancy. Marine vessel strikes remain a risk; however, marine mammal risk reduction protocols and procedures have been included in the EIS and associated Dredge Management Plan. As per existing observations, Dugong still utilise the area in and around the GEMCO port at Milner Bay and ongoing occupancy of the area surrounding the marine infrastructure at Winchelsea Island is also predicted.	Unlikely. There is a high likelihood species will be present within the Project area from time to time, however the species is not restricted to this area. The species is predicted to continue to utilise Bartalumba Bay during Project operation. This is support by records of the species occurring around the active GEMCO port at Milner Bay.
Fragment an existing population into	Unlikely. There is little genetic flow between different population of Australian	Unlikely. Australian Snubfin Dolphin are a mobile species and are not restricted to this area. The	Unlikely – Knowledge of the seasonal movements, migrations and breeding seasonality of these	Unlikely. Within the broader area of Bartalumba Bay and Groote Eylandt, only a small percentage	Unlikely. Research suggest that the species population could be demographically isolated in the

Criterion	Australian Humpback Dolphin – <i>Sousa sahalensis</i> (Migratory)	Australian Snubfin Dolphin – <i>Orcaella heinsohni</i> (Migratory)	Indo-Pacific Bottlenose Dolphin – <i>Tursiops aduncus</i> (Migratory)	Dugong – <i>Dugong dugon</i> (Migratory)	False Killer Whale – <i>Pseudorca crassidens</i> (Cetacean)
two or more populations	Humpback Dolphins, which makes the species more vulnerable to disturbances through coastal modifications like dredging, construction and increased shipping (Brown et al., 2017). However, the area has no known aggregation points for Australian Humpback Dolphins. Bartalumba Bay is likely to infrequently utilised by a subpopulation and disturbance within the bay would not fragment the existing subpopulation.	species is vulnerable to disturbances through coastal modifications like dredging, construction and increased shipping (Brown et al., 2017). Blue Mud Bay and Limmen Bight which are 50 km north and 150 km south from Winchelsea Island respectively, are consistent hotspots for Australian Snubfin Dolphins. In the NT, most records of Australian Snubfin Dolphins are from estuaries, tidal rivers and coastal areas within 20 km of river mouths. In the Gulf of Carpentaria, Australian Snubfin Dolphins occur up to 20 km offshore. Bartalumba Bay is likely to be infrequently utilised by a subpopulation and disturbance within the bay would not fragment the existing subpopulation.	inshore dolphin species is lacking for the North Marine Region, however a study in the Darwin region found that Bottlenose Dolphins (<i>Tursiops sp.</i>) appeared to move freely among Shoal Bay, Darwin Harbour and Bynoe Harbour, an area of over 1,000 km ² , with as many as 40 identified individuals being sighted in different sites at different times (Brooks et al., 2017). Bartalumba Bay is likely to be infrequently utilised by the species and disturbance within the bay would not fragment the existing population.	of seagrass exists within the Project disturbance envelope and the modelled Zone of High Impact (ZoHI) for dredging (area of irreversible loss). Within Bartalumba Bay this extent is 1.2%, while estimates from the CSIRO (2015) and the Institute for Marine and Antarctic Studies (IMAS) (2005) place the lower and upper extents of seagrass occurrence surrounding Groote Eylandt at 27,000 ha and 56,500 ha respectively. In a regional context, the Project equates to a predicted loss of between 0.019% and 0.009% of seagrass habitat. The disturbance area is also at the northern extent of seagrass distribution on the western coast of Winchelsea Island. The limited extent of the physical wharf component and continued occupancy of Dugong at the Milner Bay Port, indicate the Project is highly unlikely to fragment an existing population.	NT. However, Bartalumba Bay is likely to infrequently utilised and the limited proposed disturbance within the bay would not fragment the existing subpopulation, although it may temporarily discourage use in the eastern portion of the bay during certain activities related to construction and dredging.
Adversely affect habitat critical to the survival of a species	Unlikely. No known BIA exists within Project area, nor within the Southern Gulf of Carpentaria. While Bartalumba Bay may be	Unlikely. While Bartalumba Bay may be infrequently utilised by Australian Snubfin Dolphins it does not constitute habitat that is	Unlikely. While Bartalumba Bay may be infrequently utilised by Indo-pacific Bottlenose Dolphins it does not constitute habitat that	Unlikely. The proportion of seagrass impacted by the Project is minor considering local and regional occurrence and is not	Unlikely. False Killer Whales prefer deep, offshore waters and sometimes deep coastal waters (Culik, 2005), with studies in the

Criterion	Australian Humpback Dolphin – <i>Sousa sahalensis</i> (Migratory)	Australian Snubfin Dolphin – <i>Orcaella heinsohni</i> (Migratory)	Indo-Pacific Bottlenose Dolphin – <i>Tursiops aduncus</i> (Migratory)	Dugong – <i>Dugong dugon</i> (Migratory)	False Killer Whale – <i>Pseudorca crassidens</i> (Cetacean)
	suitable for the species foraging, the area is unlikely to contain habitat critical to the survival of the species, particularly given the species transient and wide-ranging movement patterns.	critical to the survival of the species. In the NT, most records of Australian Snubfin Dolphins are from estuaries, tidal rivers and coastal areas within 20 km of river mouths. Furthermore, the Project’s irreversible impact on productive habitat constitutes only 0.2% of the habitat in Bartalumba Bay and a fraction of this amount when considering the regional habitat in the Groote Archipelago (O2 Marine, 2022).	is critical to the survival of the species, nor will the habitat within Bartalumba Bay be significantly impacted to the extend it is unsuitable to the species.	likely to be habitat critical to the survival of the species.	NT showing the species regularly spending time in both pelagic and coastal environment (Palmer et al., 2017). While there have been multiple records surrounding Winchelsea Island this is not considered habitat critical to the survival of the species.
Disrupt the breeding cycle of a population	Unlikely. There is a lack of knowledge regarding Australian Humpback Dolphins breeding seasonality. Nevertheless, the portion of marine area proposed to be temporarily disturbed is a small fraction of the suitable habitat in the Groote Archipelago and therefore disruption to the breeding cycle is highly unlikely.	Unlikely. There is a lack of knowledge of seasonal breeding patterns in the NT. Calves around Cleveland Bay QLD are seen all year round, indicating that the Australian Snubfin Dolphin may not have particular breeding periods (Parra, 2006). The portion of marine area proposed to be temporarily disturbed is a small fraction of the suitable habitat in the Groote Archipelago and therefore disruption to the breeding cycle is highly unlikely.	Unlikely. Calving peaks occur in spring and summer or spring and autumn. The portion of marine area proposed to be temporarily disturbed is a small fraction of the suitable habitat in the Groote Archipelago and therefore disruption to the breeding cycle is highly unlikely.	Unlikely. The loss of seagrass habitat is considered so minor, dredging short-lived and physical disturbance limited that disruption to the breeding cycle is unlikely, particularly considering the mobile nature of the species.	Unlikely. There are no known seasonal pattern and calving areas in Australian waters (Baker, 1990; Bannister et al., 1996; Purves & Pilleri 1978; Stacey et al., 1991). The portion of marine area proposed to be temporarily disturbed is a small fraction of the suitable habitat in the Groote Archipelago and therefore disruption to the breeding cycle is highly unlikely.
Modify, destroy, remove, isolate or decrease the availability or	Unlikely. Direct and indirect disturbance from marine activities has been assessed to result in 141.75 ha (cumulative	Unlikely. Direct and indirect disturbance from marine activities has been assessed to result in 141.75 ha (cumulative	Unlikely. Indo-Pacific Bottlenose Dolphins can be negatively impacted by habitat destruction and degradation (Ross, 2006),	Unlikely. Dugongs can be negatively affected by habitat degradation including coastal development and port expansion.	Unlikely. Residue of mercury and hydrocarbon including DDE have been detected in tissues of False Killer Whales (Stacey & Baird

Criterion	Australian Humpback Dolphin – <i>Sousa sahalensis</i> (Migratory)	Australian Snubfin Dolphin – <i>Orcaella heinsohni</i> (Migratory)	Indo-Pacific Bottlenose Dolphin – <i>Tursiops aduncus</i> (Migratory)	Dugong – <i>Dugong dugon</i> (Migratory)	False Killer Whale – <i>Pseudorca crassidens</i> (Cetacean)
<p>quality of habitat to the extent that the species is likely to decline</p>	<p>loss), with 15.82 ha classified as moderate to high sensitivity/productivity marine habitat (e.g., seagrasses and corals) and the remaining 125.93 ha consisting of low sensitivity/productivity bare substrates consisting of bioturbated silt and sand/shell hash. The loss of 15.82 ha of high productive habitat constitutes only 0.2% of the habitat in Bartalumba Bay and a fraction of this amount when considering the regional habitat in the Groote Archipelago (O2 Marine, 2022). As such, it is highly unlikely the Project would result in any adverse impact to the species, let alone a species decline.</p>	<p>loss), with 15.82 ha classified as moderate to high sensitivity/productivity marine habitat (e.g., seagrasses and corals) and the remaining 125.93 ha consisting of low sensitivity/productivity bare substrates consisting of bioturbated silt and sand/shell hash. The loss of 15.82 ha of high productive habitat constitutes only 0.2% of the habitat in Bartalumba Bay and a fraction of this amount when considering the regional habitat in the Groote Archipelago (O2 Marine, 2022). As such, it is highly unlikely the Project would result in any adverse impact to the species, let alone a species decline.</p>	<p>water pollution and noise disturbance (Braulik et al., 2019). Repeated and cumulative stressors have the potential to disrupt and displace individuals (Bejder et al., 2006; Smith et al., 2016). A range of control and management measures associated with these aspects are included in the Project commitments to limit the potential for impacts to species such as the Indo-pacific Bottlenose Dolphin, should it be present in the area during construction and operation. Direct and indirect disturbance from marine activities has been assessed to result in 141.75 ha (cumulative loss), with 15.82 ha classified as moderate to high sensitivity/productivity marine habitat (e.g., seagrasses and corals) and the remaining 125.93 ha consisting of low sensitivity/productivity bare substrates consisting of bioturbated silt and sand/shell hash. The loss of 15.82 ha of high productive habitat constitutes only 0.2% of the habitat in Bartalumba Bay and a fraction of</p>	<p>This usually leads to direct seagrass loss which leads to reduced food resources which then potentially causes delayed reproduction or starvation. Furthermore, pollution, vessel strike and noise can also have negative effects on the species. Those stressors can cause disturbances, stress, or disrupt behaviour (Marsh et al., 2008). Within Bartalumba Bay this extent of lost habitat is predicted to be 1.2%, while estimates from the CSIRO (2015) and IMAS (2005) indicate an upper and lower extent of potential loss in the regional setting of between 0.019% and 0.009%. The disturbance area is also at the northern extent of seagrass distribution on the western coast of Winchelsea Island. The limited extent of the physical wharf component and continued occupancy of dugongs at the Milner Bay Port, indicate the species is unlikely to decline as a sole result of the Project.</p>	<p>1991). Exposure to pollution such as plastic debris, oil spills and dumping of industrial wastes into waterways and the sea could lead to bio-accumulation of toxic substances in body tissues, which moreover could lead to immunosuppression and increased mortalities of species (Bannister et al., 1996). Given the proposed Project operations, limited use of chemicals (e.g., no chemicals used for processing) and management commitments the Project is unlikely to produce impacts that that would result in species decline. The portion of marine area proposed to be temporarily disturbed is a small fraction of the suitable habitat in the Groote Archipelago.</p>

Criterion	Australian Humpback Dolphin – <i>Sousa sahalensis</i> (Migratory)	Australian Snubfin Dolphin – <i>Orcaella heinsohni</i> (Migratory)	Indo-Pacific Bottlenose Dolphin – <i>Tursiops aduncus</i> (Migratory)	Dugong – <i>Dugong dugon</i> (Migratory)	False Killer Whale – <i>Pseudorca crassidens</i> (Cetacean)
			this amount when considering the regional habitat in the Groote Archipelago (O2 Marine, 2022). As such, it is highly unlikely the Project would result in any adverse impact to the species, let alone a species decline.		
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species’ habitat	Unlikely. The species is listed as Migratory only. There are no known marine invasive species that directly affect the species. Nevertheless, management measures will be implemented regarding hygiene controls and biosecurity measures to reduce the possibility of introducing marine invasive species to the waters surrounding Winchelsea Island.	Unlikely. The species is listed as Migratory only. There are no known marine invasive species that directly affect the species. Nevertheless, management measures will be implemented regarding hygiene controls and biosecurity measures to reduce the possibility of introducing marine invasive species to the waters surrounding Winchelsea Island.	Unlikely. The species is listed as Migratory only. There are no known marine invasive species that directly affect the species. Nevertheless, management measures will be implemented regarding hygiene controls and biosecurity measures to reduce the possibility of introducing marine invasive species to the waters surrounding Winchelsea Island.	Unlikely. Invasive species are not identified as a key threat to Dugongs. There are no known marine invasive species that directly affect the species. Nevertheless, management measures will be implemented regarding hygiene controls and biosecurity measures to reduce the possibility of introducing marine invasive species to the waters surrounding Winchelsea Island.	Unlikely. Management measures will be implemented regarding hygiene controls and biosecurity measures to reduce the possibility of introducing invasive species to Winchelsea Island.
Introduce disease that may cause the species to decline	Unlikely. Introduction of disease is not identified as a specific risk for the species. The Project is unlikely to introduce diseases that might cause the species to decline. The quarantine protocols for the Project are designed to minimise associated risks.	Unlikely. Introduction of pathogens is identified as a risk to the species (namely, <i>Toxoplasmosis gondii</i>). The Project is unlikely to introduce diseases that might cause the species to decline. The quarantine protocols for the Project are designed to minimise associated risks.	Unlikely. Introduction of disease is not identified as a specific risk for the species. The Project is unlikely to introduce diseases that might cause the species to decline. The quarantine protocols for the Project are designed to minimise associated risks.	Unlikely. Introduction of disease is not identified as a specific risk for the species. The Project is unlikely to introduce diseases that might cause the species to decline. The quarantine protocols for the Project are designed to minimise associated risks.	Unlikely. <i>Edwardsiella tarda</i> can cause sepsis which further can lead to death in captive marine mammals. However, the evidence of negative effects of <i>E. tarda</i> in wild marine mammals remains poorly understood due to the limitations of postmortem analyses (Dunn et al., 2001)

Criterion	Australian Humpback Dolphin – <i>Sousa sahalensis</i> (Migratory)	Australian Snubfin Dolphin – <i>Oracaella heinsohni</i> (Migratory)	Indo-Pacific Bottlenose Dolphin – <i>Tursiops aduncus</i> (Migratory)	Dugong – <i>Dugong dugon</i> (Migratory)	False Killer Whale – <i>Pseudorca crassidens</i> (Cetacean)
					The Project is unlikely to introduce disease that might cause the species to decline. The quarantine protocols for the Project are designed to minimise associated risks.
Interfere with the recovery of the species	Unlikely. The Project area is not within a BIA for the species. The scale or the Project and limited marine disturbance is unlikely to interfere with the recovery of the species.	Unlikely. The Project area is not within a BIA for the species. The scale or the Project and limited marine disturbance is unlikely to interfere with the recovery of the species.	Unlikely. The scale or the Project and limited marine disturbance is unlikely to interfere with the recovery of the species.	Unlikely. The scale or the Project and limited marine disturbance is unlikely to interfere with the recovery of the species.	Unlikely. Reproduction of the False Killer Whale are barely studied, but females are estimated to calve every 7 years (Palmer et al., 2009). Therefore species recovery is most likely a slow process. The scale or the Project and limited marine disturbance is unlikely to interfere with the recovery of the species.

Table 10.2-6 Significant Impact Assessment – Marine Reptiles and Fish

Criterion	Flatback Turtle – <i>Natator depressus</i> (Vulnerable and Migratory)	Green Turtle – <i>Chelonia mudas</i> (Migratory)	Hawksbill Turtle – <i>Eretmochelys imbricata</i> (Vulnerable and Migratory)	Saltwater Crocodile – <i>Crocodylus porosus</i> (Migratory)	Green Sawfish – <i>Pristis zijsron</i> (Vulnerable and Migratory)
Lead to a long-term decrease in the size of a population	Unlikely. Flatback Turtles are the most widely spread nesting marine turtle species in the NT, nesting on a wide variety of beach types around the entire coastline. Flatback Turtles surrounding Winchelsea Island are a part of the Arafura Sea	Unlikely. The Green Turtle is found in tropical and subtropical waters globally, including Australia; and is one of Australia’s most common marine turtles. Within the southern Great Barrier Reef, population numbers are estimated at 8,000 for the	Unlikely. The Hawksbill Turtle within the Winchelsea Island region is part of the north-east Arnhem Land genetic stock, a stock with approximately 200 to 600 nesting females recorded from 2009 – 2010, however there has been no long-term	Unlikely. Saltwater Crocodile have been sighted within the 10 km search area from Winchelsea Island, including a record to the east in North West Bay and a record to the west of	Unlikely. While there have been no recorded observations of Green sawfish in the Project area, or within the 10 km search area, there is a high likelihood of the species occurring within proximity of Project areas.

Criterion	Flatback Turtle – <i>Natator depressus</i> (Vulnerable and Migratory)	Green Turtle – <i>Chelonia mudas</i> (Migratory)	Hawksbill Turtle – <i>Eretmochelys imbricata</i> (Vulnerable and Migratory)	Saltwater Crocodile – <i>Crocodylus porosus</i> (Migratory)	Green Sawfish – <i>Pristis zijsron</i> (Vulnerable and Migratory)
	<p>genetic stock, which is considered the largest genetic stock within Australia. The Flatback Turtles is one of only two marine turtles without a global distribution, occurring only in the tropical waters of northern Australia, Papua New Guinea and Irian Jaya.</p> <p>During marine turtle surveys, Flatback Turtle nests were observed on the western beaches of Winchelsea Island, with the nearest being located approximately 4 km north of the wharf. However, very few older nests were identified in this area and the key nesting areas were determined to be on the north of the Island. The Project will not directly disturb any nesting areas, lighting would not be directly visible at the key northern nesting beaches and various management measures to prevent impacts to the species have been included in the EIS.</p> <p>Bartalumba Bay exhibits suitable foraging habitat for the species. While the marine portions of the Project area (198 ha) could</p>	<p>species. Within the NT, the Green Turtle occurs in numerous conservation reserves including Casuarina Coastal Reserve, Garig Gunak Barlu National Park and Nanydjaka Indigenous Protected Area. The Green Turtles within the Winchelsea Island region are part of the Gulf of Carpentaria genetic stock.</p> <p>All Green Turtle nests on Winchelsea Island were identified on the northern beaches. The Project will not directly disturb any nesting areas, lighting would not be directly visible at the key northern nesting beaches and various management measures to prevent impacts to the species have been included in the EIS.</p> <p>Adult Green Turtles eat mainly seagrass and algae. The cumulative benthic loss assessment identified benthic communities in Bartalumba Bay with seagrass totalling 436.74 ha and a predicted irreversible loss to these areas of 5.22 ha (1.2%) from the Project. Such an impact is unlikely to result in the long-term decrease of the size of the</p>	<p>monitoring for this stock and its status is currently unknown. Hawksbill Turtles are found in tropical, subtropical and temperate waters globally and have been recorded in all the oceans of the world.</p> <p>All Hawksbill Turtle nests on Winchelsea Island were identified on the northern beaches. The Project will not directly disturb any nesting areas, lighting would not be directly visible at the key northern nesting beaches and various management measures to prevent impacts to the species have been included in the EIS.</p> <p>In Australia and elsewhere, Hawksbill Turtle are omnivorous, eating a variety of animals and plants including sponges, hydroids, cephalopods (octopus and squid), gastropods (marine snails), cnidarians (jellyfish), seagrass and algae (Carr & Stancyk, 1975; Whiting, 2000). Bartalumba Bay exhibits suitable foraging habitat for the species. While the marine portions of the Project area (198 ha) could constitute habitat,</p>	<p>Bartalumba Bay in Connexion Passage.</p> <p>Saltwater Crocodiles have a high likelihood of occurrence in the Project area. The species population size is estimated to be between 100,000–200,000 individuals in Australia and in the NT its population size is around 70,000–75,000 individuals.</p> <p>Bartalumba Bay exhibits suitable habitat for the species. While the marine portions of the Project area (198 ha) could constitute habitat, it is likely that Saltwater Crocodile will be present within the Project marine elements from time to time but are not restricted to this area as they are highly mobile. Furthermore, with the exception of the minor physical wharf infrastructure, Project activities and disturbance will be intermittent and are highly unlikely to lead to long-term decrease in the size of a population.</p> <p>Furthermore, the species population size has an overall increasing trend in Australia and therefore it is highly unlikely that</p>	<p>The Green Sawfish inhabits muddy bottom habitats and enters estuaries. It has been recorded in inshore marine waters, estuaries, river mouths, embankments and along sandy and muddy beaches. Bartalumba Bay exhibits suitable habitat for the species. While the marine portions of the Project area (198 ha) could constitute habitat, it is likely that Green Sawfish will be present within the Project marine elements from time to time but are not restricted to this area as they are highly mobile.</p> <p>The modelled temporary outer extents of the Zone if Moderate Impact (ZoMI) and ZoHI from the dredge plume is 138.2 ha. The spatially localised plumes are predicted to be short-lived (roughly three weeks) with irreversible impacts to marine benthic communities (ZoHI) limited to 22.8 ha with the majority being low productivity bare substrate environments, with only 5.22 ha containing seagrasses of varying densities. The potential extent of impacts to the habitat is unlikely to lead to</p>

Criterion	Flatback Turtle – <i>Natator depressus</i> (Vulnerable and Migratory)	Green Turtle – <i>Chelonia mudas</i> (Migratory)	Hawksbill Turtle – <i>Eretmochelys imbricata</i> (Vulnerable and Migratory)	Saltwater Crocodile – <i>Crocodylus porosus</i> (Migratory)	Green Sawfish – <i>Pristis zijsron</i> (Vulnerable and Migratory)
	<p>constitute habitat, it is likely that Flatback Turtles will be present within the Project marine elements from time to time but are not restricted to this area. Furthermore, with the exception of the minor physical wharf infrastructure, Project activities and disturbance will be intermittent and are highly unlikely to lead to long-term decrease in the size of a population.</p>	<p>population surrounding Grootte Eylandt. Furthermore, Green Turtles are known to migrate more than 2,600 km between feeding and nesting grounds; therefore, the Project is not expected to place an ecologically significant proportion of the population at risk.</p>	<p>it is likely that Hawksbill Turtles will be present within the Project marine elements from time to time but are not restricted to this area. Furthermore, with the exception of the minor physical wharf infrastructure, Project activities and disturbance will be intermittent and are highly unlikely to lead to long-term decrease in the size of a population.</p>	<p>any potential impact could affect overall species population size negatively.</p>	<p>long-term decrease in the size of a population.</p>
<p>Reduce the area of occupancy of the species</p>	<p>Unlikely. The Flatback Turtle is one of the two species of marine turtles that does not have a global distribution, where it is found only in the tropical waters of northern Australia, Papua New Guinea and Irian Jaya. In northern Australia, Flatback Turtles nest along the entire coastline of the NT, making them the most widespread nesting marine turtles in the region. There is a high likelihood species will be present within the Project area from time to time, however the species is not restricted to this area. The species may continue to utilise Bartalumba</p>	<p>Unlikely. There is a high likelihood species will be present within the Project area from time to time, however the species is not restricted to this area. The species may continue to utilise Bartalumba Bay during construction and operation when moving between areas for nesting or for foraging. It is unlikely the Project will reduce the area of occupancy of the species.</p>	<p>Unlikely. Within the NT, majority of the Hawksbill Turtle population abundance is concentrated around north-eastern Arnhem Land and Grootte Eylandt. Hawksbill Turtles forage in tidal and sub-tidal coral and rocky reef habitats, where there is an abundance of algae, sponges and soft corals available. Hawksbill Turtles are highly mobile and migratory, with a global distribution and therefore it is unlikely the Project will reduce the area of occupancy of the species.</p>	<p>Unlikely. The Saltwater Crocodile has a distribution range from Rockhampton QLD throughout the NT to Kind Sound (near Broome) in WA. Due to the species high distribution range and its increasing population size throughout Australia it is very unlikely that this Project would interfere with species overall occupancy.</p>	<p>Unlikely. There are no records of Green Sawfish sightings within or surrounding the Project area. However, there is a high likelihood species will be present within the area from time to time, although the species is not restricted to this area. The species may continue to utilise Bartalumba Bay during construction and operation when and it is unlikely the Project will reduce the area of occupancy of the species.</p>

Criterion	Flatback Turtle – <i>Natator depressus</i> (Vulnerable and Migratory)	Green Turtle – <i>Chelonia mudas</i> (Migratory)	Hawksbill Turtle – <i>Eretmochelys imbricata</i> (Vulnerable and Migratory)	Saltwater Crocodile – <i>Crocodylus porosus</i> (Migratory)	Green Sawfish – <i>Pristis zijsron</i> (Vulnerable and Migratory)
	<p>Bay during construction and operation when moving between areas for nesting or for foraging. It is unlikely the Project will reduce the area of occupancy of the species.</p>				
<p>Fragment an existing population into two or more populations</p>	<p>Unlikely. The Project intersects both habitat critical to the survival of the Flatback Turtle and a BIA inter-nesting zone. However, Flatback Turtles are highly mobile, migratory and widespread within tropical waters of Australia, Irian Jaya and New Guinea. As such, it is unlikely that the Project will fragment an existing population into two or more populations.</p>	<p>Unlikely. The Green Turtle is found in tropical and subtropical waters globally, including Australia; and is one of Australia’s most common marine turtles. There are seven regional populations of Green Turtles in Australia are thought to represent genetically distinct subpopulations, with a very low level of genetic exchange between regions. The southern Gulf of Carpentaria population is predicted to have around 5,000 individuals (DEH, 2005). The distribution of the Gulf of Carpentaria stock is from northeast Arnhem Land to southeast Gulf of Carpentaria. As such, it is unlikely that the Project will fragment an existing population into two or more populations.</p>	<p>Unlikely. There are three genetically distinct stocks of Hawksbill Turtles in Australia, with those at that nest at the Winchelsea/Groote Eylandt area being part of the north-east Arnhem Land stock. The distribution of the north-east Arnhem Land stock is widespread within north-east Arnhem Land including the entire Groote Archipelago. As such, it is unlikely that the Project will fragment an existing population into two or more populations.</p>	<p>Unlikely. Due to the Saltwater Crocodile’s high distribution range, its migratory tendency and lack of subpopulation in the Groote Archipelago, it is highly unlikely the Project will fragment an existing population into two or more populations.</p>	<p>Unlikely. Catch records show that the Green Sawfish inhabits all regions of the Gulf of Carpentaria, with a pattern of relative abundance, that is, in low numbers and with a highly variable frequency of occurrence. With Green Sawfish being mobile and widespread in the Gulf of Carpentaria, it is unlikely that the Project will fragment an existing population into two or more populations.</p>

Criterion	Flatback Turtle – <i>Natator depressus</i> (Vulnerable and Migratory)	Green Turtle – <i>Chelonia mudas</i> (Migratory)	Hawksbill Turtle – <i>Eretmochelys imbricata</i> (Vulnerable and Migratory)	Saltwater Crocodile – <i>Crocodylus porosus</i> (Migratory)	Green Sawfish – <i>Pristis zijsron</i> (Vulnerable and Migratory)
Adversely affect habitat critical to the survival of a species	Unlikely. The Project area does intersect habitat critical to the survival of the Flatback Turtle. Habitat intersected by the Project area is likely to be utilised for intermittent foraging. Critical nesting habitat for this species occurs on the northern side of Winchelsea Island and will not be impacted by the Project. The Project will not adversely impact habitat critical to the survival of the species.	Unlikely. The Project area does intersect habitat critical to the survival of the Green Turtle. Habitat intersected by the Project area is likely to be utilised for intermittent foraging. Critical nesting habitat for this species occurs on the northern side of Winchelsea Island and will not be impacted by the Project. The Project will not adversely impact habitat critical to the survival of the species.	Unlikely. The Project area does intersect habitat critical to the survival of the Hawksbill Turtle. Habitat intersected by the Project area is likely to be utilised for intermittent foraging. Critical nesting habitat for this species occurs on the northern side of Winchelsea Island and will not be impacted by the Project. The Project will not adversely impact habitat critical to the survival of the species.	Unlikely. The habitat intersected by the Project is not critical to the survival of the species.	Unlikely. There is suitable Green Sawfish habitat surrounding Winchelsea Island, but there have not been any recorded sightings within area. The habitat intersected by the Project is unlikely to be critical to the survival of the species and adverse impacts to existing habitat is minor.
Disrupt the breeding cycle of a population	Unlikely. In northern Australia, Flatback Turtles nest along the entire coastline of the NT, making them the most wide spread nesting marine turtles in the region. During marine turtle surveys, Flatback Turtle nests were observed on the western beaches of Winchelsea Island, with the nearest being located approximately 4 km north of the wharf. However, very few older nests were identified in this area and the key nesting areas were determined to be on the north of the Island. The Project will not directly disturb any nesting areas.	Unlikely. There are numerous nationally significant breeding sites in the Northern Territory including Cobourg Peninsula, the mainland from Gove to the northern edge of Blue Mud Bay, the southeast of Groote Eylandt, and the northern beaches of islands in the Sir Edward Pellew group. The Project area does not contain any known nesting beaches or defined inter-nesting areas, however field surveys conducted at Winchelsea Island (2020 – 2022) recorded 32 Green Turtle nesting sites along the north / north-east coast and Islands.	Unlikely. The Groote Archipelago is known to be an important breeding area for the north-east Arnhem Land Hawksbill Turtle population. Field surveys conducted at Winchelsea Island (2020 – 2022) recorded 104 Hawksbill Turtle nesting sites along the north / north-east coast and islands. These nests were recorded high along the beach, adjacent to trees and shrubs. Majority of nests recorded at Winchelsea Island during the survey period were recorded in October 2021. The Project will not directly disturb any nesting areas, lighting would	Unlikely. Saltwater Crocodile’s nesting period is between November and May, with peak nesting occurring during January and February. Female Saltwater Crocodile will stay close by to guard eggs. Preferred nesting habitat of the Saltwater Crocodile includes elevated, isolated freshwater swamps that do not experience the influence of tidal movements. There is no suitable nesting habitat in close proximity to the Project.	Unlikely. Green Sawfish uses soft bottom inshore areas for breeding. Juvenile sawfish are limited to shallow areas; therefore they could be negatively impacted by dredged channels or increased depths. Catch records show that the Green Sawfish inhabits all regions of the Gulf of Carpentaria and the Project is unlikely to disrupt the breeding cycle of a population.

Criterion	Flatback Turtle – <i>Natator depressus</i> (Vulnerable and Migratory)	Green Turtle – <i>Chelonia mudas</i> (Migratory)	Hawksbill Turtle – <i>Eretmochelys imbricata</i> (Vulnerable and Migratory)	Saltwater Crocodile – <i>Crocodylus porosus</i> (Migratory)	Green Sawfish – <i>Pristis zijsron</i> (Vulnerable and Migratory)
	lighting would not be directly visible at the key northern nesting beaches and various management measures to prevent impacts to the species have been included in the EIS.	All Green Turtle nests on Winchelsea Island were identified on the northern beaches. The Project will not directly disturb any nesting areas, lighting would not be directly visible at the key northern nesting beaches and various management measures to prevent impacts to the species have been included in the EIS.	not be directly visible at the key northern nesting beaches and various management measures to prevent impacts to the species have been included in the EIS.		
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Unlikely. The Project will not impact nesting habitat. With regard to foraging habitat, the cumulative benthic loss assessment identified benthic communities in Bartalumba Bay with seagrass totalling 436.74 ha and a predicted irreversible loss to these areas of 5.22 ha (1.2%) from the Project. Such an impact is unlikely to result in a species decline in the population surrounding Groote Eylandt. The modelled temporary outer extents of the ZoMI and ZoHI from the dredge plume is 138.2 ha. The spatially localised plumes are predicted to be short-lived (roughly three weeks) with irreversible impacts to marine benthic communities (ZoHI)	Unlikely. The Project will not impact nesting habitat. With regard to foraging habitat, the cumulative benthic loss assessment identified benthic communities in Bartalumba Bay with seagrass totalling 436.74 ha and a predicted irreversible loss to these areas of 5.22 ha (1.2%) from the Project. Such an impact is unlikely to result in a species decline in the population surrounding Groote Eylandt. The modelled temporary outer extents of the ZoMI and ZoHI from the dredge plume is 138.2 ha. The spatially localised plumes are predicted to be short-lived (roughly three weeks) with irreversible impacts to marine benthic communities (ZoHI)	Unlikely. Hawksbill Turtles spend their first five to ten years drifting on ocean currents, whereafter it resides in soft coral and sandy habits globally. Hawksbill Turtles are known to migrate up to 2,400 km between foraging areas and nesting beaches, suggesting they are adaptable to find new resources if disruption occurs. As such, it is considered unlikely that the Project will modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	Unlikely. The species experiences negative effects due to habitat destruction. Nonetheless, the Saltwater Crocodile has an overall increasing tendency in population size throughout Australia and is widespread.	Unlikely. There is suitable Green Sawfish habitat surrounding Winchelsea Island, but there have not been any recorded sightings within area. The habitat intersected by the Project is unlikely to be critical to the survival of the species and the extent of potential adverse impacts to existing habitat from the Project is unlikely to result in a species decline.

Criterion	Flatback Turtle – <i>Natator depressus</i> (Vulnerable and Migratory)	Green Turtle – <i>Chelonia mudas</i> (Migratory)	Hawksbill Turtle – <i>Eretmochelys imbricata</i> (Vulnerable and Migratory)	Saltwater Crocodile – <i>Crocodylus porosus</i> (Migratory)	Green Sawfish – <i>Pristis zijsron</i> (Vulnerable and Migratory)
	<p>limited to 22.8 ha with the majority being low productivity bare substrate environments. Such an area of impact is unlikely to result in a species decline.</p> <p>Given the proposed Project operations, limited use of chemicals (e.g., no chemicals used for processing) and management commitments the Project is unlikely to produce impacts that that would result in species decline. The portion of marine area proposed to be temporarily disturbed is a small fraction of the suitable habitat in the Groote Archipelago.</p>	<p>limited to 22.8 ha with the majority being low productivity bare substrate environments. Such an area of impact is unlikely to result in a species decline.</p> <p>Given the proposed Project operations, limited use of chemicals (e.g., no chemicals used for processing) and management commitments the Project is unlikely to produce impacts that that would result in species decline. The portion of marine area proposed to be temporarily disturbed is a small fraction of the suitable habitat in the Groote Archipelago.</p>			
<p>Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat</p>	<p>Unlikely. There are no known marine invasive species that directly affect the species. Nevertheless, management measures will be implemented regarding hygiene controls and biosecurity measures to reduce the possibility of introducing marine invasive species to the waters surrounding Winchelsea Island.</p>	<p>Unlikely. During the construction and operational phases of the Project, there is an increase in potential for weed and pest species to move into the adjacent retained areas of potential habitat.</p> <p>Hygiene protocols will be implemented within operational area to reduce weeds or diseases that may be introduced to the site, and active pest management will be enforced to reduce introduced predators.</p>	<p>Unlikely. Management measures will be implemented regarding hygiene controls and biosecurity measures to reduce the possibility of introducing invasive species to Winchelsea Island. It is therefore unlikely that the Project would result in invasive species that are harmful to marine turtles becoming established in the species' habitat.</p>	<p>Unlikely. Invasive species have the potential to be of concern to Saltwater Crocodiles which is stated in the North Marine Plan (DSEWPaC, 2012a; Table 14). However, invasive species risk is primarily related to the river habitat. Management measures will be implemented regarding hygiene controls and biosecurity measures to reduce the possibility of introducing invasive species to Winchelsea Island.</p>	<p>Unlikely. Management measures will be implemented regarding hygiene controls and biosecurity measures to reduce the possibility of introducing invasive species to Winchelsea Island.</p>

Criterion	Flatback Turtle – <i>Natator depressus</i> (Vulnerable and Migratory)	Green Turtle – <i>Chelonia mudas</i> (Migratory)	Hawksbill Turtle – <i>Eretmochelys imbricata</i> (Vulnerable and Migratory)	Saltwater Crocodile – <i>Crocodylus porosus</i> (Migratory)	Green Sawfish – <i>Pristis zijsron</i> (Vulnerable and Migratory)
Introduce disease that may cause the species to decline	<p>Unlikely. Flatback Turtles may contract Fibropapillomatosis (FP), a tumour-causing disease that results in tumour masses on the skin, including around the eyes, mouth, and in internal organs. It is thought that human disturbance of the environment and pollution may influence FP, however this is not confirmed. To date, within Australia there have been no recorded occurrences of turtles contracting diseases and pathogens.</p> <p>The Project is unlikely to introduce disease that may cause the Flatback Turtle species to decline.</p>	<p>Unlikely. Marine turtles are known to obtain diseases as a result of poor water quality and bacterial infections from vessel strike and ghost fishing entanglement. Green Turtles have been documented to contract FP, a tumour-causing disease that results in tumour masses on the skin, including around the eyes, mouth, and in internal organs. It is thought that human disturbance on the environment and pollution may influence FP, however this is not confirmed. To date, within Australia there have been no recorded occurrences of turtles contracting diseases and pathogens.</p> <p>The Project is unlikely to introduce disease that may cause the species to decline and will have hygiene protocols implemented to reduce the risk of disease introduction to the island.</p>	<p>Unlikely. Hawksbill Turtles have been documented to contract FP, a tumour-causing disease that results in tumour masses on the skin, including around the eyes, mouth, and in internal organs. It is thought that human disturbance on the environment and pollution may influence FP, however this is not confirmed. To date, within Australia there have been no recorded occurrences of turtles contracting diseases and pathogens.</p> <p>The Project is unlikely to introduce disease that may cause the Hawksbill turtle species to decline.</p>	<p>Unlikely. The Project is unlikely to introduce diseases that might cause the species to decline. The quarantine protocols for the Project are designed to minimise associated risks.</p>	<p>Unlikely. The Project is unlikely to introduce diseases that might cause the species to decline. The quarantine protocols for the Project are designed to minimise associated risks.</p>
Interfere with the recovery of the species.	<p>Unlikely. Given the widespread distribution of the species within its range, any potential impact on the Flatback Turtle is expected to be minor and construction</p>	<p>Unlikely. The scale or the Project and limited marine disturbance is unlikely to interfere with the recovery of the species.</p>	<p>Unlikely. The scale or the Project and limited marine disturbance is unlikely to interfere with the recovery of the species.</p>	<p>Unlikely. The species has an overall increasing population trend throughout Australia. The scale or the Project and limited marine disturbance is unlikely to</p>	<p>Unlikely. Green Sawfish are believed to be long-lived with low fecundity and late maturity (Stevens et al., 2005; Walker, 1998; Stobutzki et al., 2002).</p>

Criterion	Flatback Turtle – <i>Natator depressus</i> (Vulnerable and Migratory)	Green Turtle – <i>Chelonia mydas</i> (Migratory)	Hawksbill Turtle – <i>Eretmochelys imbricata</i> (Vulnerable and Migratory)	Saltwater Crocodile – <i>Crocodylus porosus</i> (Migratory)	Green Sawfish – <i>Pristis zijsron</i> (Vulnerable and Migratory)
	<p>impacts are temporary. As the species are highly mobile and migratory, the Project is unlikely to interfere with the recovery of the Flatback Turtle.</p>			<p>interfere with the recovery of the species.</p>	<p>Therefore, the recovery rate of this species would be slow. However, the scale of the Project and limited marine disturbance is unlikely to interfere with the recovery of the species.</p>

10.2.5 Migratory Species – Significant Impact Assessment

Of the 47 migratory species identified in the PMST search (Appendix L), 16 are also listed as threatened species. The list of migratory species identified in the PMST report and corresponding records in the NT Fauna Atlas or from field surveys are listed in Table 10.2-7.

Table 10.2-7 Migratory Species Identified in the PMST Report and Fauna Atlas as Occurring, or Potentially Occurring within 10 km of the Project area.

Species	Common Name	PMST	NT Fauna Atlas	Recorded on Winchelsea Island (EMS 2023a,b,c)
Migratory Birds				
<i>Acrocephalus orientalis</i>	Oriental Reed-Warbler	✓	-	-
<i>Anous stolidus</i>	Common Noddy	✓	-	-
<i>Actitis hypoleucos</i>	Common Sandpiper	✓	✓	-
<i>Apus pacificus</i>	Fork-tailed Swift	✓	✓	-
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	✓	✓	-
<i>Calidris canutus</i>	Red Knot	✓	-	-
<i>Calidris ferruginea</i>	Curlew Sandpiper	✓	✓	✓
<i>Calidris melanotos</i>	Pectoral Sandpiper	✓	-	-
<i>Calonectris leucomelas</i>	Streaked Shearwater	✓	-	-
<i>Cecropis daurica</i>	Red-rumped Swallow	✓	-	-
<i>Charadrius leschenaultii</i>	Greater Sand Plover	✓	✓	✓
<i>Charadrius veredus</i>	Oriental Plover	✓	✓	-
<i>Cuculus optatus</i>	Oriental Cuckoo	✓	✓	-
<i>Fregata ariel</i>	Lesser Frigatebird	✓	✓	-
<i>Fregata minor</i>	Great Frigatebird	✓	-	-
<i>Glareola maldivarum</i>	Oriental Pratincole	✓	✓	-
<i>Hirundo rustica</i>	Barn Swallow	✓	✓	-
<i>Limnodromus semipalmatus</i>	Asian Dowitcher	✓	-	-
<i>Limosa lapponica</i>	Bar-tailed Godwit	✓	✓	-
<i>Motacilla cinerea</i>	Grey Wagtail	✓	-	-
<i>Motacilla flava</i>	Yellow Wagtail	✓	-	-
<i>Numenius madagascariensis</i>	Eastern Curlew	✓	✓	✓
<i>Phaethon lepturus</i>	White-tailed Tropicbird	✓	-	-
<i>Sterna dougallii</i>	Roseate Tern	✓	-	✓
<i>Pandion haliaetus</i>	Osprey	✓	✓	-

Species	Common Name	PMST	NT Fauna Atlas	Recorded on Winchelsea Island (EMS 2023a,b,c)
<i>Tringa nebularia</i>	Common Greenshank	✓	-	✓
Migratory Marine Species (Excluding Birds)				
<i>Balaenoptera musculus</i>	Blue whale	✓	-	-
<i>Balaenoptera edeni</i>	Bryde's Whale	✓	-	-
<i>Dugong dugon</i>	Dugong	✓	✓	-
<i>Orcaella heinsohni</i>	Australian Snubfin Dolphin	✓	✓	-
<i>Orcinus orca</i>	Killer Whale	✓	-	-
<i>Sousa sahalensis</i> as <i>Sousa chinensis</i>	Australian Humpback Dolphin	✓	✓	-
<i>Caretta caretta</i>	Loggerhead Turtle	✓	-	-
<i>Chelonia mydas</i>	Green Turtle	✓	✓	✓
<i>Crocodylus porosus</i>	Saltwater Crocodile	✓	✓	-
<i>Dermochelys coriacea</i>	Leatherback Turtle	✓	-	-
<i>Eretmochelys imbricata</i>	Hawksbill Turtle	✓	-	✓
<i>Lepidochelys olivacea</i>	Olive Ridley Turtle	✓	-	✓
<i>Natator depressus</i>	Flatback Turtle	✓	✓	✓
<i>Anoxypristis cuspidata</i>	Narrow Sawfish	✓	-	-
<i>Carcharodon carcharias</i>	White Shark	✓	-	-
<i>Mobula alfredi</i> as <i>Manta alfredi</i>	Reef Manta Ray	✓	-	-
<i>Mobula birostris</i> as <i>Manta birostris</i>	Giant Manta Ray	✓	-	-
<i>Pristis clavate</i>	Dwarf Sawfish	✓	-	-
<i>Pristis pristis</i>	Freshwater Sawfish	✓	-	-
<i>Pristis zijsron</i>	Green Sawfish	✓	-	-
<i>Rhincodon typus</i>	Whale Shark	✓	-	-

A total of 22 migratory shorebird or marine bird species were recorded on Winchelsea Island during the field surveys (refer to Table 10.2-8). Small populations of migratory shorebirds were present in coastal regions of Winchelsea Island during the November 2018, October/December 2021 and August/October 2022 surveys, with larger abundances of aerial counts (109) present in December 2021 and 96 in August 2022.

There were no nationally or internationally significant habitats for migratory shorebirds recorded on Winchelsea Island (EMS, 2023c). However, it is evident that small numbers of migratory shorebirds are present on the western and south-eastern coastal areas of the island, with larger populations present during the wet seasons months, being October to March (DEE, 2017 in EMS, 2023c). Additionally, numerous locations on Winchelsea Island were identified as being of local significance for wetland and marine bird species, being brackish wetlands on the north-western coastline, tidal flats on the western coast, salt pans and mudflats in the southern and south-eastern coast (EMS, 2023c).

Under the EPBC Act and in accordance with the '*Matters of National Environmental Significance, Significant Impact Guidelines 1.1* (Significant Impact Guidelines 1.1)' (DoE, 2013), important migratory shorebird habitat include those recognised as nationally or internationally important. Internationally important habitats are habitats that regularly support either of the following:

- 1 percent (%) of the individuals in a population of one species or subspecies of waterbird; or
- A total abundance of at least 20,000 waterbirds.

Whereas nationally important habitats are habitats that regularly support any of the following;

- 0.1 % of the flyway population of a single species of migratory shorebird; OR
- 2,000 migratory shorebirds; or
- 15 migratory shorebird species.

Migratory shorebirds are present at small numbers on Winchelsea Island, and none exceed significance thresholds for 1% or 0.1% of the flyway population. The surveys conducted by EMS concluded that the number of species, being 13, and the maximum shorebird count, being 116, are both below the significance threshold for species richness and numbers at a location.

Table 10.2-8 Listed Migratory Bird Species

Common Name	Scientific Name	Status EPBC	Migratory EPBC Act	Current Survey	Max Count	Broad Habitat	Local Status
Pacific Golden Plover	<i>Pluvialis fulva</i>		Migratory	✓	8	Tidal flats, mud flats, salt pans	Small numbers, western tidal flats
Grey Plover	<i>Pluvialis squatarola</i>		Migratory	✓	14	Tidal flats, mud flats, salt pans	Small numbers, western tidal flats
Lesser Sand Plover	<i>Charadrius mongolus</i>	Endangered	Migratory	✓	58	Tidal flats, mud flats, salt pans	Small numbers, tidal flats, salt pans
Greater Sand Plover	<i>Charadrius leschenaultii</i>	Vulnerable	Migratory	✓	25	Tidal flats, mud flats, salt pans	Small numbers, tidal flats
Eastern Curlew	<i>Numenius madagascariensis</i>	Critically Endangered	Migratory	✓	12	Tidal flats, mud flats, salt pans	Small numbers, tidal flats
Whimbrel	<i>Numenius phaeopus</i>		Migratory	✓	11	Tidal flats, mud flats, salt pans	Small numbers, tidal flats
Common Greenshank	<i>Tringa nebularia</i>		Migratory	✓	3	Tidal flats, mud flats, salt pans	Small numbers feeding on tidal flats, brackish wetlands
Marsh Sandpiper	<i>Tringa stagnatilis</i>		Migratory	✓	1	Tidal flats, mud flats, salt pans	Small numbers feeding on tidal flats
Grey-tailed Tattler	<i>Tringa brevipes</i>		Migratory	✓	20	Tidal flats, mud flats, salt pans, rocky headlands	Small numbers, coastal flats and rocks
Curlew Sandpiper	<i>Calidris ferruginea</i>	Critically Endangered	Migratory	✓	6	Tidal flats, mud flats, salt pans	Small numbers, SE coastal mudflats
Common Sandpiper	<i>Actitis hypoleucos</i>		Migratory	✓	4	Tidal flats, mud flats, salt pans, rocky headlands	Small numbers feeding on tidal flats
Red-necked Stint	<i>Calidris ruficollis</i>		Migratory	✓	39	Tidal flats, mud flats, salt pans	Small numbers, coastal flats and rocks
Sharp-tailed Sandpiper	<i>Calidris acuminata</i>		Migratory	✓	88	Tidal flats, mud flats, salt pans, wetlands	Small numbers, coastal flats, brackish wetlands
(Australian) Gull-billed Tern*	<i>Gelochelidon nilotica macrotarsa</i>		Migratory	✓	17	Marine and coastal habitats, sandy beaches	Small numbers, coastal flats, brackish wetlands

Common Name	Scientific Name	Status EPBC	Migratory EPBC Act	Current Survey	Max Count	Broad Habitat	Local Status
Caspian Tern	<i>Hydroprogne caspia</i>		Migratory	✓	2	Marine and coastal habitats, sandy beaches, rocky shores	Small numbers, coastal flats
Crested Tern	<i>Thalasseus bergii</i>		Migratory	✓	25	Marine and coastal habitats, sandy beaches, rocky shores	Small numbers, coastal flats/rocks
Common Tern	<i>Sterna hirundo</i>		Migratory	✓	27	Marine and coastal habitats, sandy beaches, rocky shores	Small numbers, coastal flats/rocks
Little Tern	<i>Sternula albifrons</i>		Migratory	✓	6	Marine and coastal habitats, sandy beaches, rocky shores	Small numbers, coastal flats
Black-naped Tern	<i>Sterna sumatrana</i>		Migratory	✓	4	Marine and coastal habitats, sandy beaches, rocky shores	Small numbers, coastal flats
Lesser Frigatebird	<i>Fregata ariel</i>		Migratory	X	0	Offshore marine	One offshore record, existing data
Eastern Osprey	<i>Pandion haliaetus</i>		Migratory	✓	6	Coastal marine, rocky headlands	Small numbers, coastal areas and rocky shores
Fork-tailed Swift	<i>Apus pacificus</i>		Migratory	✓	10	Aerial feeder in broad range of habitats	Open forest. Non-resident
Arafura Fantail	<i>Rhipidura rufifrons dryas</i>		Migratory	✓	4	Monsoon vine forest, riparian forest, Callitris woodland, mangroves	Small numbers, monsoon forest, mangrove and Callitris patches
Total Species		4	23	22			

* Field identification between gull-billed tern and Australian gull-billed tern not resolved during survey.

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