



**Rustlers Roost and Quest 29
Open-Cut Mine Redevelopment**

**Draft Environmental Impact
Statement (EIS)**

**Section 9 - Commonwealth
Governments Matters**

Prepared pursuant to the Environment Protection Act 2019

October 2021

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Document History and Status

Revision	Date issued	Reviewed by	Approved by	Date approved	Revision type
A	05/09/2021	P.Davey, T.Mitchell	P.Davey	05/09/2021	Draft
B	24/09/2021	S.Ley; T.Mitchell	P.Davey	30/09/2021	Draft
0	22/10/2021	P.Davey	P.Davey	22/10/2021	Final

Distribution of Copies

Version	Date issued	Quantity	Electronic	Issued to
Draft, Rev A	05/09/2021	1	Word	Primary Gold Ltd
Rev B	30/09/2021	1	Word	Primary Gold Ltd
Rev 0	22/10/2021	1	PDF	Primary Gold Ltd

Last Saved:	25 October 2021
File Name:	1001087_Rustlers-Roost-Quest-29-Draft EIS_Final_Oct 2021
Author:	CDM Smith
Project Manager:	Paul Davey
Client:	Primary Gold Ltd (PGO)
Document Title:	Rustlers Roost and Quest 29 Open-Cut Mine Redevelopment: Draft Environmental Impacts Statement (EIS)
Document Version:	Rev 0
Project Number:	1001087

Key Project Terms

Term	Definition
Adaptive Management	Systematic process for incrementally improving management practices by learning from the outcomes of past and current practices.
Carbon in Leach	This process uses a dilute alkaline cyanide solution to leach (dissolve) gold from the ore material. Activated carbon removes gold out of dilute cyanide solution by adsorption (sticking). The leaching agent and activated carbon are added together in a slurry of ore and water.
Development Envelope	Defined as the maximum area within which the Project footprint could occur. The development envelope for the Project encompasses 790 ha, inclusive of Rustlers Roost, Quest 29, the accommodation camp and haul road.
Environmental Aspect	An element of the Primary Gold's 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 the Primary Gold'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.
Existing Disturbance Footprint	Defined as the direct disturbance area from known historical activities associated with the Rustlers Roost, Quest 29, accommodation camp and haul road areas. For Rustlers Roost and Quest 29 this is taken from the existing Mine Management Plans. The existing direct disturbance footprint encompasses 169.4ha within the development envelope.
Heap Leach Pad	Existing areas where historic mining placed ore for processing via a leaching solution to dissolve and capture the mineral. The pads contain the remaining material.
Maximum Vegetation Clearing Extent	The maximum extent of native vegetation clearing proposed for the Project based on mapped vegetation extent layers which account for historic anthropogenic disturbances to the development envelope (e.g. historic mining and pastoral activities). This area constitutes a total of 368.86 ha.
Project	The Project includes the expansion of existing pits, waste rock landforms, water storage dams and internal roads in both the Rustlers Roost and Quest 29 MLs. Two new pits will be constructed at Rustlers Roost and new infrastructure includes an onsite processing plant, a tailings storage facility, a landfill, laydown area, magazine, administration office, accommodation camp and groundwater bores for water supply. The Project is inclusive of an expanded connecting haul road between the non-contiguous extraction areas and an accommodation camp.
Project Area	The Project area is defined as wholly including ML1083 (Rustlers Roost), ML 29783 (Quest 29), ML 29814 (accommodation camp) and the connecting haul road. The entire Project area covers 1,143.25 ha.
Direct Disturbance Footprint	Defined as the direct disturbance area based on the current proposed infrastructure and material placement inclusive of Rustlers Roost, Quest 29, the accommodation camp and haul road. This area covers both historically disturbed and undisturbed areas. The disturbance footprint encompasses 532.84 ha within the Project area.
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.
Study Area	Refers to the area of survey or investigation for a specific study. This area may be beyond the Project area or development envelope.
Tailings Storage Facility	A specially engineered and constructed impoundment into which tailings (residue) from the ore processing plant is 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.
Waste Rock Dump	An engineered and constructed impoundment into which overburden from the mining process is placed for safe storage in perpetuity.

Acronyms, Abbreviations and Units

Abbreviation, Acronym or Unit	Definition
\$m	Million dollars
%	Percentage
+ve	Assessment of positive
μS	Microsiemens
4WD	Four-wheel drive
AADT	Average Annual Daily Traffic
AAS	Atomic Absorption Spectrophotometer
AAPA	Aboriginal Areas Protection Authority
AARL	Anglo American Research Laboratory
ABS	Australian Bureau of Statistics
AE	Aquatic Ecosystems
AEP	Annual Exceedance Probability
AFANT	Amateur Fishermen's Association of the Northern Territory
AHD	Australian Height Datum
ALA	Atlas of Living Australia
ALARP	As Low As Reasonably Practicable
AMD	Acid and Metalliferous Drainage
ANC	Acid Neutralising Capacity
ANCOLD	Australian National Committee on Large Dams
ANFO	Ammonium Nitrate
ANZG	Australia and New Zealand Government
ARI	Average Recurrence Interval
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
AS	Australian Standard
ASRIS	Australian Soil Resource Information System
ASX	Australian Stock Exchange
AS/NZS	Australian/New Zealand Standards
AUSRIVAS	Australian River Assessment System
BESS	Battery Energy Storage System
BoM	Bureau of Meteorology
BOO	Build-Own-Operate
BOOT	Build-Own-Operate-Transfer
Bq	Becquerel
BUD	Beneficial Use Declaration
CAD	Computer-Aided Design
CAPEX	Capital Expenditure
CCTV	Closed Circuit Television
CE	Community and Economy
CEO	Chief Operating Officer
CH ₄	Methane

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Abbreviation, Acronym or Unit	Definition
CIL	Carbon in Leach
CO ₂	Carbon Dioxide
CO ₂ -e	Carbon Dioxide Equivalent
COPC	Contaminant of Potential Concern
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSL	Compact Soil Liner
CSM	Conceptual Site Model
C&D	Construction and Demolition
C&I	Commercial and Industrial
DAWE	Department of Agriculture, Water and Environment (Cth) (current)
DEPWS	Department of Environment, Parks and Water Security (NT) (current)
DGV	Default Guideline Value
DIDO	Drive-in Drive-out
DITT	Department of Industry, Tourism and Trade (NT) (current)
DIWA	Directory of Important Wetlands of Australia
DO	Dissolved Oxygen
DotE	Department of the Environment (Cth) (former)
DotEE	Department of the Environment and Energy (Cth) (former)
EC	Electrical Conductivity
EH&S	Environment, Health and Safety
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EMS	Environmental Management System
EPA	Environment Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPL	Environment Protection Licence
EP Act	<i>Environment Protection Act 2019</i>
ERA	Energy Resources of Australia
ERP	Emergency Response Plan
ESCP	Erosion and Sediment Control Plan
ESD	Ecologically Sustainable Development
GDE	Groundwater Dependent Ecosystem
GGAP	Greenhouse Gas Abatement Plan
GHG	Greenhouse Gas
GJ	Gigajoule
GL	Gigalitre (1,000 Megalitres)
GPS	Global Positioning System
GRP	Gross Regional Product
GST	Goods and Services Tax
g/t	Grams Per Tonne
GV	Guideline Value
GWP	Global Warming Potential
ha	Hectare

Abbreviation, Acronym or Unit	Definition
HDPE	High Density Polyethylene
HEC-HMS	Hydrologic Modelling System
HFC	Hydrofluorocarbons
HP	Hydrological Processes
HSE	Health, Safety and Environment
IAP2	International Association for Public Participation
IBC	Intermediate Bulk Container
ID	Identification
IECA	International Erosion Control Association
IFC	International Finance Corporation
IPCC	Intergovernmental Panel on Climate Change
IPP	Independent Power Provider
ISO	International Organisation for Standardisation
IWEQ	Inland Water Environmental Quality
JORC	Joint Ore Reserve Committee
kL	Kilolitre
km	Kilometre
km ²	Square Kilometre
kV	Kilovolt
L	Litre
L/s	Litre Per Second
LED	Light Emitting Diode
LiDAR	Light Detection and Ranging
LNG	Liquefied Natural Gas
LOM	Life-of-Mine
LPG	Liquefied Petroleum Gas
M	Million
m	Metre
m ²	Metre squared
m ³	Cubic metre
mAHD	Metres Australian Height Datum
mBGL	Metres Below Ground Level
MCP	Mine Closure Plan
MEDLI	Model for Effluent Disposal Using Land
mg	Milligram
ML	Mining Lease (Granted)
MLA	Mining Lease Application
mm	Millimetre
MMP	Mining Management Plan
MNES	Matter of National Environmental Significance
MP	Management Plan
mRL	Metres Reduced Level
Mt	Million Tonnes

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Abbreviation, Acronym or Unit	Definition
Mtpa	Million Tonnes Per Annum
MW	Megawatt
N ₂ O	Nitrous Oxide
NAF	Non-Acid Forming
NAPP	Net Acid Producing Potential
N/A	Not Applicable
NGER Act	<i>National Greenhouse Energy Reporting Act 2007</i>
NLC	Northern Land Council
NMD	Neutral Mine Drainage
NORM	Naturally Occurring Radioactive Material
NOI	Notice of Intent
NO ₂	Nitrogen Dioxide
NSESD	National Strategy for Ecologically Sustainable Development
NT	Northern Territory
NTG	Northern Territory Government
NTU	Nephelometric Turbidity Unit
NT Act	<i>Native Title Act 1993</i>
NVIS	National Vegetation Information System
OPEX	Operational Expenditure
PAF	Potentially Acid Forming
PASS	Potential Acid Sulfate Soil
PER	Public Environmental Report
PET	Plecoptera, Ephemeroptera and Trichoptera
PFC	Perfluorocarbon
PGO	Primary Gold Limited, a wholly owned subsidiary of Hanking Australia Investment Pty Ltd
PMF	Probable Maximum Flood
PMLU	Post Mining Land Use
PMST	Protected Matter Search Tool
PPL	Perpetual Pastoral Lease
Q	Quarter
RL	Reduced Level
RMP	Risk Management Plan
RO	Reverse Osmosis
ROM	Run of Mine
RRMPL	Rustlers Roost Mining Pty Ltd
RSWL	Reduced Standing Water Level
SA	Statistical Area
SD	Saline Drainage
SDS	Safety Data Sheet
SEP	Stakeholder Engagement Plan
SEIFA	Socio-Economic Indexes for Areas
SF ₆	Sulfur Hexafluoride
SGV	Site-Specific Guideline Value

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Abbreviation, Acronym or Unit	Definition
SIGNAL	Stream Invertebrate Grade Number – Average Level
SoBS	Site of Botanical Significance
SoCS	Site of Conservation Significance
SSAN	Security Sensitive Ammonium Nitrate
SSC	State Suburb Code
SSTV	Site-Specific Trigger Values
STP	Sewage Treatment Plant
SWG	Stock Water Drinking Guidelines
SWL	Standing Water Level
t	Tonne
TAMS	Territory Asset Management Services
TARP	Trigger Action Response Plan
TBD	To Be Determined
TE	Terrestrial Ecosystems
TEC	Threatened Ecological Community
TEQ	Terrestrial Environmental Quality
Th	Thorium
TN	Total Nitrogen
ToR	Terms of Reference
TP	Total Phosphorus
TPWC Act	<i>Territory Parks and Wildlife Conservation Act 1976</i>
TSF	Tailings Storage Facility
TSS	Total Suspended Solids
TSSC	Threatened Species Scientific Committee
U	Uranium
UC	Uncertain
V	Volt
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change
WCD	Water Control District
WDL	Waste Discharge Licence
WMP	Water Management Plan
WONS	Weed of National Significance
WRD	Waste Rock Dump
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

Section 9 Commonwealth Government Matters

This section has been prepared to address the ToR requirement to appropriately consider potential impacts to MNES and provide justification for why the Project does not have potential to significantly impact on MNES (refer to Table 5 in Appendix C).

9.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act provides protection of the environment, heritage and biodiversity conservation. Under the EPBC Act, actions that are likely to cause a significant impact on a MNES require referral to the Commonwealth Government Minister for the Environment for consideration. There are nine MNES listed under the EPBC Act, being:

- World heritage properties;
- National heritage places;
- Wetlands of international importance (Ramsar wetlands);
- Nationally threatened species and ecological communities;
- Migratory species;
- 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 (the ‘water trigger’).

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 guideline 1.1 (Significant Impact Guidelines 1.1)*’ (DotE 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 a 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 intensity²². Proponent self-assessment is a standard approach to determine whether a Project warrants referral, and this section provides an outline of that assessment.

²² Booth v Bosworth (2001) 114 FCR 39 “the Flying Fox Case” considering the operation of s43A and s43B of the EPBC Act.

9.2 Matters of National Environmental Significance (MNES)

9.2.1 Overview

The following section considers the potential impact of the Project on each of the nine MNES listed under the EPBC Act. Each of the MNES has been considered against the significant impact criteria referenced in Significant Impact Guidelines 1.1 (DotE 2013).

The Commonwealth Government Department of Agriculture, Water and Environment (DAWE) 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.

An initial PMST search was conducted for the ecological investigations in 2017 using a 20 km radius around the survey areas. A subsequent PMST search was completed in 2021 using a 25 km radius, to identify any changes to the modelled MNES occurrences. The PMST searches were supplemented by a search of records of occurrence of listed threatened species (flora and fauna) using the NT Species Atlas on NR Maps (refer to Appendix R). Ecological surveys undertaken in 2016 and 2017 targeted listed as threatened under the EPBC Act and TPWC Act identified by the PMST and NT Species Atlas as occurring or potentially occurring within the survey areas. A summary of potential MNES relevant to the Project is provided in Table 9-1.

Table 9-1 Summary of the Potential Impacts of MNES

Matters of National Environmental Significance	Relevant for Consideration	Details
World heritage properties	X	The Project is located approximately 46 km west from the Kakadu National Park. Kakadu was listed as a world heritage area by UNESCO meeting five criteria for its outstanding natural and cultural universal values. The Project catchment does not flow into Kakadu and there are no other World Heritage Properties in proximity. Refer to Figure 9-1.
National heritage places	X	In 2007, Kakadu was included on the National Heritage List in recognition of its national heritage significance under the EPBC Act. The Project is located approximately 46 km west of Kakadu and the catchment within which the Project is situated does not flow into Kakadu. Refer to Figure 9-1.
Wetlands of international importance/ Ramsar wetlands	X	In 2010, the entire Kakadu was included in the Ramsar Convention, meeting all nine criteria as a wetland of international importance. The Project is located approximately 46 km west of Kakadu and the catchment within which the Project is situated does not flow into Kakadu. Beyond Kakadu the next closest Ramsar wetland is the Cobourg Peninsula, approximately 154 km north-east. Refer to Figure 9-1.
Nationally threatened species and ecological communities	✓	A total of 25 EPBC Act listed threatened fauna species and three threatened flora species were identified as likely to occur within 20 km of the Project area in 2017. An updated search in 2021 using a 25 km radius again identified 25 listed threatened fauna species; however, three additional species were identified and three species from the 2017 search removed. The 2021 PMST provided the same results for threatened flora (refer to Appendix R). Field surveys conducted in 2016, 2017, 2020 and 2021 no threatened flora or fauna species were recorded in the on-ground surveys. The surveys included intensive transect surveys in accordance with relevant guidelines for two listed flora species with modelled potential habitat intersecting the Project area <i>H. macrothrix</i> (Endangered) and <i>S. ensatum</i> (Endangered), and neither of these species were detected to be present in the Project Area. The Vegetation Survey Report included in Appendix M provides the survey methodologies and results. Based on these results, threatened flora are not considered relevant to the Project.

Section 9 Commonwealth Government Matters

Matters of National Environmental Significance	Relevant for Consideration	Details
		<p>Nevertheless, following consideration of survey results the ecological assessment determined that seven EPBC Act listed fauna species have a moderate or high likelihood of occurrence within the Project area and thus threatened species are considered further below. These seven species are:</p> <ul style="list-style-type: none"> ▪ Bare-rumped Sheath-tailed Bat (<i>Saccolaimus saccolaimus nudicluniatus</i>) - Vulnerable; ▪ Gouldian Finch (<i>Erythrura gouldiae</i>) – Endangered; ▪ Fawn Antechinus (<i>Antechinus bellus</i>) – Vulnerable; ▪ Partridge Pigeon (<i>Geophaps smithii smithii</i>) – Vulnerable; ▪ Red Goshawk (<i>Erythrotriorchis radiatus</i>) – Vulnerable; ▪ Grey Falcon (<i>Falco hypoleucos</i>) – Vulnerable; ▪ Northern Brushtail Possum (<i>Trichosurus vulpecula arnhemensis</i>) – Vulnerable. <p>No threatened ecological communities were identified in the Project area or within the 25 km PMST and NT Species Atlas searches.</p>
Migratory species	✓	<p>The EPBC PMST and NT Species Atlas identified 45 migratory species as occurring or potentially occurring within 20 km of the survey areas. The 2021 PMST search using a 25 km radius identified an additional one migratory species (Pectoral Sandpiper) (Appendix R).</p> <p>No fauna species listed as migratory were recorded during either survey (LES 2017). Further, no migratory species are expected to either occur within the Project area or be significantly impacted by the Project. Nevertheless, the non-detection of migratory species does not prove such species are absent from the site but does allow consideration of the habitat quality for these species. Migratory species are considered further below.</p> <p>There were also three listed marine species identified in the Project area or immediate surrounds during surveys (Saltwater Crocodile, Freshwater Crocodile and Rainbow Bee-eater). However, none of these species are listed as threatened species or migratory species under the EPBC Act.</p>
Commonwealth marine areas	X	There are no commonwealth marine areas close to the Project area. The Project area is located approximately 135 km to the closest Commonwealth marine area (northern-west coast of the Northern Territory off Dundee Beach).
The Great Barrier Reef Marine Park	X	Not applicable. The Project area is located approximately 1,280 km to the closest point of the Great Barrier Reef Marine Park.
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.

Note – the Project does not intersect Commonwealth land but is in close proximity to the Mount Bunday Military Training Area, located approximately 11 km to the east of the Project area. The Mary River National Park separates the Project from the Commonwealth Land and there will be no direct impacts to the training area. As such, the Project has not been assessed against 'Actions on, or impacting upon Commonwealth land, and actions by Commonwealth agencies, Significant impact guideline 1.2 (Significant Impact Guidelines 1.2)' (DSEWPC 2013).

For threatened species and migratory species identified as being potentially relevant to the Project in Table 9-1, the corresponding sub-section provides a table of assessment against the significant impact criteria for that matter based on the Significant Impact Guidelines 1.1 (DotE 2013).

Section 9 Commonwealth Government Matters

Search results included species listed under the EPBC Act as critically endangered, endangered and vulnerable. In determining if the action is likely to have a significant impact on these species, and therefore require the Project to be referred to the DAWE, it is necessary to consider if there is a real chance or possibility the action will:

- Adversely affect habitat critical to the survival of a species;
- Modify, destroy, remove or 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.

Additional criteria for critically endangered or endangered species include:

- 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 endangered or critically endangered species' habitat, or
- Interfere with the recovery of the species.

Additional criteria for vulnerable species include:

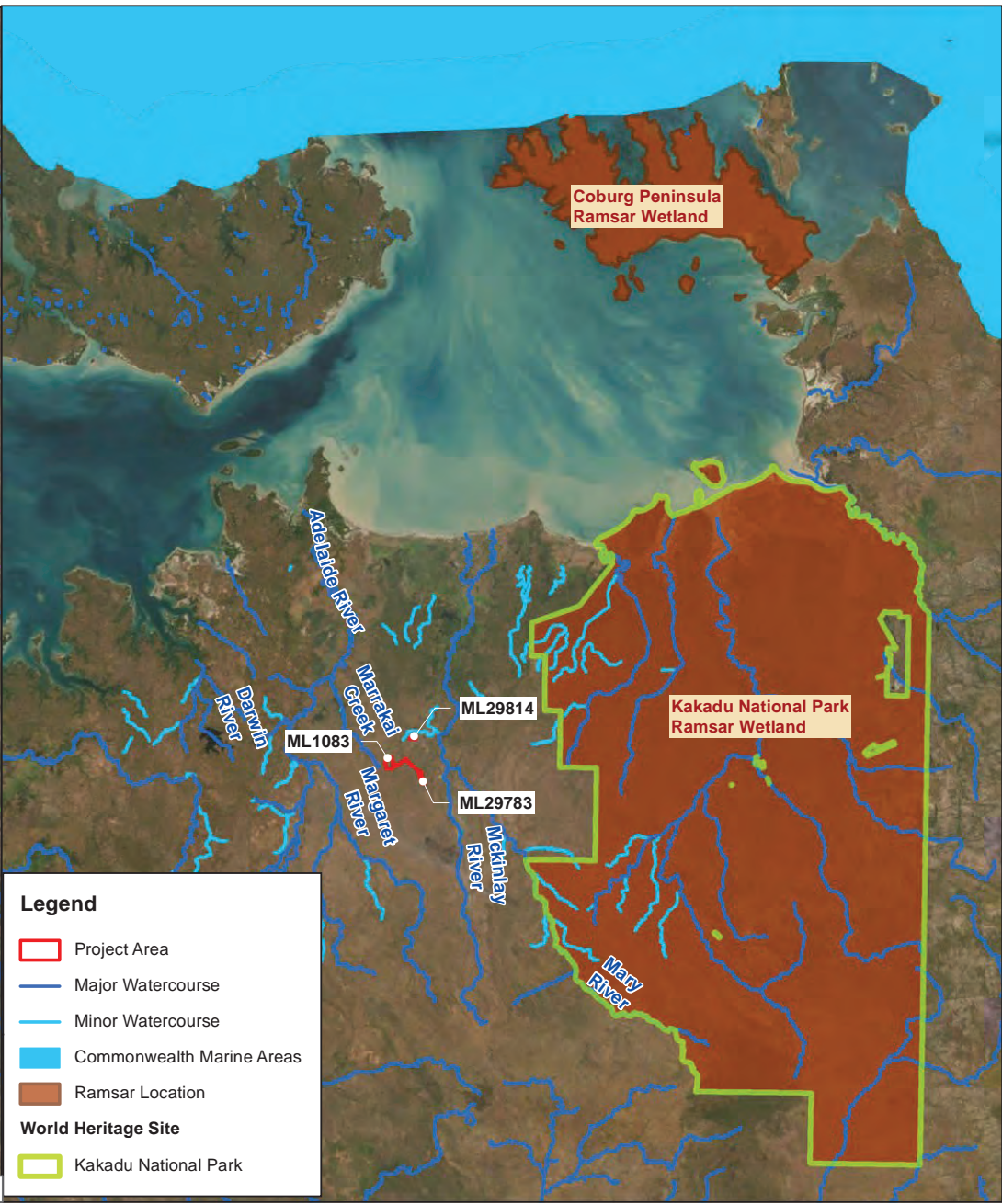
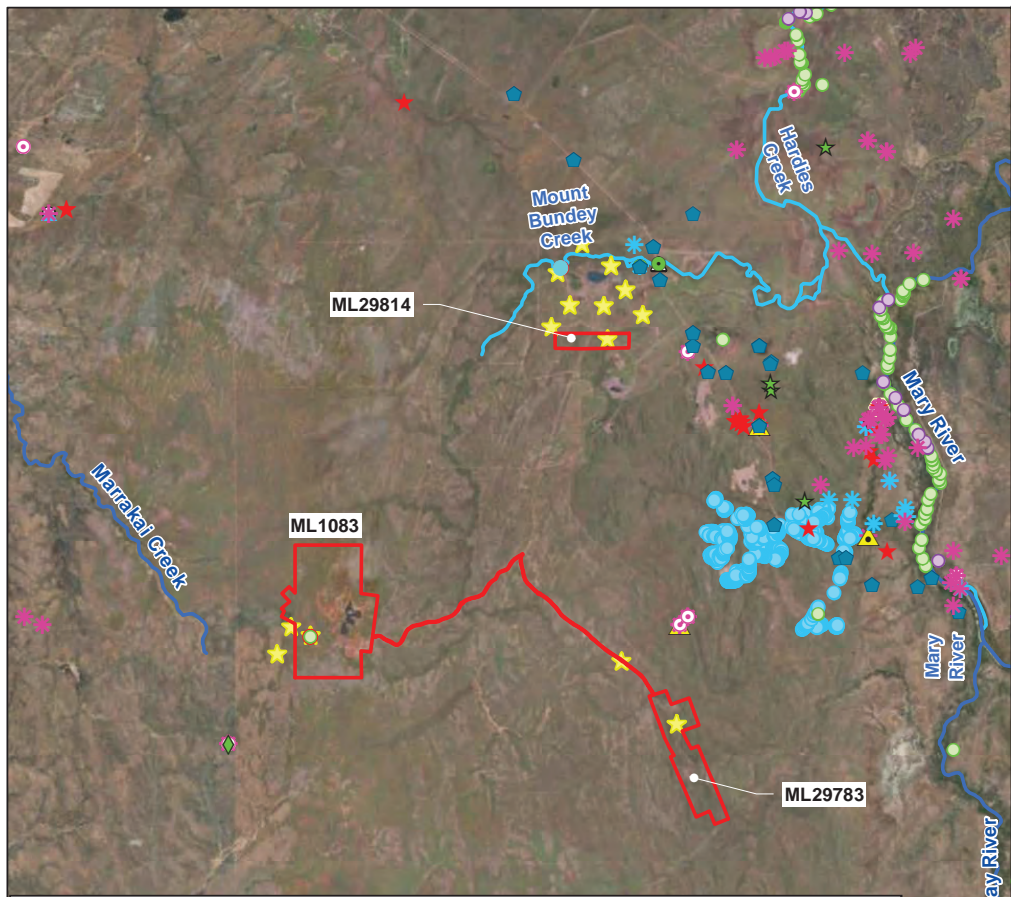
- Lead to a long-term decrease in the size of an important population of a species;
- Reduce the area of occupancy of an important population;
- Fragment an existing important population into two or more populations;
- Disrupt the breeding cycle of an important population;
- Result in invasive species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

A population is defined under the EPBC Act 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."*

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."*



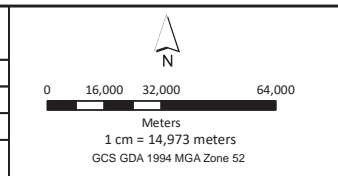
- Legend**
- Project Area
 - Major Watercourse
 - Minor Watercourse
- Fauna Species**
- NT Government Records
- Black-footed Tree-Rat (EN)
 - Cattle Egret (MA)
 - Common Greenshank (MI)
 - ◆ Common Sandpiper (MA)
 - ◆ Fawn Antechinus (VU)
 - Fork-tailed Swift (MI)
- Flora Species**
- NT Government Records
- Helicteres Macrothrix (EN)
 - ★ Goodenia Quadrifida (EN)
- Field Survey Records**
- △ Black-footed Tree-Rat (EN)
 - Freshwater Crocodile (MA)
 - ★ Rainbow Bee-eater (MA)
- Other Fauna Species:
- Freshwater Crocodile (MA)
 - ★ Gouldian Finch (EN)
 - ★ Magpie Goose (MA)
 - ◆ Northern Quoll (EN)
 - ▲ Oriental Cuckoo (MI)
 - ▲ Oriental Pratincole (MI)
 - ★ Partridge Pigeon (VU)
 - Red Goshawk (VU)
 - Saltwater Crocodile (MA,MI)
 - ◆ Sharp-tailed Sandpiper (MI)

- Legend**
- Project Area
 - Major Watercourse
 - Minor Watercourse
 - Commonwealth Marine Areas
 - Ramsar Location
 - World Heritage Site
 - Kakadu National Park

Note: Listing Categories: MA = Marine, MI = Migratory, VU = Vulnerable, EN = Endangered, CE = Critically Endangered

R	Details	Date
1	Final	31/08/21
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

DESIGNED					CHECKED					TK				
SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	TK	TK	TK	TK	TK
DRAWN					CHECKED					TK				
SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	TK	TK	TK	TK	TK
APPROVED					DATE					31/08/21				
TK	TK	TK	TK	TK	TK	TK	TK	TK	TK	TK	TK	TK	TK	TK



DISCLAIMER
 CDM Smith has endeavoured to ensure accuracy and completeness of the data. CDM Smith assumes no legal liability or responsibility for any decisions or actions resulting from the information contained within this map.

DATA SOURCE
 NT Government Open Source Data



FIGURE 9-1

Matters of National Environmental Significance Occurrence

DRG Ref: 1001087-EIS-07-7.36

9.2.2 Desktop and Field Surveys

No threatened ecological communities occur within 25 km of the Project area and although the EPBC Protected Matters Species Tool (PMST) and NT Fauna Atlas identified a total of 45 migratory species as occurring, or suitable habitat potentially occurring, within 20 km of the Project area, none were recorded during the on-ground surveys in 2016 and 2017.

Aquatic ecology field surveys were conducted at Mount Bunday Creek in 2015, 2017, 2018, 2019 and 2020. In 2017, 2018 and 2019, remote camera trapping was included to understand the spatial distribution of Mitchell's and Mertens Water Monitors along Mount Bunday Creek. While the surveys were commissioned for the neighbouring Toms Gully Mine, the survey area included Mount Bunday Creek which is hydrologically connected to the current Project area. Therefore, the survey results are also relevant to the current Project. While the surveys were targeted at monitor species, they recorded all fauna encounters. A single occurrence of an EPBC Act listed threatened species, the Black-footed Tree Rat (*Mesembriomys gouldii*), was identified during this three year survey involving 660 days of camera deployment. The species was identified at camera site M5, which is approximately 16.5 km downstream of the haul road portion of the Project area and 2.1 km north-east of the accommodation camp Project area (Figure 7-15).

Camera traps, cage traps, spotlighting and searches for suitable habitat were undertaken for the Black-footed Tree rat during the 2016 and 2017 surveys. The surveys included searches for indicators of the species presence such as scratching on trees and eaten fruit; however, no signs were identified. No signs of presence were found, and Black-footed Tree Rats were not camera- or live-trapped, and were not found during spotlighting despite there being potentially suitable habitat in the survey areas. Therefore, there remains a low likelihood that the Black-footed Tree rat occurs within the Project areas, and proposed operations are not expected to have a significant impact on a population of this species. As such, the Black-footed Tree rat is not considered further in Section 9.2.3.

Targeted, on-ground surveys were conducted by qualified scientists within habitats defined as suitable for the threatened species identified by the NT EPA, as well as other listed species identified from searches of the EPBC PMST and NT Fauna Atlas. These additional species either occurred, or had the potential to occur, within the 20 km of the three lease areas. Sampling of the survey area including the accommodation camp and north, included seven of the identified habitats, but no threatened flora or fauna species were recorded in the on-ground surveys and habitat was found to be marginal or minor.

The two species of particular concern highlighted by the NT EPA in 2016 and 2017 were the Yellow-snouted Gecko (*Lucasium occultum*) and the sub-shrub *H. macrothrix* (both listed as Endangered under the EPBC Act). The 2021 ToR for the Project also identified the flora species *S. ensatum* (Endangered) for consideration, due to the Project area intersecting modelled habitat for the species. In addition to the trapping grids and motion-sensing cameras, species-specific searches were conducted for occurrence of Yellow-snouted Gecko within the marginally suitable and limited habitat north of the accommodation camp. Spotlighting by two to three people occurred over a total of 12 nights in woodland vegetation and in well-developed leaf litter. No individuals were recorded and it was determined that, due to marginal quality of habitat in the area, there was a low residual likelihood the species occurs in the accommodation camp area. Therefore, proposed operations are not likely to have a significant impact on a population of the species or the conservation status of the species and it is not considered further.

H. macrothrix surveys in 2016 and 2017 did not detect the species. Candidate specimens were collected for further identification by the NT Herbarium. All specimens were identified as a related species, not *H. macrothrix*. Additional targeted surveys for both *H. macrothrix* and *S. ensatum* were completed in 2020 and 2021, for portions of the Project area intersecting modelled potential habitat. Neither were detected and no other threatened flora species was identified. The assessment concluded that there were no significant populations of *H. macrothrix* or *S. ensatum* in the survey area and the Project has a very low risk of having an impact on the species. Therefore, this species is not considered further in this section.

The remaining threatened species were similarly surveyed in respective suitable habitats (over three consecutive nights or occasions) using Elliott traps, funnel traps, standardised bird survey techniques, bat echolocation detectors, motion-detection cameras and/or active searches. Quality of the habitats present in the Project area was marginal and no occurrences of any species were detected during surveys. Therefore, it is unlikely these species will be significantly affected by the proposed mining activity. Nevertheless, seven species listed under the EPBC Act were still considered to have a moderate or high likelihood of occurrence within the Project area and have been considered further in Table 9-2.

Several invasive weed species were identified in the Project area during surveys (refer to Section 7.2.1.3). Some of these invasive species are recognised as constituting a key threatening process to several listed species, including listed fauna species identified as potentially occurring in the area through the PMST search. These include the Gouldian Finch (*Erythrura gouldiae*), Partridge Pigeon (*Geophaps smithii smithii*), Northern Quoll (*Dasyurus hallucatus*) and the Red Goshawk (*Erythrotriorchis radiatus*). Yellow-snouted Gecko (*Lucasium occultum*) is also threatened by these invasive weed species but the closest record to the Project area is 28 km north and none were detected during surveys.

This key threatening process has an associated Threat Abatement Plan and the implementation of any strategic plan also associated with recorded Weeds of National Significance are the responsibility of land holders and land managers and will be required in the MMP.

Several introduced fauna species were recorded during the ecology surveys in 2016 and 2017. These were cat, cattle, water buffalo, cane toad, horse, house mouse and pig. Cattle were recorded in Rustlers Roost. Water buffalo were recorded at Annie's Dam in Rustlers Roost. Cane toads were ubiquitous throughout all three survey areas. The impacts of three of these species are listed Key Threatening Processes and all have associated Threat Abatement Plans prepared by DAWE. Species listed as adversely affected by cat predation include Partridge Pigeon, Black-footed Tree-rat, Northern Quoll and Fawn Antechinus. Northern Quoll also have been identified as being negatively affected by cane toads.

9.2.3 Nationally Threatened Species

A likelihood of occurrence and assessment of potential for significant impact on species with potential to occur in the Project area was completed (Table 9-1). While this section addressed EPBC Act listed species the assessment in a combined consideration of both TPWC Act and EPBC Act listed species to provide a single reference source for the Draft EIS. No threatened fauna species listed under the EPBC Act have been identified in the Project area during any ecological survey, and this indicates their likelihood to occur in the area at some point in time and does not necessarily indicate current presence.

Table 9-2 Assessment of Likelihood of Occurrence and Potential Significant Impact of Fauna Species

Common Name	Scientific Name	Status ²³		Preferred Habitat	Records within 25 km ²⁴ / Most Recent	Assessment of Likelihood of Occurrence	Indicative Land Units ²⁵	Assessment of Significant Impact
		NT	Cth					
Threatened (non-migratory) Birds								
Yellow Chat (Alligator Rivers)	<i>Epthianura crocea tunneyi</i>	E	E	Tall grasslands and samphire shrublands (on coastal salt pans).	0	Unlikely Suitable habitat does not appear to exist in Project area	-	Unlikely Suitable habitat does not appear to exist in Project area
Red Goshawk	<i>Erythroriorchis radiatus</i>	V	V	Coastal and subcoastal tall, open forest and woodlands, tropical savannas traversed by rivers lined with timber, and along the edges of rainforest (including paperbark forest and gallery forests) (Woinarski, 2006; Marchant & Higgins 1993 cited in DEWHA 2010). The species generally only nests in trees taller than 20 m and within 1 km of a watercourse or wetland, but not in areas with fragmented vegetation (Aumann & Baker-Gabb, 1991; Czechura 2001 cited in TSSC 2015a). The species hunts within a home range of up to 200 km ² in open forests and gallery forests (Czechura & Hobson, 2000, cited in TSSC 2015a).	6 / 2018	Unlikely (for breeding) The Project area is to be further than 1 km from a (substantial) watercourse or wetland. If the area is not used for breeding (evident via nests), the species may forage within the habitats of the Project area.	N/A	Unlikely No breeding habitat on site.
Gouldian Finch	<i>Erythrura gouldiae</i>	V	E	Feb-Oct: wooded hills with <i>Eucalyptus tintinnans</i> . Nov-Jan: lowland drainages (DEWHA 2010).	90 / 2019	Possible Widespread woodlands of <i>E. miniata</i> , <i>E. tetradonta</i> and <i>E. tintinnans</i> (LES 2017) – the latter is a known breeding tree species. This aligns with land unit 2b, and somewhat aligns with the Baker land system. In addition, EcOz, in their referral, state there are occasional <i>T. tintinnans</i> across land unit 2b and that there are patches of <i>E. tintinnans</i> and <i>Corymbia</i> dominated open woodland on hills and rises. These areas could comprise suitable habitat.	2b / Baker land system	Unlikely The Project is not likely to increase the impacts of the threatening processes identified and from the lack of recorded evidence of the Gouldian Finch inhabiting the area, the Project is unlikely to have a significant impact on a population of this species. However, further field surveys proposed to improve the MNES significant impact assessment robustness.
Grey Falcon	<i>Falco hypoleucos</i>	V	V	Timbered lowland plains in arid and semi-arid Australia (TSSC 2020).	3 / 2002	Possible Species may occasionally utilise habitats in the Project area for foraging. However, the Project area is not within the species' preferred distribution and suitable breeding habitat does not appear to occur.	Any (for foraging)	Unlikely Wide ranging species and Project area is not within species' 'preferred' range. Therefore, the Project is unlikely to significantly impact the species.
Crested Shrike-tit	<i>Falcunculus frontatus whitei</i>	-	V	A range of eucalypt and melaleuca woodlands; from relatively wet, though still strongly seasonal, areas in Arnhem Land to semi-arid woodlands of the southern Victoria River District (Woinarski and Ward 2012a)	0	Possible Suitable habitat occurs in the Project area. The species may occur, at least occasionally (noting that the species is thought to be in low densities across the landscape).	Almost any	Unlikely No local records and species is thought to occur in low densities across landscape, therefore an important population unlikely to occur within Project area.
Partridge Pigeon	<i>Geophaps smithii</i>	V	V	Principally in lowland eucalypt open forests and woodlands, with grassy understoreys and dominated by <i>Eucalyptus tetradonta</i> and <i>E. miniata</i> that has a structurally diverse understorey (DEWHA 2010).	36 / 2019	Possible Suitable habitat may exist in the form of eucalypt open forests and woodlands. Not recorded during 2016 and 2017 surveys (LES 2017).	2a, 2b	Unlikely The Partridge Pigeon was not recorded during either the November 2016 or May 2017 on-ground surveys, but there were three records noted north of the accommodation camp in the past (recorded in 1987 and 1988). There remains a high likelihood that the Partridge Pigeon could occur in the Project area. The proposed operations are not likely to increase the impact of key threats on the Partridge Pigeon. Therefore it is not expected that the Project will have a significant impact on an important population of this species.

²³ Conservation status under either the *Environment Protection and Biodiversity Conservation Act 1999* ('Cth.') or *Territory Parks and Wildlife Conservation Act* ('NT'): CE = Critically Endangered, E = Endangered, V = Vulnerable, M = Migratory, '-' = not listed

²⁴ As per the NT Flora and Fauna Atlases (as of June 2021)

²⁵ This provides an indication of potential vegetation communities that the species may occur in. Refinement should be conducted on the ground to target areas of suitable habitat within these areas

Common Name	Scientific Name	Status ²³		Preferred Habitat	Records within 25 km ²⁴ / Most Recent	Assessment of Likelihood of Occurrence	Indicative Land Units ²⁵	Assessment of Significant Impact
		NT	Cth					
Australian Painted Snipe	<i>Rostratala australis</i>	V	E	Shallow, vegetated, freshwater swamps, claypans or inundated grasslands or saltmarshes (including temporary wetlands) (Marchant and Higgins 1993 cited in DEWHA 2010; Taylor and Chatto 2013). Likely to occur on any shallow ephemeral wetlands in central or southern NT. Possibly occurs in northern areas of the NT.	0	Possible Suitable habitat is apparently present in Annie's Dam (at least). However, no records exist within 25 km. Only four records exist in the greater Darwin region with the most recent being from 2006. The <i>Survey guidelines for Australia's threatened birds</i> (DEWHA 2010) indicate the species occurs mainly in south-eastern Australia. Despite this, given the species is thought to be nomadic or migratory (Taylor and Chatto 2013; DEWHA 2010) and it may be present from time to time.	Wetlands	Unlikely Given there are no local records and a paucity of regional records, plus the species is thought to be nomadic or migratory and mostly occur in south-eastern Australia, it is unlikely that the Project would significantly impact the species.
Masked Owl	<i>Tyto novaehollandiae kimberli</i>	V	V	Mainly in eucalypt tall open forests (esp. those dominated by <i>Eucalyptus miniata</i> , <i>E. tetradonta</i> and <i>Corymbia nesophila</i>) and commonly roosts in monsoon rainforests and forages in more open vegetation types, including grasslands and "treeless plains" (Woinarski & Ward 2012b).	0	Possible Whilst no records exist within 25 km of the survey area, there may be suitable habitat in the form of tall <i>E. miniata</i> / <i>E. tetradonta</i> eucalypt woodlands (potentially land unit 2 and 2b). If the area is not used for breeding, the species may forage within the habitats of the survey area.	2a, 2b Most other vegetation for foraging.	Unlikely Given there are no local records and a paucity of regional records, and the species was not detected during relatively recent surveys (LES 2017), it is unlikely that the Project would significantly impact the species.
Threatened and Migratory Birds								
Red Knot	<i>Calidris canutus</i>	V	E, M	Intertidal mudflats and sandflats Also, some species may occur in inland wetlands	1 / 2018	Possible The only potentially suitable habitat for some of these species is Annie's Dam, which is a freshwater dam, measuring approximately 4 ha. It comprises shallow, low-sloping edges with emergent aquatic vegetation. All other waterbodies are steep-sided (e.g., pits), too small or are ephemeral streams.	Annie's Dam	Unlikely No migratory birds were detected during surveys conducted in 2016 and 2017 (LES 2017). Given the relatively small area of potentially suitable habitat (i.e., Annie's Dam) for any of these species, regardless of whether any individuals utilise it, it is unlikely to constitute important habitat nor be significantly impacted by the Project.
Curlew Sandpiper	<i>Calidris ferruginea</i>	V	CE, M		0			
Great Knot	<i>Calidris tenuirostris</i>	V	CE, M		2 / 2018			
Greater Sand Plover	<i>Charadrius leschenaultii</i>	V	V, M		3 / 2013			
Lesser Sand Plover	<i>Charadrius mongolus</i>	V	E, M		4 / 2019			
Eastern Curlew	<i>Numenius madagascariensis</i>	V	CE, M		2 / 1973			
Mammals								
Fawn Antechinus	<i>Antechinus bellus</i>	E	V	Savannah woodland and tall open forest; shelters in tree hollows and fallen logs (Young 2012). It occurs mostly in open forests and woodlands dominated by <i>Eucalyptus miniata</i> and/or <i>E. tetradonta</i> , particularly where these forests have a relatively dense shrubby understorey (Friend, 1985; Friend and Taylor, 1985; cited in TSSC 2015). It is less frequently found in areas with frequent intense fires (Corbett <i>et al.</i> 2003; cited in TSSC 2015b)).	1 / 1988	Possible There is a paucity of recent local and regional records, and the species was not identified during surveys conducted in the 1990's to the east of the Project area. There is also a high fire frequency in Rustlers Roost (Less so in Q22 and the accommodation area) which is likely to have diminished the quality of habitat for the species by removing logs and other ground substrate. The species this shows a preference for areas exposed to cooler and less frequent fires (Woinarski <i>et al.</i> 2004; cited in Young 2012). There is a single record within 25 km is from 1988. However, the species is still occasionally being recorded in some locations.	2a, 2b (except for areas with little ground substrate (e.g., highly disturbed areas)	Unlikely Despite targeted survey effort, the Fawn Antechinus was not recorded during either November 2016 or May 2017, but the species has been recorded 3.5 km south-east of the accommodation camp. There remains a low to-moderate likelihood that the Fawn Antechinus occurs within the Project area. However, further field surveys proposed to improve the MNES significant impact assessment robustness.

Common Name	Scientific Name	Status ²³		Preferred Habitat	Records within 25 km ²⁴ / Most Recent	Assessment of Likelihood of Occurrence	Indicative Land Units ²⁵	Assessment of Significant Impact
		NT	Cth					
Brush-tailed Rabbit-rat	<i>Conilurus penicillatus</i>	E	V	Eucalypt tall open forest. May also occur on coastal grasslands (with scattered large <i>Casuarina equisetifolia</i> trees, beaches, and stunted eucalypt woodlands on stony slopes). It shelters in tree hollows, hollow logs and, less frequently, in the crowns of pandanus or sand-palms. It has been demonstrated to prefer tall eucalypt forests away from wet areas in sites that had not been exposed to recent severe fires (Firth <i>et al.</i> , 2006a; cited in TSSC 2016).	0	Unlikely There are no records in the vicinity of the Project area (despite several surveys) and, at least in the Rustlers Roost, most of the eucalypt woodlands have burnt frequently. Both factors substantially contribute to an 'unlikely' conclusion.	2a, 2b	Unlikely Given there are no local records and a paucity of regional records, and the species was not detected during relatively recent surveys (LES 2017), it is unlikely that the Project would significantly impact the species.
Northern Quoll	<i>Dasyurus hallucatus</i>	CE	E	Wide range of habitats, but the most suitable habitats appear to be rocky areas and it was once common in many eucalypt open forests (Woinarski and Hill 2012). DotE (2016) describes suitable habitat in the top end of the NT as rocky areas and tall open coastal eucalypt forests, with prime habitat being sandstone escarpment. DotE (2016) also states that habitat in Kakadu includes open forest and woodlands on plains dominated by <i>Eucalyptus tetradonta</i> , <i>E. miniata</i> and <i>E. tectifera</i> , and riparian areas with flowing water dominated by <i>Melaleuca viridiflora</i> and <i>Pandanus spiralis</i> (Oakwood 2000; cited in DotE (2016). Critical habitat (relevant to the survey area), as defined by DotE (2016), includes "structurally diverse woodland or forest areas containing large diameter trees, termite mounds or hollow logs".	63 / 2009 ²⁶	Possible Utilising the definition of critical habitat by DotE (2016), potentially suitable habitats within the Project area include land units 2a and 2b, though only where it is structurally diverse, contains large trees, termite mounds or hollow logs, or flowing water. Much of the potentially suitable habitat in Rustlers Roost has burnt nearly every year (over the last 20 years (NAFI 2021). The site may be occasionally used for foraging or traversed by dispersing young males, given the historic records nearby, it is appropriate to consider that the species may occur there.	2a and 2b though only where it is structurally diverse, contains large trees, termite mounds or hollow logs, or flowing water.	Unlikely Given the low availability of habitat in the survey areas, and the lack of sign that the Northern Quoll was present during on-ground surveys, there is a low likelihood that this species is present in the Project area. However, further field surveys proposed to improve the MNES significant impact assessment robustness.
Ghost Bat	<i>Macroderma gigas</i>	-	V	Often roost in a deep crack or cave during the day and perch in vegetation nearby during the night (Ward and Milne 2016).	0	Possible Its distribution is influenced by the availability of suitable caves and mines for roost sites. Rocky areas may contain suitable roosts. Recently, it has mostly been recorded in the Pine Creek, Katherine, Kakadu and Litchfield regions.	N/A (though rocky areas should be targeted)	Unlikely Two bat detectors (a SongMeter SM2BAT+ and a SongMeter SM3BAT) were deployed at ten sites encompassing the three survey areas for the 2017 survey. No Ghost Bats were recorded. No caves were identified in the disturbance area. However, further field surveys proposed to improve the MNES significant impact assessment robustness.
Black-footed Tree-rat	<i>Mesembriomys gouldii gouldii</i>	V	E	The Black-footed Tree-rat lives in tropical woodlands and open forests, mainly dominated by <i>Eucalyptus miniata</i> and/or <i>E. tetradonta</i> (TSSC 2015c). It prefers woodlands and forests with a relatively dense shrubby understorey (Friend and Taylor, 1985; Friend 1987; cited in TSSC 2015c). It shelters in tree hollows and pandanus stands during the day (Hill 2012). It forages both on the ground and in trees and may travel at least 500 m from roost sites to foraging areas (Friend <i>et al.</i> 1992), cited in TSSC, 2015c).	2 / 1999	Possible Whilst there is a paucity of records in the NT Fauna Atlas from the local area, one individual was recorded during surveys in Mount Bunday Creek (north of the Project area and not in the NT Fauna Atlas). Suitable habitat may occur on site based on analysis of aerial imagery and land unit mapping and a review of existing literature (e.g., LES 2017), though high fire frequency in Rustlers Roost may reduce its likelihood to occur in that area.	2a, 2b Potentially suitable – elsewhere	Unlikely Camera traps, cage traps, spotlighting and searches for suitable habitat were undertaken for the Black-footed Tree Rat during the 2016 and 2017 surveys. Specifically, signs of scratching on trees and eaten fruit that may indicate the presence of the species were looked for. These signs were not found, and Black-footed Tree Rats were not camera- or live-trapped, and were not found during spotlighting despite there being potentially suitable habitat in the survey areas. Since 2017, extensive camera trapping on Mount Bunday Creek has confirmed a single occurrence. Therefore, there remains a likelihood that the species occurs within the survey areas, but the proposed operations are not expected to have a significant impact on a population of this species.
Nabarlek	<i>Petrogale concinna canescens</i>	V	E	Rocky areas (sandstone or granite), especially on steep slopes, with large boulders, caves and crevices (Ward and Woinarski 2012). May move to forage in adjacent flat areas.	0	Possible The species is restricted to rocky sandstone or granite areas, especially on steep slopes, with large boulders, caves and crevices, and may move to forage in adjacent flat areas (Ward & Woinarski, 2012). While there are no local records, there may be potentially suitable habitat near Quest 29 (escarpment or rocky steep hills)	N/A (steep, rocky hills / scarp)	Unlikely The closest record of the Nabarlek is 61 km south-east of Quest 29. Given the proximity of prior records, there is a low likelihood that the Nabarlek is present in the survey areas and it is unlikely to be significantly impacted. Nevertheless, further field surveys including the rocky outcrops near Quest 29 area proposed to improve the MNES significant impact assessment robustness.

²⁶ Only one record from 2009 with the remainder prior to 2000.

Common Name	Scientific Name	Status ²³		Preferred Habitat	Records within 25 km ²⁴ / Most Recent	Assessment of Likelihood of Occurrence	Indicative Land Units ²⁵	Assessment of Significant Impact
		NT	Cth					
Northern Brush-tailed Phascogale	<i>Phascogale pirata</i>	E	V	Tall open forests dominated by <i>Eucalyptus miniata</i> and <i>E. tetradonta</i> and shelters in hollows during the day (Woinarski and Ward, 2012c).	0	Possible Marginal habitat may exist on site, although no local records exist. Majority of records in the Top End are from the Garig Gunak Barlu, Kakadu and Litchfield National Parks.	2a, 2b	Unlikely The closest record of this the Northern Brush-tailed Phascogale to the survey areas is 53.5 km south-west of Rustlers Roost. Given the potentially suitable habitat in the survey areas, but considering the proximity to prior records, there is a moderate likelihood that the Northern Brush-tailed Phascogale occurs in the survey areas but it is unlikely the Project would significantly impact the species. However, further field surveys proposed to improve the MNES significant impact assessment robustness.
Bare-rumped Sheath-tailed Bat	<i>Saccolaimus saccolaimus</i>	-	VU	A large insectivorous bat that occurs in open <i>Pandanus</i> woodland and eucalypt tall open forests (Churchill 1998).	0	Possible Whilst it has been recorded across the region from Cobourg Peninsula to Keep River, it may be difficult to detect (D. Milne, pers. Comm. 2019).	Several (not specified)	Unlikely There is a moderate likelihood that the Bare-rumped Sheath-tailed Bat is present in the Project area. As proposed operations are within previously disturb areas, and any further disturbance will be generally localised it is not expected that there will be a significant impact on a population of this species. However, further field surveys proposed to improve the MNES significant impact assessment robustness.
Northern Brush-tailed Possum	<i>Trichosurus vulpecula arnhemensis</i>	-	VU	Tall eucalypt open forests with large hollow-bearing trees, some mangrove communities, some rainforests and some semi-urban areas (notably around Darwin) (TSSC 2021)	1 / 1989	Possible While there is a paucity of local records, there may be potentially suitable habitat.	Any	Unlikely The Northern Brushtail Possum is mainly threatened by frequent, intense fires, predation by feral cats and habitat modification from invasive grasses. The proposed operations are not likely to increase the impact of key threats on the Northern Brushtail Possum. Therefore it is not expected that the Project will have a significant impact on an important population of this species. However, further field surveys proposed to improve the MNES significant impact assessment robustness.
Water Mouse	<i>Xeromys myoides</i>	-	V	DotE (2015a) describes critical habitat for the species as all mangrove communities, intertidal communities, and coastal freshwater wetlands with one or more of the following features: <ul style="list-style-type: none"> intact hydrology prey resources (Crustaceans, marine polyclads and marine pulmonates and bivalves) active water mouse nest structures a defined supralittoral bank that could enable the construction of nests. Habitat critical to survival of the water mouse may not have all these features.	0	Unlikely No local and regional records. No potentially suitable habitat.	N/A	Unlikely Given there are no local records and a paucity of regional records, and no potentially suitable habitat occurs within the Project area, it is unlikely that the Project would significantly impact the species.
Reptiles								
Plains Death Adder	<i>Acanthopsis hawkei</i>	V	V	It is known to occur on the cracking soils on floodplains of the Adelaide River, Mary River and Alligator River, the cracking black soils of the Barkly Tableland on the NT/QLD border, the Mitchell Grass Downs of western QLD and likely on floodplains and cracking soil plains across mainland northern Australia (Ward and Phillips 2012).	7 / 2004	Unlikely No recent records exist in the local area and no suitable habitat exists on the site.	None	Unlikely No suitable habitat within Project area.

Common Name	Scientific Name	Status ²³		Preferred Habitat	Records within 25 km ²⁴ / Most Recent	Assessment of Likelihood of Occurrence	Indicative Land Units ²⁵	Assessment of Significant Impact
		NT	Cth					
Yellow-snouted Gecko	<i>Lucasium occultum</i>	V	E	Open forests dominated by <i>Eucalyptus miniata</i> and <i>E. tetradonta</i> , typically with red sandy-loam soils (Beggs, K. <i>et al.</i> 2012).	0 / -	<p>Possible</p> <p>Although no individuals were recorded marginal quality habitat occurs in the Project area. The closest records (in the NT Fauna Atlas) are approximately 30 km to the east and north-east.</p>	2a, 2b	<p>Unlikely</p> <p>Spotlighting efforts targeting the Yellow-snouted Gecko was undertaken over six nights during each survey. Searches for habitat suitable for the Yellow-snouted Gecko were also undertaken during the day while travelling through the survey areas. The Yellow-snouted Gecko has been recorded in areas with well-developed leaf litter and grasses in open forests with red sandy-loam soils. Red sandy loam soils were not recorded in the survey areas. Therefore, survey effort was targeted towards those sites with woodland vegetation and well-developed leaf litter. Despite survey efforts, the Yellow-snouted Gecko was not recorded in the survey areas during either on-ground survey period. Therefore, there is a low residual likelihood that the Yellow-snouted Gecko occurs in the Project area. However, further field surveys proposed to improve the MNES significant impact assessment robustness.</p>
Sharks								
Northern River Shark	<i>Glyphis garricki</i>	V	E	Rivers, tidal sections of large tropical estuarine systems, macrotidal embayments, inshore and offshore marine habitats (Pillans <i>et al.</i> 2009, cited in DotE 2015b)	0	<p>Unlikely</p> <p>Suitable habitat does not exist within the Project area.</p>	-	<p>Unlikely</p> <p>Suitable habitat does not exist within the Project area.</p>
Largetooth Sawfish	<i>Pristis pristis</i>	V	V, M	Sandy or muddy bottoms of shallow coastal waters, estuaries and river mouths, as well as the central and upper reaches of freshwater rivers and isolated water holes (DotE 2015b)	2 / 2007		-	

9.2.4 Migratory Species

A desktop study was undertaken to identify migratory species potentially occurring within the Project area. A search of the PMST revealed 19 migratory species as potentially occurring within a 25 km radius of the Project area (Table 9-3 and Appendix R). In addition, the NT Fauna Atlas contains an additional 22 migratory species that have been recorded within 25 km of the Project area. All 41 species have been placed in to four categories for the purpose of this assessment – migratory marine species (excluding birds), migratory shorebirds, migratory species contained in the Referral guideline for 14 birds listed as migratory species under the EPBC Act (DotE 2015) and migratory - other, as discussed in the following sections.

Four of these 19 are also threatened species – the Curlew Sandpiper (*Calidris ferruginea*), Eastern Curlew (*Numenius madagascariensis*) (both Critically Endangered), Greater Sand Plover (*Charadrius leschenaultia*) and Freshwater Sawfish (*Pristis pristis*) (both Vulnerable). These species are assessed against the relevant threatened species criteria in Section 9.2.3.

Table 9-3 Migratory Species Identified in the PMST and Fauna Atlas as Occurring, or Potentially Occurring, within 25 km of the Project Area

Species	Common Name	PMST	NT Fauna Atlas
Migratory Marine Species (excluding birds)			
<i>Crocodylus porosus</i>	Saltwater Crocodile	✓	✓
<i>Pristis pristis</i>	Freshwater Sawfish	✓	✓
Migratory Shorebirds			
<i>Actitis hypoleucos</i>	Common Sandpiper	✓	✓
<i>Arenaria interpres</i>	Ruddy Turnstone	-	✓
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	✓	✓
<i>Calidris alba</i>	Sanderling	-	✓
<i>Calidris canutus</i>	Red Knot	-	✓
<i>Calidris ferruginea</i>	Curlew Sandpiper	✓	-
<i>Calidris melanotos</i>	Pectoral Sandpiper	✓	-
<i>Calidris ruficollis</i>	Red-necked Stint	-	✓
<i>Calidris tenuirostris</i>	Great Knot	-	✓
<i>Charadrius leschenaultii</i>	Greater Sand Plover	✓	✓
<i>Charadrius mongolus</i>	Lesser Sand Plover	-	✓
<i>Charadrius veredus</i>	Oriental Plover	✓	✓
<i>Gallinago megala</i>	Swinhoe's Snipe	-	✓
<i>Glareola maldivarum</i>	Oriental Pratincole	✓	✓
<i>Heteroscelus brevipes</i>	Grey-tailed Tattler	-	✓
<i>Limosa</i>	Black-tailed Godwit	-	✓
<i>Numenius madagascariensis</i>	Eastern Curlew	✓	✓
<i>Numenius minutus</i>	Little Curlew	-	✓
<i>Numenius phaeopus</i>	Whimbrel	-	✓

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Species	Common Name	PMST	NT Fauna Atlas
<i>Pluvialis fulva</i>	Pacific Golden Plover	-	✓
<i>Tringa glareola</i>	Wood Sandpiper	-	✓
<i>Tringa nebularia</i>	Common Greenshank	-	✓
<i>Tringa stagnatilis</i>	Marsh Sandpiper	-	✓
<i>Xenus cinereus</i>	Terek Sandpiper	-	✓
Migratory species contained in the Referral guideline for 14 birds listed as migratory species under the EPBC Act (DotE 2015)			
<i>Acrocephalus orientalis</i>	Oriental Reed-Warbler	✓	-
<i>Apus pacificus</i>	Fork-tailed Swift	✓	✓
<i>Cecropis daurica</i>	Red-rumped Swallow	✓	-
<i>Cuculus optatus</i>	Oriental Cuckoo	✓	✓
<i>Hirundo rustica</i>	Barn Swallow	✓	-
<i>Motacilla cinerea</i>	Grey Wagtail	✓	-
<i>Motacilla flava</i>	Yellow Wagtail	✓	-
<i>Pandion haliaetus</i>	Osprey	✓	✓
<i>Rhipidura rufifrons</i>	Rufous Fantail	✓	-
Migratory – other			
<i>Chlidonias leucopterus</i>	White-winged Black Tern	-	✓
<i>Hydroprogne caspia</i>	Caspian Tern	-	✓
<i>Plegadis falcinellus</i>	Glossy Ibis	-	✓
<i>Sterna dougallii</i>	Roseate Tern	-	✓
<i>Sterna hirundo</i>	Common Tern	-	✓
<i>Sternula albifrons</i>	Little Tern	-	✓

9.2.4.1 Migratory Marine Species (Excluding Birds)

Two migratory marine (non-bird) species – the Saltwater Crocodile (*Crocodylus porosus*) and the Freshwater Sawfish (*Pristis pristis*) have been recorded within 25 km of the Project area. Based on the analysis of aerial imagery and land unit mapping, it is determined that the Freshwater Sawfish is unlikely to occur in the Project area given the absence of suitable habitat.

However, the Saltwater Crocodile is considered as potentially occurring in the Project area given the presence of ephemeral watercourses intersecting the Project area and anecdotal sightings. In the absence of any species-specific referral guidelines for Saltwater Crocodiles, an assessment against the significant impact criteria for listed migratory species in the EPBC Act *Significant Impact Guidelines 1.1*. It is determined that a significant impact to the Saltwater Crocodile is unlikely because:

- There is unlikely to be any ‘important habitat’ for the species within the Project area; and
- The Project is unlikely to seriously disrupt the lifecycle of an ecologically significant proportion of Saltwater Crocodiles (though this has not been defined in a guideline).

9.2.4.2 Migratory Shorebirds

Twenty-four migratory shorebird species are known to, or may, occur within 25 km of the Project area. Analysis of vegetation and land unit mapping, aerial imagery, and survey results suggests that little suitable habitat exists for shorebird species in the Project area. The only potentially suitable habitat for shorebirds is Annie's Dam, which is a freshwater dam, measuring approximately 4 ha, and comprises shallow, low-sloping edges with emergent aquatic vegetation. All other waterbodies are either steep-sided (e.g., pits), too small or are ephemeral streams. In addition, no shorebirds were detected during surveys conducted in 2016 and 2017 (LES 2017), noting that only the 2016 survey was conducted during the period when most migratory shorebirds are present in Australia (September-March).

Upon analysis of the migratory species that have been recorded within 25 km of the Project area (in the NT Fauna Atlas), most records are concentrated on major watercourses, particularly the Mary River to the east. Using the industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species (EPBC Act Policy Statement 3.21 (DoEE 2017)), Annie's Dam (or anywhere within the Project area) is unlikely to meet the relevant criteria for the assessment of nationally important habitat for shorebirds, as follows:

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

Consequently, there is unlikely to be a significant impact to migratory shorebirds as they are not assessed further in the Draft EIS.

9.2.4.3 Migratory Species Contained in the Referral Guideline for 14 Birds Listed as Migratory Species Under the EPBC Act

Nine migratory species contained within the PMST results (of which two have been recorded within 25 km of the Project area) are included in the *Referral guideline for 14 birds listed as migratory species under the EPBC Act* (DotE 2015). The likelihood of the occurrence of each of these species and important habitats within the Project area was assessed by analysis of aerial imagery and land unit mapping as well as existing reports (e.g., LES 2017). None of these species were observed during the 2016 and 2017 ecological surveys, nor during ongoing aquatic ecology field surveys conducted at Mount Bundy Creek in 2015, 2017, 2018, 2019 and 2020. It is determined that four out of the nine species potentially occur within the Project area (Table 9-4). Significant impact thresholds of each of these four species are shown in Table 9-5 with an assessment against the significant impact criteria shown in Table 9-6. It is concluded that no migratory species contained in the *Referral guideline for 14 birds listed as migratory species under the EPBC Act* (DotE 2015) are likely to be significantly impacted as a result of the Project.

Table 9-4 Assessment of the Likelihood of Occurrence for Species in the Referral Guideline for 14 Birds Listed as Migratory Species Under the EPBC Act

Species	Marine	Migratory	EPBC Act Threatened Species Status	Important habitat ²⁷		No. of records within 25 km (NT Fauna Atlas) / Most Recent Year Detected	Likelihood of Species Occurrence in Project Area
				Description	Presence in Project Area		
Fork-tailed Swift (<i>Apus pacificus</i>)	✓	✓	-	Non-breeding habitat only: Found across a range of habitats, from inland open plains to wooded areas, where it is exclusively aerial.	Present – wide range of habitats	11 / 2019	Likely – Recent records in region and potential suitable habitat in Project area.
Red-rumped Swallow (<i>Cecropis daurica</i>)	✓	✓	-	Non-breeding habitat only: predominately forages over wetlands and open well-watered grasslands.	Possible – Annie’s Dam (at least)	0 / -	Unlikely – Extremely uncommon migrant to Australia (DotE 2015). No local records and paucity of regional (and national) records.
Oriental Cuckoo (<i>Cuculus optatus</i>)	-	✓	-	Non-breeding habitat only: monsoonal rainforest, vine thickets, wet sclerophyll forest or open Casuarina, Acacia or Eucalyptus woodlands. Frequently at edges or ecotones between habitat types. Riparian forest is favoured habitat in the Kimberley region.	Probable – range of habitats.	10 / 2015	Likely – Two records approximately 2 km north of Quest 29. Suitable habitat may to occur in Project area.
Barn Swallow (<i>Hirundo rustica</i>)	✓	✓	-	Non-breeding habitat only: occurs in the air above open vegetated areas including native and agricultural grasslands as well as over open water areas.	Possible – Annie’s Dam (at least)	0 / -	Unlikely – Extremely uncommon migrant to Australia (DotE 2015). No local records and paucity of regional records.

²⁷ As described in the *Referral guideline for 14 birds listed as migratory species under the EPBC Act* (Department of the Environment, 2015)

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Species	Marine	Migratory	EPBC Act Threatened Species Status	Important habitat ²⁷		No. of records within 25 km (NT Fauna Atlas) / Most Recent Year Detected	Likelihood of Species Occurrence in Project Area
				Description	Presence in Project Area		
Grey Wagtail (<i>Motacilla cinerea</i>)	✓	✓		Non-breeding habitat only: has a strong association with water, particularly rocky substrates along water courses but also lakes and marshes.	Possible – rocky creek lines and/or Annie’s Dam	0 / -	Unlikely – Extremely uncommon migrant to Australia (DotE 2015). No local records and paucity of regional records.
Yellow Wagtail (<i>Motacilla flava</i>)	✓	✓	-	Non-breeding habitat only: mostly well-watered open grasslands and the fringes of wetlands. Roosts in mangroves and other dense vegetation.	Possible – Annie’s Dam (at least)	0 / -	Unlikely – Extremely uncommon migrant to Australia (DotE 2015). No local records and paucity of regional records.
Rufous Fantail (<i>Rhipidura rufifrons</i>)	✓	✓		Moist, dense habitats, including mangroves, rainforest, riparian forests and thickets, and wet eucalypt forests with a dense understorey. When on passage a wider range of habitats are used including dry eucalypt forests and woodlands and Brigalow shrublands.	Probable – riparian vegetation around Annie’s Dam or along creeks.	111 / 2019 (<i>Rhipidura dryas</i> ²⁸)	Likely – Suitable habitat may exist in the Project area, and there are numerous local records.
Oriental Reed-Warbler (<i>Acrocephalus orientalis</i>)	✓	✓	-	Non-breeding habitat only: emergent aquatic vegetation along waterways and water bodies.	Possible – Annie’s Dam.	0 / -	Unlikely – Extremely uncommon migrant to Australia (DotE 2015). No local records and paucity of regional records.

²⁸ The Draft referral guideline for 14 birds listed migratory under the EPBC Act list this species in the NT as *Rhipidura rufifrons* and displays numerous sightings in the NT, however this species is not included in the NT Fauna Atlas. Rather, the NT Fauna Atlas contains records for *Rhipidura dryas*. In the referral guidelines, the 'Arafura Rufous Fantail' is stated as a population of the migratory species, which is assumed to be the same as *Rhipidura dryas*.

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Species	Marine	Migratory	EPBC Act Threatened Species Status	Important habitat ²⁷		No. of records within 25 km (NT Fauna Atlas) / Most Recent Year Detected	Likelihood of Species Occurrence in Project Area
				Description	Presence in Project Area		
Osprey (<i>Pandion haliaetus</i>)	✓	✓	-	Bays, estuaries, along tidal stretches of large coastal rivers, mangrove swamps, coral and rock reefs, terrestrial wetlands and coastal lands of tropical and temperate Australia and offshore islands. They feed primarily in the sea or nearby estuarine waters and nest in trees (often dead or with dead tops), rocky coastlines and on artificial structures such as telecommunication towers. Ospreys are generally found on or near the coast but also range inland along large rivers, mainly in northern Australia.	Unlikely – site is not coastal, does not contain a large river. The closest large river (McKinlay River) is approximately 6 km east of Quest 29. The Mary River is approximately 7 km east of the accommodation facility.	0 / -	Unlikely – No suitable habitat or local records.

Table 9-5 Potentially Occurring Migratory Species Significant Impact Threshold as per Draft Referral Guideline for 14 Birds Listed as Migratory Under the EPBC Act

Common Name	Ecologically Significant Proportion of a Population		Invasive Species Harmful to the Migratory Species	Important Habitat Area Thresholds (ha)	
	1%	0.1%		1%	0.1%
Fork-tailed Swift	1,000	100	Unknown	*29	*
Oriental Cuckoo	10,000	1,000	Unknown	250,000	25,000
Arafura Rufous Fantail	22,000	2,200	Black Rat (<i>Rattus rattus</i>), invasive vines of riparian habitat (e.g. rubber vine <i>Cryptostegia grandiflora</i>)	4,500	450
Salt-water Crocodile	Unknown	Unknown	Buffalo ³⁰	Unknown	Unknown

Table 9-6 Assessment Against Significant Impact Criteria: Migratory Species Contained in the Draft Referral Guidelines for 14 Birds Listed as Migratory Under the EPBC Act

Criterion	Assessment against Significant Criteria
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species.	Unlikely – The Project is unlikely to adversely affect the minimum area thresholds of important habitat for any potentially occurring species.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species.	Unlikely – The Project is unlikely to result in an established invasive species in the Project area for any of the potentially occurring migratory species. Buffaloes and Black Rats already occur in the region.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	Unlikely – It is highly unlikely that there is an ecologically significant proportion of any of the potentially occurring species within the Project area.
Assessment of potential for significant residual impacts	The Project does not meet any of the criteria that would constitute a significant impact to migratory species. As such, it is concluded that the proposed development is unlikely to significantly impact any of the four potentially occurring migratory species.

²⁹ No threshold area is shown for the Fork-tailed Swift within the *Draft referral guideline for 14 birds listed migratory under the EPBC Act* (DoE, 2015).

³⁰ Stated in the Australian Government's Species Profile and Threats Database as a threat to Saltwater Crocodiles.

9.2.4.4 Other Migratory Species

Six remaining migratory species have either been recorded, or potentially occur, within 25 km of the Project area. Of these, five are Tern species and one is the Glossy Ibis. The only potentially suitable habitat for these species is likely to be Annie's Dam, which is a freshwater dam, measuring approximately 4 ha. The dam comprises shallow, low-sloping edges with emergent aquatic vegetation. All other waterbodies are steep-sided (e.g. pits), too small or are ephemeral streams. In addition, no migratory birds were detected during surveys conducted in 2016 and 2017 (LES 2017). Given the relatively small area of potentially suitable habitat (i.e., Annie's Dam) for any of these species, regardless of whether any individuals utilise it, it is unlikely to constitute important habitat nor be significantly impacted by the Project.