EPBC ACT REFERRAL – ATTACHMENT 1 – ASSESSMENT OF IMPACTS TO MNES

HEMI GOLD PROJECT

12 MAY 2023

Attachment 1 - Assessment of Impacts to MNES Hemi Gold Project

REVISION HISTORY

Rev	Description	Date
0	Assessment of Impacts to MNES	12 May 2023

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Hemi Gold Project

1. INTRODUCTION

1.1 Purpose of Attachment

This attachment has been prepared to provide additional relevant information to support referral of the Hemi Gold Project (Hemi, the Project, or the Action) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). It complements the information in, and should be read in conjunction with, the EPBC Act Referral Form (Referral Form).

The owner and proponent of the Project is De Grey Mining Limited (De Grey).

1.2 Scope of Attachment

This attachment provides an assessment of the potential impacts of the Hemi Gold Project on Matters of National Environmental Significance (MNES), and associated mitigation measures, to enable the Department of Climate Change, Energy, the Environment and Water (DCCEEW) to determine whether the Project is likely to have a significant impact on MNES. The attachment provides assessments of the significance of impacts to the MNES in Table 1-1.

Table 1-1: Summary of MNES

Species	Conservation Status (EPBC Act)	Recorded	Section
Seringia exastia (Fringed Fire-bush)	Critically Endangered	Recorded	Section 3.2
Dasyurus hallucatus (Northern Quoll)	Endangered	Recorded	Section 4.3
Macrotis lagotis (Greater Bilby)	Vulnerable	Recorded	Section 4.4
Rhinonicteris aurantia (Pilbara Leaf-nosed Bat)	Vulnerable	Recorded	Section 4.5
Macroderma gigas (Ghost Bat)	Vulnerable	Not recorded	Section 4.6
Liasis olivaceus barroni (Pilbara Olive Python)	Vulnerable	Not recorded	Section 4.7
Falco hypoleucos (Grey falcon)	Vulnerable	Not recorded	Section 4.8
Pezoporus occidentalis (Night Parrot)	Endangered	Not recorded	Section 4.9
Migratory Species	Migratory	One species recorded	Section 4.10

1.3 Summary of Attachments to the EPBC Referral

This is Attachment 1 to the Hemi Gold Project Referral Form. Other attachments to the Referral Form are:

- Attachment 2: Additional Information on Hydrology and Hydrogeological Studies.
- Attachment 3: Additional Information on Traditional Owner Consultation.
- Attachment 4: Exploration Environmental Management Plan
- Attachment 5: Flora and Vegetation Studies Hemi – Part 1 (Umwelt, 2023).
- Attachment 5: Flora and Vegetation Studies Hemi – Part 2 (Umwelt, 2023).
- Attachment 5: Flora and Vegetation Studies Hemi – Part 3 (Umwelt, 2023).
- Attachment 5: Flora and Vegetation Studies Hemi – Part 4 (Umwelt, 2023).
- Attachment 6: Detailed Vertebrate Fauna Survey 2021 – 2022 (Western Wildlife, 2023)
- Attachment 7: Status of *Seringia exastia* Hemi (Umwelt, 2022)
- Attachment 8: Fauna Management Plan Hemi (De Grey, 2022).

2. BACKGROUND INFORMATION

2.1 Location

The Project is located 85 km south of Port Hedland in the Pilbara region of Western Australia (Figure 2-1).

The Project is predominately located on the Indee Station Pastoral Lease with a small portion of the northern miscellaneous licences intersecting the Mundabullangana Station Pastoral Lease.

The project will proceed on the following mining tenure:

- Mining Lease M47/1628 (pending) submitted by Last Crusade Pty Ltd, a wholly owned subsidiary of De Grey. This lease application includes the Hemi deposits and the surrounding area.
- Miscellaneous Licences L45/600, L45/604 (pending), L 45/605, L45/612 (pending), L47/1047 (pending), L47/1048, L47/1049, L47/966 (pending), L47/963 (pending), L45/642, L47/1069 (pending), L47/1070, L47/1071 submitted by De Grey. These will be used for supporting infrastructure.

Tenement applications and the proposed development envelope are shown in Figure 2-2. Additional tenure (inside the proposed development envelope) will be applied for as needed.

2.2 Project Description

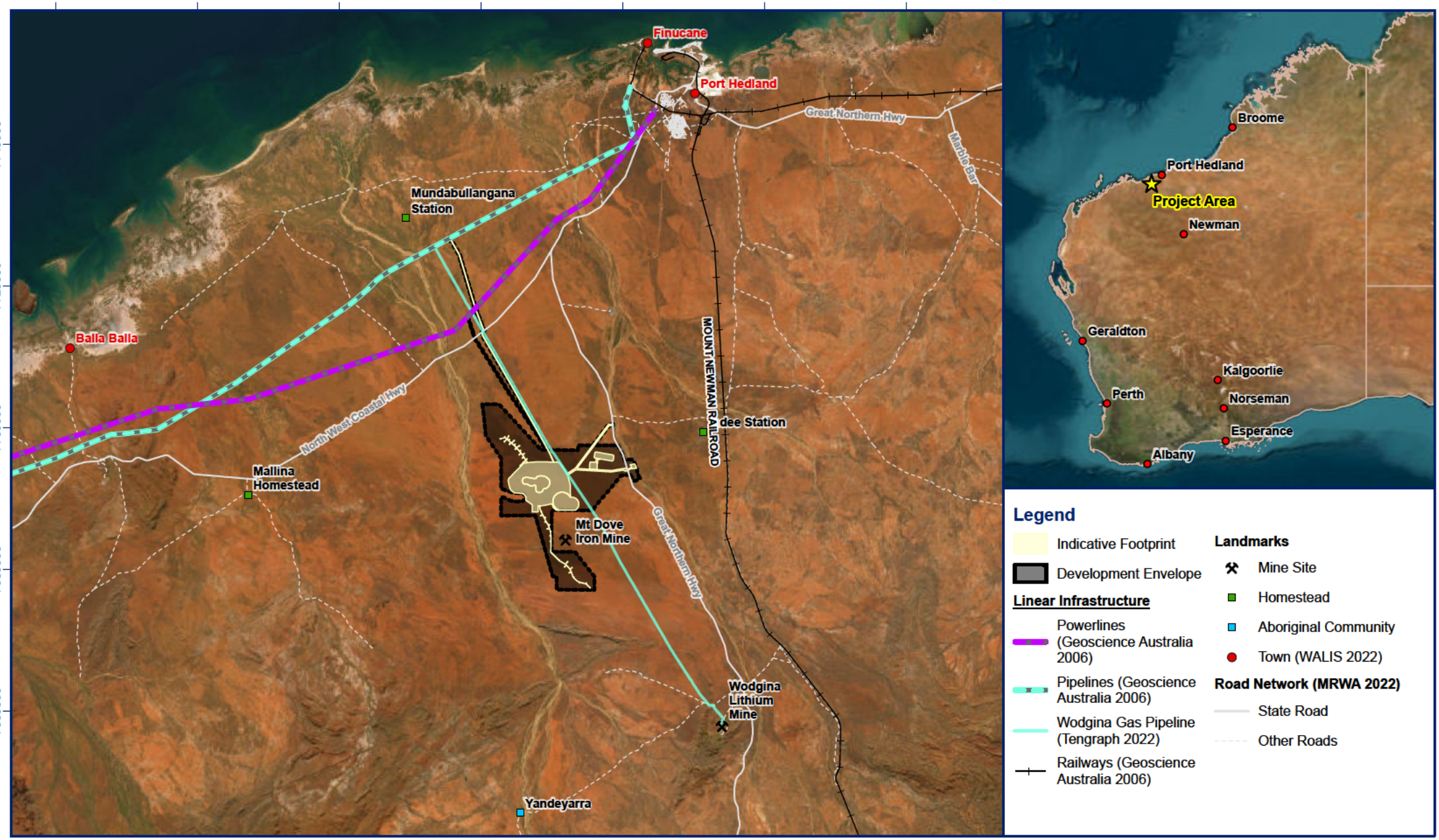
The key components of the Project will comprise:

- Open cut mining of gold bearing ore from six pits collectively known as the Hemi deposits (Aquila, Brolga, Crow, Diucon, Eagle, and Falcon).
    - Requires clearing of approximately 540 ha's of mapped *Macrotis lagotis* (Greater Bilby) habitat.
    - Increase in noise, vibration and light spill into Greater Bilby habitat.
- Construction and subsequent operation of a ~10 million tonne per annum (mtpa) processing plant.
    - Requires clearing of approximately 35 ha's of mapped Greater Bilby habitat.
    - Increase in noise, vibration and light spill into Greater Bilby habitat.
- Storage of tailings in a 2-cell, Integrated Waste Landform (IWL) Tailings Storage Facility (TSF).
    - Requires clearing of approximately 720 ha's of mapped Greater Bilby habitat.
- Water supply from the local groundwater aquifer with accompanying groundwater and surface water management infrastructure to facilitate mine dewatering and aquifer reinjection.
    - Requires clearing of approximately 70 ha's of mapped Greater Bilby habitat.
- Discharge of surplus water that is of acceptable quality into the Turner River, via water management ponds.
    - Requires clearing of approximately 15 ha's of mapped Greater Bilby habitat.
    - Requires clearing of approximately 35 ha's of mapped *Dasyurus hallucatus* (Northern Quoll), *Liasis olivaceous barroni* (Pilbara Olive Python) and *Falco hypoleucos* (Grey Falcon) habitat.
    - Alteration of the Turner River for Northern Quoll, Pilbara Olive Python from a seasonal flow to a continuous flow.
- Stockpiling of waste rock with rehabilitation to form safe, stable and non-polluting Waste Rock Landforms (WRLs).

  - Requires clearing of approximately 1,440 ha's of mapped Greater Bilby habitat.
  - Increase is weed species from rehabilitation activities.

- Stockpiling of low-grade ore separately from waste rock for future processing after high-grade ore is exhausted.
  - Requires clearing of approximately 80 ha's of mapped Greater Bilby habitat.
  - Potential for increase in weed species from rehabilitation activities, if low-grade ore stockpiles are not processed.
- Two linear infrastructure corridors to access the Karratha to Port Hedland Gas Pipeline and the electrical grid, north of the Hemi deposits. Once a decision is made regarding power supply, redundant corridors can be removed from the Development Envelope.
  - Requires clearing of approximately 200 ha's of mapped Greater Bilby habitat.
  - Increase in fire risk from power lines connecting Hemi to the electrical grid.
- Two linear infrastructure corridors for a sealed access road; dewatering infrastructure and potential power infrastructure, east of the Hemi deposits.
  - Requires clearing of approximately 350 ha's of mapped Greater Bilby habitat.
  - Potential for vehicle strikes to all fauna MNES.
- Power supply consisting of connection to the North West Interconnected System (NWIS) (preferred option), with potential for an on-site solar farm. On-site gas-fired power generation is available as a secondary option.
  - Clearing of Greater Bilby habitat if on-site solar farm is approved for construction and operation.
- Construction and operation of a sealed airstrip that can accommodate the operation of aircraft with capacity for approximately 100 passengers.
  - Requires clearing of approximately 250 ha's of mapped Greater Bilby habitat.
  - Potential for direct mortality from strikes with aircraft for all Migratory species and *Falco hypoleucos* (Grey Falcon).
- Construction of additional supporting infrastructure including offices, workshops, laydowns, explosives magazines, accommodation village, wastewater treatment, landfills, surface water management infrastructure, pipelines, and borrow pits.
  - Requires clearing of 2,100 ha's of mapped Greater Bilby habitat.
  - Potential for increase in feral predator species of all fauna MNES.
- An anticipated 15-year Life of Mine (including an initial two-year dewatering phase), followed by a closure phase.
  - Requires clearing of 5,750 ha's of mapped Greater Bilby habitat.
  - Requires clearing of 35 ha's of mapped Northern Quoll, Pilbara Olive Python and Grey Falcon habitat.
  - Potential for vehicle strikes to MNES.

A conceptual site layout is provided in Figure 2-3. Approximately 5,830 ha of clearing is required for the Project, inside a development envelope of 22,194 ha.



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PROJECT		CLIENT
May 2023	Hemi Gold Project Proposal	DE GREY MINING LTD
Figure 2-1		
ADV-AU-00241	Hemi Gold Project Location	

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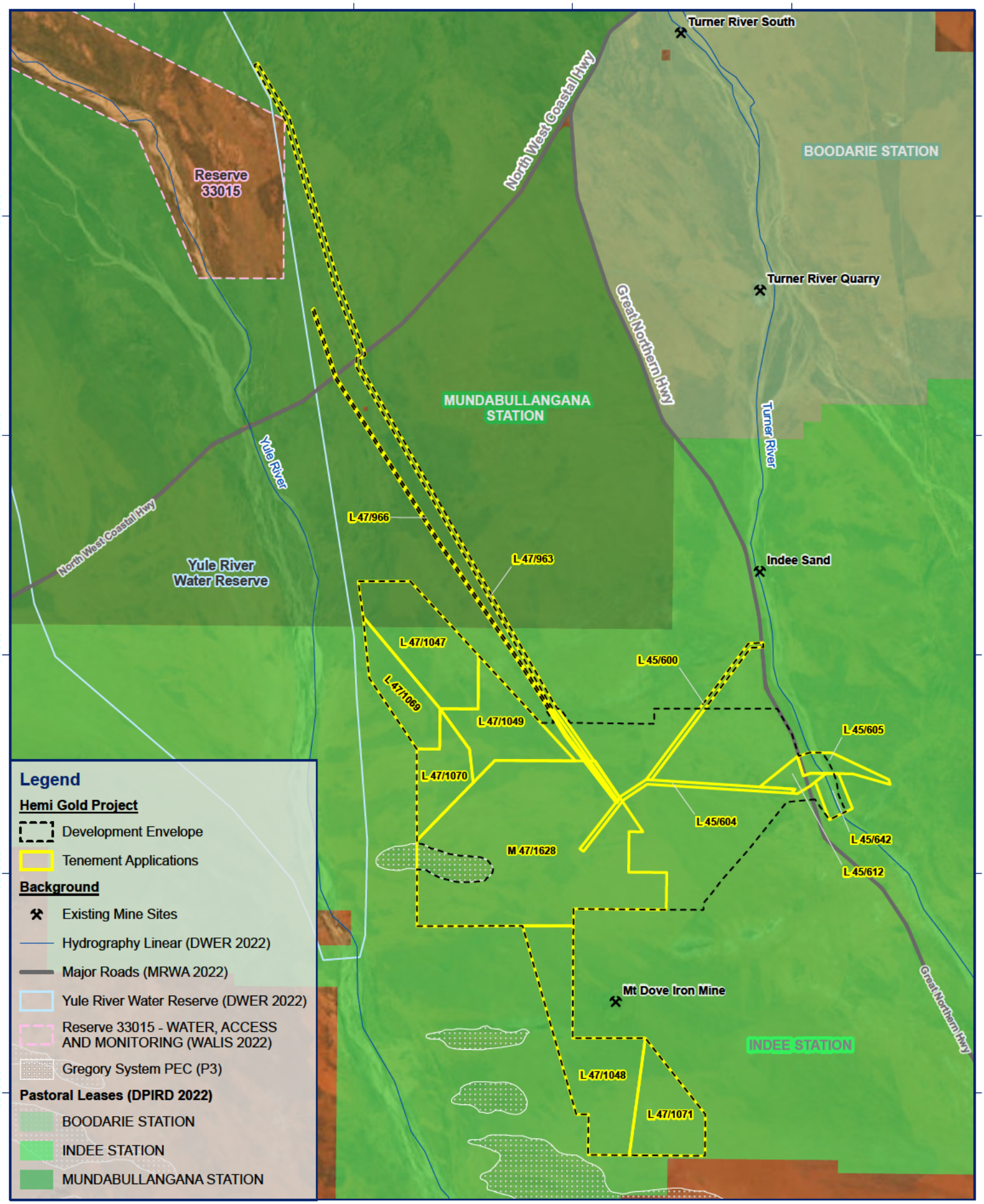

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Hemi Gold Project Proposal

Hemi Gold Project Tenement Plan and Development Envelope

Figure 2-2 | ADV-AU-00241 | May 2023

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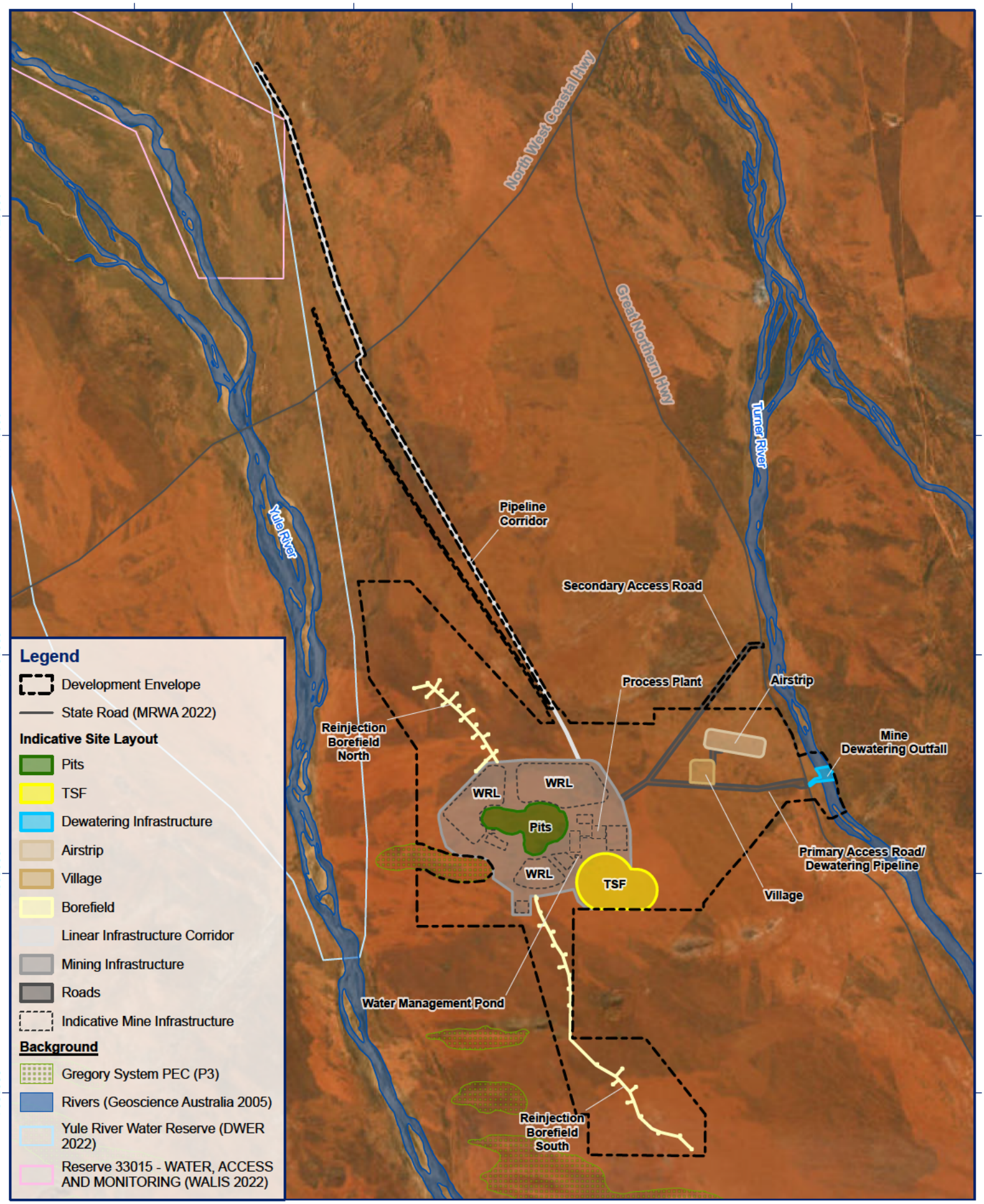

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Hemi Gold Project Proposal

Hemi Gold Project Indicative Site Layout

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Figure 2-3	ADV-AU-00241	May 2023

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2.3 Environmental Setting

The Project is in Chichester subregion (PIL1) of the Pilbara region, as described by the Interim Biogeographic Regionalisation for Australia (IBRA) Version 7 (DoEE, 2012). The dominant vegetation type of the Project area[1] can broadly be described as *Acacia* species over *Triodia* low hummock grassland/shrubland. The Project area is relatively flat and slopes gradually to the north-northwest with only local minor relief caused by occasional bedrock outcrop or sand dunes. Soils are typically sandy plains and pebbly plains.

The climate is characterised as semi-arid to tropical due to occasional severe weather from tropical cyclones and rain bearing depressions (ex-tropical cyclones). Most rainfall occurs between December and June, with an annual average rainfall of 317.7 mm (BOM, 2022).

Relatively shallow alluvium is widespread and forms a shallow aquifer that extends from Hemi to the Yule River but not the Turner River. The groundwater table is typically at 5 m to 10 m below the ground level. The shallow groundwater systems flow to the northwest and north-northwest across the project area under a low hydraulic gradient.

The Project area is located between the Yule River and Turner River catchments, within an internal catchment. An area of approximately 528 km^2 is upstream of the Project area. The Yule River and Turner River occur about 9 km to the west and 14 km to the east of the Hemi deposits.

2.4 Studies to Support Environmental Impact Assessment

De Grey has undertaken a comprehensive suite of environmental studies to characterise the existing baseline environment and analyse potential impacts from the Project. These are summarised in Table 2-1.

The findings of these studies indicate that MNES associated with the Project are limited to Threatened Flora and Fauna.

[1] The Project area is defined in Section 2 of the Referral Form.

Table 2-1: Summary of Supporting Studies

Aspect	Consultant	Description of Environmental Studies	Status
Materials Characterisation	SRK Consulting (Australasia)	• Static testing of waste rock and tailings. • Acid-base accounting. • Leachate analysis. • Assessment of dispersive potential of transported overburden.	95% of the waste rock samples were non-acid forming and can be managed to achieve safe, stable and non-polluting landforms. Impacts to MNES from mine waste are not anticipated.
Hydrogeology	Geowater Consulting	• Pump testing of aquifers • Numerical modelling of drawdown and mounding • Particle tracking analysis for reinjection.	Groundwater drawdown and reinjection is not anticipated to impact MNES. Further information on hydrogeology is provided in Attachment 2 of the Referral Form.
Hydrology	Surface Water Solutions	• Catchment mapping • Flood analysis for operations and closure. • Floodwater modelling in Turner River. • Modelling of discharge wetting front in Turner River. • Flood analysis for closure.	Impacts to MNES from altered hydrology are not anticipated. Additional information on the proposed discharge to the Turner River is provided in Attachment 2 of the Referral Form.
Aquatic Ecology	Stantec Australia	• Baseline ecological assessment of Yule and Turner Rivers. • Desktop analysis and database searches. • Sampling in November 2021; May 2022. • Opportunistic wet season sampling in July 2022 after heavy rain in the Pilbara. • Species identification and assessment of conservation significance. • Analysis of water and sediment testing results. • eDNA analysis for listed species. • Ecological assessment of river systems.	No MNES identified. Aquatic habitats unlikely to be impacted by proposed discharge of surplus water into Turner River.

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Aspect	Consultant	Description of Environmental Studies	Status
Flora and Vegetation	Ecoscape (Australia)	• Desktop study and database searches. • Flora and vegetation survey in March 2021.	One Threatened species recorded that has recently synonymised with a species that is a common and widespread. Additional details are provided in Section3. No Threatened Ecological Communities Identified.
	Umwelt Environmental and Social Consultants	• Desktop study and database searches. • Multiple Flora and vegetation surveys from March to July 2022. • Incorporation of 2021 survey data. • Analysis of vegetation types and species present. • Analysis of the status of *Seringia exastia* (see Attachment 7).	
Vertebrate Fauna	Western Wildlife	• Desktop study and database searches. • Detailed surveys in September 2021 and March 2022. • Additional targeted surveys in August 2022. • Analysis of habitats and species present. • Analysis of critical habitat for listed species.	Seven Threatened and 14 Migratory species were recorded or potentially occur in the Project area. Additional details are provided in Section 4.
Short-range Endemic Fauna	Bennelongia Environmental Consultants	• Desktop study and database searches. • Surveys in November 2021 and April 2022. • Habitat mapping. • Identification of species and analysis of potential for short-range endemism.	No MNES identified.
Subterranean Fauna	Bennelongia Environmental Consultants	• Desktop study and database searches. • Analysis of stygofauna and troglofauna habitat potential. • Three rounds of stygofauna sampling. • One round of troglofauna sampling. • Identification of species present and analysis of potential for restricted distribution.	No MNES identified.
Landforms	Mine Earth	• Desktop assessment of landforms present. • Assessment of project materials. • Recommendations for landform design criteria including slopes; bench height and berm widths.	Impacts to MNES not anticipated.

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Aspect	Consultant	Description of Environmental Studies	Status
Soil Assessment	Mine Earth	• Desktop study and assessment of spatial data. • Soil sampling and analysis of laboratory test results. • Characterisation of soils at the Project. • Recommended topsoil stripping depths. • Assessment of rehabilitation suitability of soils. • Recommendations for soil storage and handling.	Impacts to MNES not anticipated.
Dust	Environmental Technologies and Analytics	• Desktop assessment of weather patterns and existing air quality. • Identification of potential receptors. • Modelling of proposed operation and assessment of likely air quality.	Impacts to MNES not anticipated.
Noise	Herring Storer Acoustics	• Identification of potential receptors. • Modelling of proposed operation and assessment of likely noise levels and compliance at receptors.	Impacts to MNES not anticipated.
Emissions Projections	Energetics	• Estimation of greenhouse gas emissions • Peer benchmarking • Scope 3 review.	Greenhouse gas emissions associated with the Project quantified.
Greenhouse gas and decarbonisation strategy	RPM Global	• Identification of emissions reductions opportunities • Setting of realistic targets on pathway to net zero by 2050.	Plan outlines a pathway to net zero by 2050.

3. ASSESSMENT OF MNES - FLORA

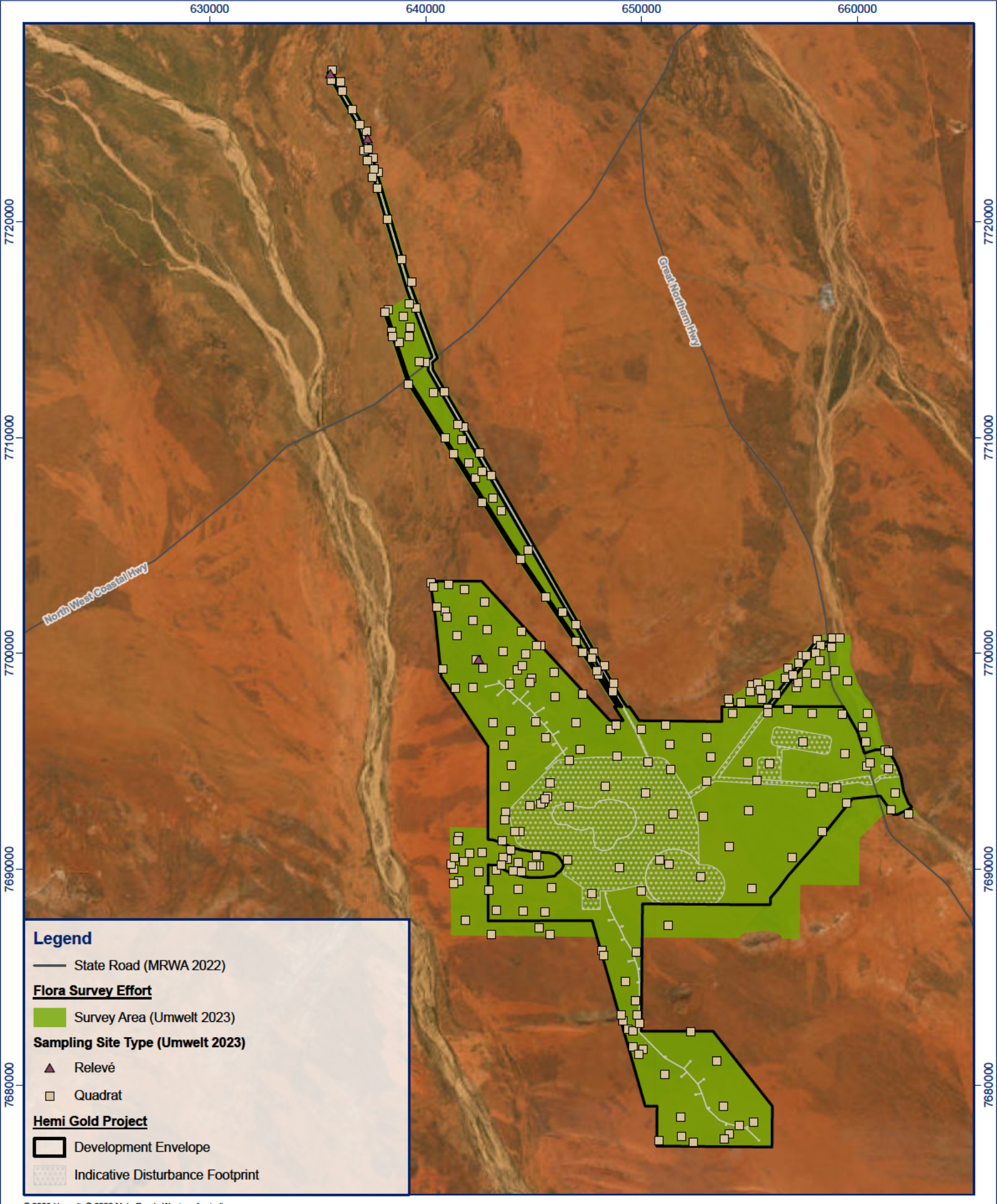
3.1 Flora Surveys

Flora and vegetation surveys for the Project were undertaken in March 2021 and between March and July 2022. An overview of the flora survey effort is provided in Figure 3-1. There are no threatened ecological communities in the Project area, and only one threatened species (critically endangered under the EPBC Act) *Seringia exastia*. Attachment 7 provides an update on recent taxonomic changes to *Seringia* taxa and the conservation status for *Seringia exastia*.

There are 17 vegetation types in the Project area which are shown on Figure 3-2, Figure 3-3 and Figure 3-4. Vegetation descriptions and areas are provided after Figure 3-4.

Vegetation in the Project area is mostly undisturbed and in excellent or very good condition. The exception being some areas which have been disturbed by exploration activities and pipeline corridors, as well as by cattle grazing and trampling. A map of vegetation condition is provided in Figure 3-5.

The flora survey report (Umwelt, 2023) is included as Attachment 5, Part 1 - 4.



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PROJECT	CLIENT
Hemi Gold Project Proposal	DE GREY MINING LTD
Overview of Flora Survey Effort	
Figure 3-1 | ADV-AU-00241 | May 2023	

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Legend

Conservation Significant Flora (Umwelt 2023)

Seringia exastia (T)

Vegetation Type - Description (Umwelt 2023)

1 - Low isolated shrubs including Acacia stellaticeps and Pluchea tetranthera over low hummock grassland dominated by Triodia longiceps and Triodia epactia over ephemeral low sparse sedgeland, tussock grassland and forbland of mixed taxa including Fimbristylis dichotoma, Bu bostylis barbata, Calandrinia stagnensis, Streptoglossa decurrens and Eriachne aristidea on red-brown clay loam, sandy clay loam or sandy clay on plains and flats

2 - Low tussock grassland to sparse tussock grassland dominated by a combination of Eriachne glauca var. glauca, Eriachne benthamii and Eriachne flaccida over low sparse hummock grassland of Triodia epactia and Triodia longiceps over ephemeral low sparse sedgeland and forbland of mixed species including Cyperus iria, Fimbristylis dichotoma, Neptunia dimorphantha, Marsilea hirsuta and Calandrinia pumila on orange, red-brown or brown clay in clay pans

3 - Low woodland to open woodland dominated by Corymbia candida subsp. candida over tall shrubland to open shrubland dominated by Acacia colei and Acacia tumida var. pilbarensis over low open to sparse shrubland of mixed species including Pluchea tetranthera, Afrohybanthus aurantiacus and Sida rohlenae subsp. rohlenae over low open to sparse hummock grassland dominated by Triodia epactia over low sparse tussock grassland of mixed species including Chrysopogon fallax, Aristida holathera var. holathera, Eragrostis eriopoda, Eriachne obtusa and Cenchrus ciliaris on orange sandy or sandy clay loam on flats

4 - Tall sparse shrubland of mixed species including Acacia ancistrocarpa, Acacia inaequilatera, Acacia colei and Melaleuca lasiandra over low open to sparse shrubland dominated by Acacia stellaticeps, Pluchea tetranthera, Sida arenicola and Corchorus elachocarpus over low hummock grassland to open hummock grassland dominated by Triodia epactia, Triodia lanigera and Triodia schinzii on red or red-brown sandy loam on plains

5 - Tall open to sparse shrubland dominated by Acacia trudgeniana and Acacia colei over low open to sparse shrubland dominated by Acacia stellaticeps, Corchorus incanus subsp. incanus and Pimelea ammocharis over low hummock grassland of Triodia epactia over low sparse tussock grassland of mixed species including Aristida holathera var. holathera, Eragrostis eriopoda, Chrysopogon fallax and Eriachne obtusa on red-brown clay or sandy loam on plains

6 - Tall sparse shrubland dominated by Acacia trachycarpa and Acacia colei over low sparse shrubland of mixed species including Acacia stellaticeps and Corchorus incanus subsp. incanus over low hummock grassland dominated by Triodia lanigera on red-brown sandy loam on low dunes within river channels

7 - Tall sparse shrubland dominated by Acacia tumida var. pi barensis over low sparse shrubland dominated by Corchorus incanus subsp. incanus and Tephrosia rosea var. clementii over ephemeral low sparse forbland and grassland of mixed species including Calocephalus beardii, Aristida contorta, Eragrostis cumingii, Indigofera colutea and Perotis rara on brown sandy loam with granite outcropping and stones on and around low granite outcrops

8 - Low open woodland to isolated trees dominated by Corymbia hamersleyana over tall open to sparse shrubland dominated by Acacia bivenosa, Acacia inaequilatera, Grevillea wickhamii subsp. aprica and Hakea loreus subsp. loreus over low sparse shrubland of mixed species dominated by Acacia stellaticeps, Scaevola amblyanthera var. centralis and Corchorus elachocarpus over low hummock grassland dominated by Triodia epactia on red or red brown clay or sandy loam with calcrete and silica stones, occasionally with calcrete or silica outcropping, on low rises or plains

9 - Tall sparse shrubland of mixed species including Acacia inaequilatera and Grevillea wickhamii subsp. aprica over low sparse shrubland of mixed species dominated by Corchorus parviflorus over low hummock grassland dominated by Triodia wiseana and Triodia epactia on red-brown clay loam with chert stones and often chert outcropping on hills and low rises

10 - Tall open to sparse shrubland dominated by Acacia ancistrocarpa, Acacia inaequilatera, Acacia sericophylla, Acacia acradenia and occasionally Melaleuca lasiandra over low shrubland to sparse shrubland dominated by Acacia stellaticeps and occasionally Sida arenicola, Indigofera monophylla, Pluchea tetranthera and Corchorus parviflorus over low hummock grassland to open hummock grassland dominated by Triodia lanigera and/or Triodia schinzii on red or red-brown sandy loam on plains

11 - Low open woodland to isolated trees of Corymbia hamersleyana over tall open to sparse shrubland dominated by Acacia orthocarpa, Acacia inaequilatera and Grevillea wickhamii subsp. aprica over low sparse shrubland dominated by Acacia stellaticeps over low hummock grassland dominated by a combination of Triodia lanigera, Triodia angusta, Triodia epactia and Triodia chichesterensis on red or red brown sandy or clay loam with primarily quartz and calcrete stones, occasionally with calcrete or quartz outcropping, on low rises and undulating plains

12 - Isolated low trees dominated by Corymbia hamersleyana over low open to sparse shrubland of mixed species including Acacia inaequilatera, Acacia acradenia, Acacia ancistrocarpa and Grevillea wickhamii subsp. aprica over low sparse shrubland of mixed species dominated by Goodenia stobbsiana over low hummock grassland dominated by Triodia epactia and occasionally Triodia wiseana on red or red-brown clay loam with silica and chert stones and often silica and chert outcropping on low rises

13 - Low open woodland dominated by Corymbia hamersleyensis and/or Corymbia candida subsp. candida over tall open to sparse shrubland dominated by Acacia ancistrocarpa, Acacia tumida var. pilbarensis, Acacia acradenia and Acacia colei over low hummock grassland of Triodia epactia on red or red-brown clay or sandy loam on flats or plains

14 - Tall open shrubland to isolated shrubs dominated by Acacia ancistrocarpa, Acacia colei and Acacia inaequilatera over low open shrubland to isolated shrubs dominated by Acacia stellaticeps and Pluchea tetranthera over low hummock grassland dominated by Triodia epactia on red or red brown sandy or clay loam on plains and flats

15 - Low open woodland of Eucalyptus victrix over tall sparse shrubland dominated by Acacia colei over low open hummock grassland of Triodia epactia over ephemeral low sparse herbland of mixed species including Bergia perennis subsp. perennis, Marsilea hirsuta, Cyperus iria and Centipeda minima subsp. macrocephala on pale brown sandy clay loam on the margins of clay pans

16 - Mid to low open woodland dominated by Eucalyptus camaldulensis subsp. refulgens and Melaleuca argentea over tall sparse shrubland dominated by Melaleuca glomerata, Acacia coriacea subsp. pendens and Acacia trachycarpa over mid to low sparse shrubland dominated by Acacia pyrifolia var. pyrifolia, Crotalaria cunninghamii and Corchorus incanus subsp. incanus over low sparse hummock grassland dominated by Triodia epactia over low sparse sedgeland dominated by Cyperus vaginatus on pale red or brown sand with patchy mixed stones in river channels

17 - Tall open to sparse shrubland dominated by Acacia sabulosa over mid open to sparse shrubland of mixed species dominated by Corchorus incanus subsp. incanus, Sida arenicola, Ptilotus arthrolasius, Gyrostemon tepperi and Triumfetta deserticola over low open to sparse hummock grassland dominated by Triodia lanigera and Triodia schinzii over low sparse tussock grassland dominated by Aristida holathera var. holathera and Eragrostis eriopoda on red sand on dunes

D - Disturbed land

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Vegetation Types and Threatened Flora Locations

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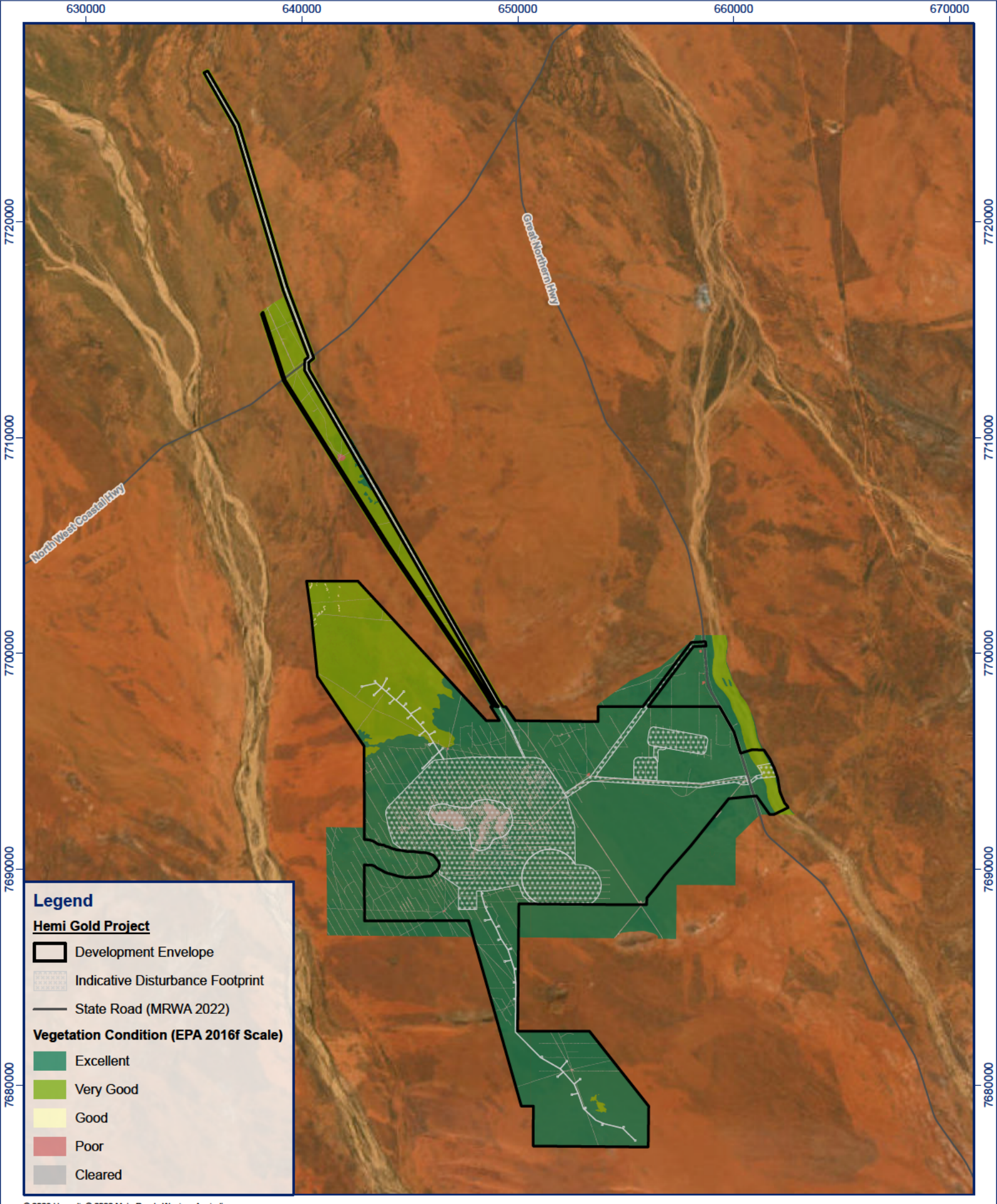

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Hemi Gold Project Proposal

Vegetation Condition

Figure 3-5 | ADV-AU-00241 | May 2023

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3.2 *Seringia exastia* (Fringed Fire-bush)

3.2.1 Species Overview

Seringia exastia (Fringed Fire-bush) (formerly known as *Keraudrenia exastia*) is endemic to Western Australia and is known from seven sub-populations within the Port of Broome. In 2012, a second population was discovered in the Great Sandy Desert area, approximately 130 km south of Broome. *Seringia exastia* is listed as Critically Endangered under the EPBC Act.

3.2.2 Status of Seringia exastia

Umwelt have prepared a memo on the status of *Seringia exastia* in the Project area, which is included as Attachment 7.

A recent taxonomic review (Binks et al., 2020) of *Seringia exastia* concluded that it is identical to the widespread common species *Seringia elliptica* and these two species have been synonymised as *Seringia exastia*, which is the older valid name. Prior to this study, the communities of *Seringia exastia* identified at the Project would have been identified as *Seringia elliptica,* which is common and widespread in the Pilbara, and not an MNES (Umwelt, 2022).

Although this species does not meet the criteria for Threatened status under the EPBC Act, it is currently listed at the time of referral and an assessment of possible impacts has been completed.

Seringia exastia was delisted as a Threatened species under the Western Australian *Biodiversity Conservation Act 2016* (BC Act) on 30 September 2022 (Minister for Environment, 2022).

3.2.3 Flora Survey Results

Approximately 200 individuals of *Seringia exastia* from one population within the development envelope were recorded during a 2021 flora survey with a further three populations recorded in the vicinity, but outside of the proposed development envelope. An additional population, inside the development envelope was recorded in 2022.

In line with advice from the Western Australian Department of Biodiversity, Conservation and Attractions (DBCA), targeted searches in all proposed disturbance areas were not undertaken in the 2022 flora surveys due to the pending delisting of the species. The species may be present in other parts of the Project area.

The known locations of *Seringia exastia* populations are shown on Figure 3-2, Figure 3-3 and Figure 3-4. Known locations inside the development envelope have been avoided, however it is possible that the species will be impacted by clearing.

3.2.4 Significance Test

An assessment of the significance of the proposed action to *Seringia exastia* is outlined in Table 3-1.

Table 3-1: Significant Impact Assessment for Seringia exastia

Significant Impact Criteria	Determination of Significance
Will the Project lead to a long-term decrease in the size of a population?	**No.** The species has been located outside of the development envelope and the species is known to be common and widespread in the Pilbara.
Will the Project reduce the area of occupancy of a species?	**No.** The species has been located outside of the development envelope and the species is known to be common and widespread in the Pilbara.
Will the Project fragment an existing population into two or more populations?	**No.** The species has been located outside of the development envelope and the species is known to be common and widespread in the Pilbara.
Will the Project adversely affect habitat critical to the survival of a species?	**No**. The species is common and widespread in the Pilbara and significant impacts to critical habitat are not anticipated.
Will the Project disrupt the breeding cycle of a population?	**No**. The species is common and widespread, and the proposed action is not anticipated to interfere with the breeding cycle.
Will the Project modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?	**No**. As the species is known to be common and widespread in the Pilbara, it is unlikely the proposed action will decrease the availability of habitat to the extent that the species is likely to decline.
Will the Project result in invasive species that are harmful to a critically endangered or endangered species becoming established in the critically endangered or endangered species' habitat?	**No**. De Grey have implemented a vehicle hygiene system where vehicles and machinery entering the Project area will be free from seeds, soils and plant material. De Grey will also implement weed control measures if required in Project areas.
Will the Project introduce disease that may cause the species to decline?	**Unlikely**. De Grey have implemented a vehicle hygiene system where vehicles and machinery entering the Project area will be free from seeds, soils and plant material.
Will the Project interfere with the recovery of the species?	**No**. The species is common and widespread in the Pilbara.

4. ASSESSMENT OF MNES - FAUNA

4.1 Vertebrate Fauna Surveys

Fauna surveys were completed in September 2021 and March 2022, with additional targeted surveys in August 2022. An overview of the fauna survey effort is provided in Figure 4-1. There are seven threatened species and one migratory species recorded or possibly occurring in the Project:

Two EPBC Act listed species or evidence of the species were recorded within the development envelope:

- Northern Quoll (*Dasyurus hallucatus*) – Endangered – Recorded along Turner River
- Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia*) – Vulnerable

Secondary signs of the following species were recorded:

- Greater Bilby (Macrotis lagotis) – Vulnerable – Secondary signs recorded (outside of the Project's disturbance footprint)

The following EPBC Act listed species are considered likely to or may occur but were not recorded within the development envelope:

- Ghost Bat (Macroderma gigas) – Vulnerable – Likely to occur – Not Recorded
- Pilbara Olive Python (Liasis olivaceus barroni) – Likely to occur – Not Recorded
- Grey Falcon (Falco hypoleucos) – Likely to occur – Not Recorded
- Fork-tailed Swift (*Apus pacificus*) – Likely to occur – Recorded north of the development envelope.
- Night Parrot (Pezoporus occidentalis) –Endangered – Possibly occurs – Not Recorded

De Grey has continued to monitor for Threatened species through the continuous placement of motion camera traps within and surrounding the Development Envelope. The camera results from March 2022 to present show no records of Northern Quoll or Greater Bilby.

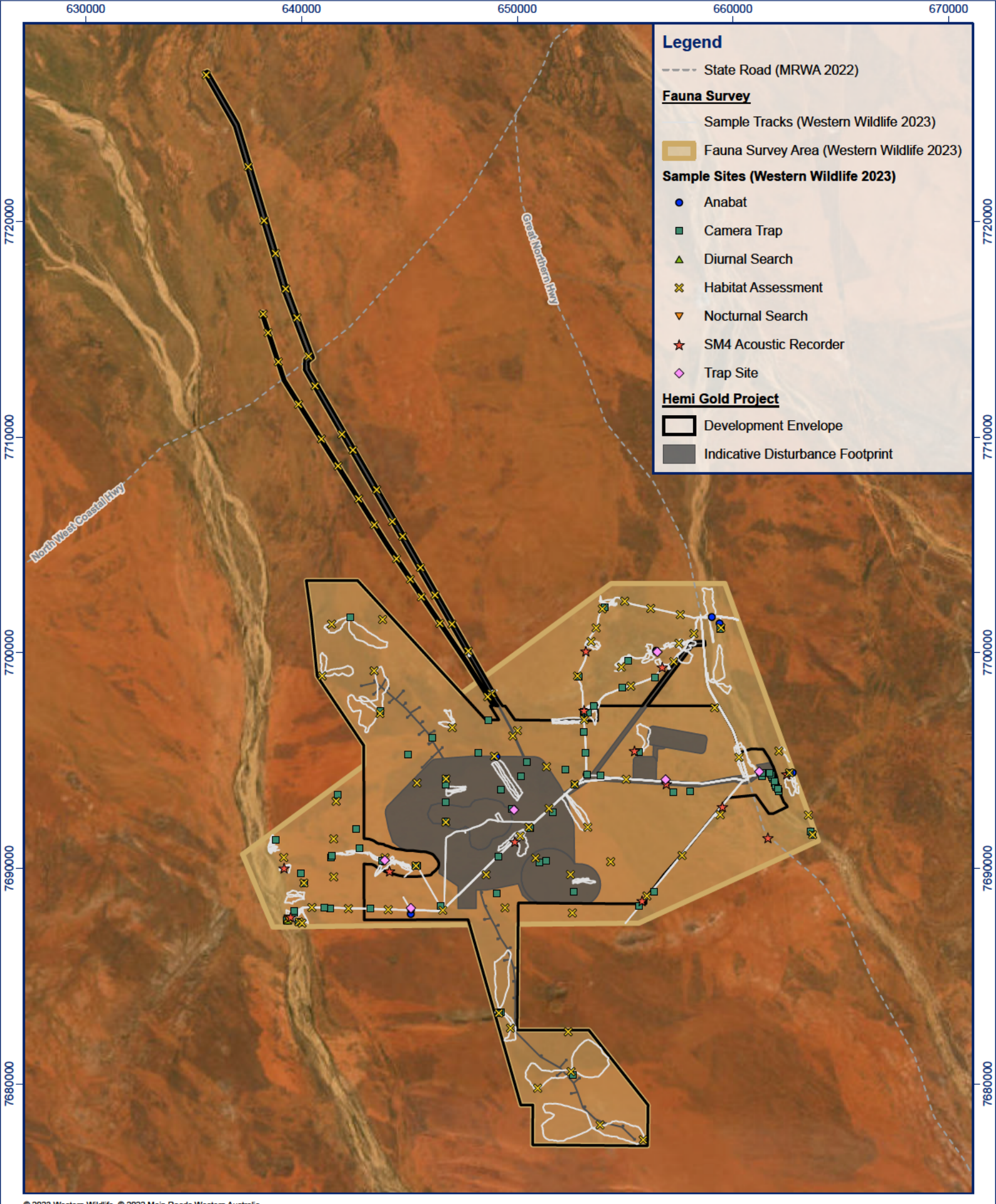
The significance of potential impacts to Threatened and Migratory species are assessed under the relevant sections below.

There are six fauna habitats in the Project area, which are shown in Figure 4-2 with the locations of all Threatened species recorded. Habitat descriptions and areas mapped are provided in Table 4-1.

Figures showing the defined areas of critical habitat for each Threatened species are included in the impact assessment sections below. These critical habitat areas are mapped to the extent of the fauna survey area; however, it can be confidently inferred that these critical habitats do not occur in isolation but are contiguous with extensive areas beyond the boundaries of the survey area. For example, Major River habitat extends up and downstream in the Yule (~250 km long) and Turner Rivers (~220 km long). The only exception is the 1.5 ha of Rocky Outcrop habitat, which has been excluded from the development envelope.

4.2 Other Fauna Surveys

No MNES were found in aquatic fauna, short-range endemic fauna and subterranean fauna surveys for the Project. A summary of these surveys and other environmental studies is provided in Table 2-1.



Scale 1 220,000
Projection GDA2020 MGA Zone 50
Created/Reviewed By HC/SP
Aerial Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

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Hemi Gold Project Proposal

Overview of Fauna Survey Effort

Figure 4-1 | ADV-AU-00241 | May 2023

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Table 4-1: Fauna Habitats

Habitat Type	Key Elements	Mapped Survey Area (ha)	Area inside Development Envelope (ha)	Area inside Provisional Disturbance Footprint (ha)
Spinifex Sandplain	• Consolidated sands suitable for burrowing reptiles and mammals.	22,718.6	15,809.8 (69.6%)	5037.1 (22.2%)
Sandplain Drainage	• Consolidated sands suitable for burrowing reptiles and mammals. • Claypans of various sizes that hold water and may be breeding. • habitat for frogs. • Mature spinifex in some areas, where encouraged by water runoff and/or protection from fire.	9,349.5	6,029.4 (64.5%)	721.2 (7.7%)
Sand Dune	• Loose flowing sands provide habitat for fossorial reptiles	190.1	0 (0%)	0 (0%)
Stony Hills	• Minor drainages lines (not mapped separately) provide dense habitat for birds. • Small stones suitable for Western Pebble-mound Mouse. • Minor rocky outcrops provide shelter for saxicoline reptiles.	1,196.4	172.9 (14.5%)	33.3 (2.8%)
Major River	• Likely to function as a corridor for fauna movement. • Waterholes provide habitat for bathing and drinking, as well as breeding habitat for frogs. • Tree hollows for arboreal reptiles, bats and hollow-nesting birds. • Leaf litter accumulations and woody debris in the creek bed • Provides habitat for reptiles.	1,231.9	181.2 (14.7%)	34.9 (2.8%)
Rocky Outcrops	• Outcropping rocky areas, boulders, overhangs and rock crevices • provide shelter for reptiles and mammals (no large caves present)	1.5	0 (0%)	0 (0%)
	Total	**34,688.0**	**22,193.4**	**5,826.5**

4.3 *Dasyurus hallucatus* (Northern Quoll)

4.3.1 Species Overview

The Northern Quoll occurs across the northern parts of Australia in several disjunct populations, including the Pilbara population. The species is listed as Endangered under the EPBC Act and BC Act with an estimated population size reduction of 50% over the last decade.

Recent studies have shown the Northern Quoll form two subpopulations in the Pilbara with a great deal of mixing, indicating the species has a large capacity for dispersal.

4.3.2 Survey Results

The Northern Quoll was recorded along the Turner and Yule Rivers and in rocky habitat during targeted fauna surveys by Western Wildlife. eDNA analysis at one site on the Yule River and two sites on the Turner River detected the Northern Quoll along the Turner River (Stantec, 2022).

Locations where the Northern Quoll has been recorded are provided on Figure 4-3. Northern Quolls are considered likely to be resident in Rocky Outcrops and Major River habitats, dispersing and foraging in adjacent habitats (Western Wildlife, 2023).

The Northern Quolls in the survey area are part of a population studied by the DBCA and are considered an 'important population'. The population is steady compared to other populations that fluctuate or show local extinctions followed by reinvasions and is considered comparable to the similarly important population on Dolphin Island (Western Wildlife, 2023).

Camera motion traps monitored by De grey from March 2022 to present have not recorded any Northern Quolls.

Detail on the local Northern Quoll population is provided on pages 62 to 64 of the fauna survey report (Attachment 6).

4.3.3 Potential Impacts

The 'EPBC Act Referral Guideline for the Endangered Northern Quoll *Dasyurus hallucatus*' (DoE, 2016) outlines the likely significant impacts a Proposal could have on the species. An assessment against these guidelines is shown in Table 4-2.

Table 4-2: Assessment of Impact on Northern Quoll

Term	Detail	Likelihood and Impact (Prior to Mitigation Measures)
Could the impacts of your action occur within the modelled distribution of the Northern Quoll?	The Northern Quoll occurs in regional populations throughout WA including the Pilbara, Little Sandy Desert and Kimberley regions.	**Yes**. The Project area is within the modelled distribution of the Northern Quoll in the Pilbara region.
Could the impacts of your action affect habitat for the Northern Quoll?	The Northern Quoll occupies a variety of habitats that usually includes some form of rocky area or structurally diverse woodland or forest for shelter. Land comprising native vegetation within 1 km of shelter habitat, quoll records or land connected to shelter habitat is considered foraging or dispersal habitat.	**Yes**. Two habitat types identified as critical habitat for the Northern Quoll were identified in fauna surveys: • Rocky Outcrop – provides shelter habitat. • Major River – provides shelter and foraging and dispersal habitat.
Have you undertaken a reconnaissance survey for Northern Quoll using the recommended methods?	To support a referral and assessment under the EPBC Act, a reconnaissance survey for presence of Northern Quoll and identification of critical habitat is required. The results are to be included for referral and assessment under the EPBC Act.	**Yes**. Fauna surveys were undertaken in 2021 and 2022 including a targeted survey using camera traps. eDNA analysis of pools in the Turner and Yule Rivers was also undertaken as part of aquatic ecology surveys. The Northern Quoll was recorded in surveys and is likely to be resident in the Rocky Outcrops and Major River habitats, dispersing and foraging into adjacent habitats.
Could your action have a significant impact on a Northern Quoll population?	An action will require approval from the Minister if the action is likely to have a significant impact on a matter of national environmental significance.	**Unlikely**. Northern Quolls and Northern Quoll habitat have been identified during surveys for the Project, but a population was not found within the Project's principal area of disturbance.
Are the measures you propose to mitigate your impacts the best available and likely to reduce the significance of the impacts?	Mitigation has the principal aim of avoiding significant impact and should be applied in the following order: • Avoid impacts. • Mitigate impacts. • Monitor effectiveness of mitigation.	**Yes**. Avoidance of critical habitat, pre-clearance surveys and standard mitigation measures will reduce the impact to the Northern Quoll population. Mitigation measures proposed by De Grey are described in Table 4-2 and are captured in a management plan (Attachment **8**).
Could your action require approval from the Minister?	If the action is inconsistent with above guidance, it is likely to have a significant impact on the Northern Quoll and will require approval from the Minister.	**No**. An assessment against significance criteria is detailed in Table 4-5 indicating the Project is unlikely to have a significant impact on the Northern Quoll population.
How can I manage Northern Quolls onsite?	To manage Northern Quolls around the area of operations and ensure mitigation measures are effective, populations should be monitored.	De Grey will implement a Fauna Management Plan for the project. This is included as Attachment **8**.

4.3.4 Mitigation Measures

An assessment of the key threats impacts and mitigation measures that De Grey will adopt for the Project are outlined in Table 4-3. Threats and key impacts are taken from Table 2 of the referral guideline for the species (DoE (Department of Environment), 2016).

De Grey will implement these mitigation measures through the enactment of a Fauna Management Plan which includes the Northern Quoll and Greater Bilby and is provided as Attachment 8.

Table 4-3: Northern Quoll Key Threats, Impacts and Mitigation Measures

Threats and Key Impacts	Mitigation Measures
Habitat clearing, modification or land use change: • Direct mortality. • Displacement. • Introduction of invasive species. • Alteration of groundwater or surface water processes.	The following areas of critical habitat have been avoided during project design: • Rocky Outcrop habitat has been excluded from the development envelope. • Major River habitat associated with Yule River has excluded from the development envelope. Impacts to the following areas of critical habitat have been minimised during Project design: • Clearing of Major River habitat associated with the Turner River is limited to the amount required to install dewatering outfall infrastructure. • Clearing of foraging and dispersal habitat within 1 km of the Turner River limited to minimum necessary for the access road and dewatering pipeline. All other infrastructure has been located away from this habitat. Disturbed areas will be rehabilitated progressively where possible. Direct mortality during clearing, construction and operations will be limited by: • Limiting clearing to the minimum required in approved areas and using previously disturbed areas to the extent possible. • Pre-clearance surveys for Northern Quolls. • Clearing areas in a progressive manner. • Enforcement of speed limits and installation of Northern Quoll signage on project roads. Mine dewatering and borefield abstraction will cause localised lowering of the groundwater table. Hydrogeological modelling (Geowater, 2023) shows the drawdown will not affect critical Major River habitat. The extent of drawdown is further limited by the reinjection of surplus water. Surplus water will be discharged into the Turner River, which will alter the wet-dry cycle of the river. This will be alleviated by: • Location of dewatering discharge point in middle section of Turner River ensuring upper catchment is unimpacted. • Reinjection of surplus water to reduce discharge into Turner River. • Explore other disposal options including third-party offtake to further reduce disposal volumes. • Use of surplus water in the process facility from year three to avoid additional discharge into Turner River. • The creation of other artificial water sources is limited to extent practicable and away from Major River habitat. • Phasing the reduction in discharge volumes in year three of the project to avoid a sudden shock to the ecosystem. The quality of discharge water will be managed by: • Application of discharge criteria in Environmental Licence. • Reinjection or reuse of water that does not meet discharge criteria.

Threats and Key Impacts	Mitigation Measures
Urbanisation • Domestic animals. • Secondary poisoning from domestic rodent control. • Roadkill and misadventure. • Persecution.	The project is not expected to have any urbanisation effects and will not result in a permanent settlement in the Project area. Site inductions will educate personnel on appropriate fauna interactions to minimise the potential for accidental or deliberate harm.
Introduction and increases of invasive species E.g. cane toads, gamba grass, feral cats and pigs, wild dogs, fox and cattle • Direct mortality. • Habitat degradation. • Competition. • Increased fire risk. • Habitat displacement. • Direct predation. • Disease e.g., Toxoplasmosis.	Introduction and spread of weeds will be managed by: • Implementation of a vehicle hygiene system. • Implement weed control measures as required. Foxes and feral cats are already present in the Project area. Existing populations of feral fauna will be controlled by: • Implementing best practice waste management measures. • Limiting the creation of permanent water bodies. • Fencing of artificial water sources where practicable and any putrescible landfills. • Monitoring and control measures as required. • Feeding of feral fauna is prohibited. • Pets on site are prohibited. The cane toad has not yet arrived in the Pilbara. De Grey will prevent its accidental introduction and establishment in the Project area by: • Implement additional vehicle hygiene measures for vehicles arriving from known cane toad range (Kimberley, Northern Territory). • Avoiding the creation of artificial water sources to the extent practicable. • Educating personnel on the cane toad in the site induction. • Reporting any confirmed sightings to DBCA. • Humane disposal of any cane toads found.
Pastoralism • Habitat degradation • Inappropriate fire regimes • Promoting cane toads	The Project is a mining project on an existing pastoral lease. De Grey does not propose to alter existing pastoral activities beyond the mining operation.
Traffic • Direct mortality • Habitat fragmentation	Traffic on site involves light vehicle traffic, aircraft and heavy machinery. De Grey will implement the following measures to reduce direct mortality from traffic: Direct mortality will be limited by: • Speed limits will be assigned and enforced. • Installation of fauna signage along all Project roads. • Driving at night will be limited to the extent possible. • Mine vehicles will be required to stay on existing roads and tracks. • Hooning and misadventure will be prohibited. • Sightings and incidents will be reported. • Personnel will be educated on Northern Quolls. Habitat fragmentation will be avoided by • Minimising clearing required for the Project. • Avoiding critical habitat to the extent possible in project design. • Progressive rehabilitation where feasible.

Threats and Key Impacts	Mitigation Measures
Inappropriate fire regimes • Increased predation risk • Loss of denning habitat	De Grey does not propose to change the existing fire regime in the Project area. Potential impacts to the fire regime will be managed by: • Conduct site inductions that include fire prevention and control measures. • Effective maintenance of vehicles including tyres and wiring to prevent fire ignition. • Vehicles kept clean to prevent vegetative material collecting underneath and igniting. • No unauthorised off-road driving to prevent vehicles igniting grassfires. • All vehicles will carry portable fire extinguishers, with training provided on fire-fighting equipment. • Emergency response capacity will be maintained. • A hot works permit system will be implemented. • Install fire breaks around critical infrastructure. • Conducting any controlled burns in consultation with DBCA.

4.3.5 Significance Test

Section 6 of the Northern Quoll Referral Guideline (DoE (Department of Environment), 2016) outlines criteria to assess if an action will have a significant impact on the Northern Quoll. An assessment has been completed in Table 4-5 that concludes the action proposed to be undertaken at Hemi Gold Project will not have a significant impact on Northern Quolls.

The following definitions, based on criteria in the Northern Quoll Referral Guideline (DoE (Department of Environment), 2016), are applied in Table 4-5:

- Important Population – the population in the Project area is important as it has been extensively studied and occurs in an area where the cane toad is not yet established.
- Critical habitat – Major River and Rocky Outcrop habitat (critical shelter habitat) as well as all habitat within 1 km (foraging and dispersal habitat).

Critical habitat identified in the survey area is shown on Figure 4-3 and areas are provided in Table 4-5. Note that these provide the extents mapped in the fauna survey and Major River habitat and associated foraging and dispersal habitat extends to the north and south along the Yule and Turner Rivers.

Table 4-4: Critical Northern Quoll Habitat Areas

Critical Habitat	Mapped Survey Area (ha)	Area inside Development Envelope (ha)	Area inside Provisional Disturbance Footprint (ha)
Major River	1,231.9	181.2	34.9
Rocky Outcrop	1.5	0.0	0.0
Foraging and Dispersal Habitat (within 1 km of the above)	3,003.3	423.9	40.4
Total	**4,236.7**	**605.1**	**75.3**

Table 4-5: Significant Impact Assessment on Northern Quoll

Significance Test	Determination of Significance
Will the project result in the loss of habitat critical to the survival of the Northern Quoll?	**Yes**. Minimal disturbance is required to construct dewatering outfall infrastructure in the Turner River including 35 ha of Major River and 41 ha of foraging and dispersal habitat. Critical Rocky Outcrop habitat where Northern Quolls were recorded has been excluded from the development envelope. Critical Major River habitat and associated foraging and dispersal habitat along the Yule River has been excluded from the development envelope. The proposed northern infrastructure corridors have been diverted to avoid disturbance to critical Major River habitat in the Yule River. The disposal of surplus water into the Turner River has been minimised via aquifer reinjection and through reuse as process water from year three of the Project. Due to avoidance and minimisation measures, the overall impact on critical habitat is unlikely to be significant.
Will the project decrease the size of a population important for the long-term survival of the Northern Quoll and therefore interfere with the recovery of the species?	**No.** Significant disturbance to critical habitat has been avoided and minimised at the design stage of the Project. The location of mining and processing infrastructure does not coincide with a Northern Quoll population. De Grey will implement a Fauna Management Plan (Attachment **8**) to ensure that: • Existing feral fauna populations are controlled. • The Project does not introduce the cane toad. • The existing fire regime is not changed. • Direct mortality is unlikely. With the above avoidance and minimisation measures in place, a decrease in an important population is not anticipated.
Will the project introduce inappropriate fire regimes or grazing activities (i.e., increasing the risk of late dry season high intensity fires to the area) that substantially degrade habitat critical to the survival of the Northern Quoll or decrease the size of a population important for the long-term survival of the species?	**No**. De Grey does not propose to alter the fire regime or existing pastoral activities as part of the Project. Fire prevention measures will be implemented, and emergency response will be maintained. If required to protect personnel and critical infrastructure, any controlled burning will be done in consultation with DBCA. Given the location of the Project any accidental fires or controlled burns are unlikely to impact critical habitat.
Will the project fragment a population important for the long-term survival into two or more populations?	**No.** Due to the exclusion of critical Rocky Outcrop habit and critical Major River habitat along the Yule River as well as associated foraging and dispersal habitat; and the minimisation of impacts to the Turner River and associated foraging and dispersal habitat, fragmentation of an important population is not anticipated.
Will the Project result in invasive species or increases of them that are harmful to the Northern Quoll becoming established in its habitat, namely cane toads, feral cats, red foxes or exotic grasses which increase fire risk. This includes actions which have inadequate quarantine measures in place for movements between the mainland and offshore islands where Northern Quolls occur?	**Unlikely.** De Grey will implement the mitigation measures described in Table 4-3 to ensure that exotic grasses and cane toads are not inadvertently introduced into the Project area and that existing populations of foxes and cats are controlled.

4.4 *Macrotis lagotis* (Greater Bilby)

4.4.1 Species Overview

The Greater Bilby is a medium-sized, solitary burrowing marsupial that is highly mobile with a large foraging range. Bilbies are nocturnal and shelter in burrows during the day. Bilbies may construct a burrow every few weeks and burrows may be used for several months creating a network of active and disused burrows in their home range.

Bilbies formerly occurred across 70% of Australia; however, they now occupy 20% of their former range. They are listed as Vulnerable under the EPBC Act.

4.4.2 Survey Results

The fauna surveys recorded secondary signs of Greater Bilby (Western Wildlife, 2023). These were mostly of old burrows, (inactive, but active in the past year), scratching's or diggings. Records were from the following habitat types:

- Spinifex Sandplain.
- Sand Dune.

Sandplain Drainage habitat was also assessed as suitable for Bilbies although no signs were found on this habitat type during surveys (Western Wildlife, 2023).

Locations of Greater Bilby records are shown on Figure 4-4. As Bilbies move their current home range as food availability changes, they are not always present in the Project area even though suitable habitat is present (Western Wildlife, 2023).

Camera motion traps monitored by De grey between March 2022 and December 2022 have not recorded any Northern Quolls.

4.4.3 Potential Impacts and Mitigation Measures

Potential Impacts, likelihood and mitigation measures are described in Table 4-6. Key impacts are taken from the National Recovery Plan for the Greater Bilby (Pavey, 2006) and *Draft Recovery Plan for the Greater Bilby* (CoA, 2019).

De Grey has captured these management actions in the Fauna Management Plan provided as Attachment 8.

Table 4-6: Macrotis lagotis (Greater Bilby) Likelihood, Impact and Mitigation Measures

Threats and Key Impacts	Likelihood and Impact (Prior to Mitigation Measures)	Mitigation Measures
Increase in the predation by foxes, cats, and wild dogs	**Possible.** Foxes, feral cats and dingos are present in the Project area which is on an active Pastoral Lease. The Greater Bilby may be impacted if feral fauna populations, particularly cats and foxes increase.	Existing populations of feral fauna will be controlled by: • Implementing best practice waste management measures. • Limiting the creation of permanent water bodies. • Fencing of artificial water sources where practicable and any putrescible landfills. • Monitoring and control measures as required. • Feeding of feral fauna is prohibited. • Pets on site are prohibited.
Habitat loss and fragmentation	**Unlikely.** Although suitable Greater Bilby habitat will be cleared to develop the Project, fragmentation will not occur as the Project area is within a large contiguous area of such habitat and is not continuously inhabited by Bilbies. Therefore, any clearing for the Project is not considered to represent a significant loss and fragmentation of suitable habitat.	Habitat loss will be managed by: • Limiting clearing to the minimum required. • Using previously disturbed areas to the extent possible. • Implementation of the internal permitting system for clearing. • Annual review of clearing areas. • Progressive rehabilitation where feasible.
Mortality and injury on roads	**Possible**. Various sized vehicles ranging from light vehicles to heavy machinery will operate within the development envelope including habitat where Greater Bilby may exist. Project-related traffic may result in death or injury of Bilbies. Death or injury of individuals in burrows may also occur during clearing for the Project.	Mortality or injury from vehicle interaction will be managed via the following measures: • Implement signed speed limits on project roads. • Installation of fauna signage in project roads • Induction to include site speed limits, identification and significance of Greater Bilby, and reporting requirements for vehicle impacts. Death or injury during clearing will be managed by: • Clear land only in approved areas. • Pre-clearance searches to identify presence of Greater Bilby, their active burrows. • Where individuals are intercepted, capture and relocate (capture effort limited to seven consecutive nights). • Anny burrows located inside proposed clearing areas (unlikely, as outside of preferred burrowing sand dune habitat) will be confirmed inactive before clearing proceeds.
Changes to fire intensity due to introduction of weeds	**Possible**. Earthmoving, mine vehicles and light vehicles may introduce additional weeds into the Project area.	The introduction and spread of weeds will be managed by: • Implementing a vehicle hygiene system. • Controlling weed populations if required.

Attachment 1 - Assessment of Impacts To MNES
Hemi Gold Project

Threats and Key Impacts	Likelihood and Impact (Prior to Mitigation Measures)	Mitigation Measures
Domestic and other introduced species	**Unlikely**. There will be no net increase of domestic animals into the development envelope as a result of the proposed action.	De Grey will not permit the keeping of pets or other introduced species on site.
Unmanaged fire	**Unlikely.** Unsupervised hot work and vehicles straying from haul roads and tracks may result in bushfires starting in the Project area.	De Grey does not propose to change the existing fire regime in the Project area. Potential impacts to the fire regime will be managed by: • Conduct site inductions that include fire prevention and control measures. • Effective maintenance of vehicles including tyres and wiring to prevent fire ignition. • Vehicles kept clean to prevent vegetative material collecting underneath and igniting. • No unauthorised off-road driving to prevent vehicles and machinery igniting grassfires. • All vehicles will carry portable fire extinguishers, with training provided on fire-fighting equipment. • Emergency response capacity will be maintained. • A hot works permit system will be implemented. • Install fire breaks around critical infrastructure. • Conducting any controlled burns in consultation with DBCA.
Loss of Traditional Owner knowledge and land management	**Unlikely**. Loss of traditional knowledge can result in alterations to landscape and habitats that adversely impact the Greater Bilby. This is unlikely to occur as a result of the Project.	De Grey has executed a Native Title Mining Agreement with Traditional Owners which includes measures and commitments to maintain and enhance traditional knowledge and land management practices.
Reduction in population resilience and genetic fitness in wild and intensively managed populations	**Unlikely**. The Greater Bilby does not continuously inhabit the Project area and suitable habitat is abundant beyond the Project area. Connections within and between local populations are unlikely to be affected by the proposed action.	Fragmentation of habitat will be avoided by: • Limiting clearing to the minimum required. • Using previously disturbed areas to the extent possible. • Implementation of an internal permitting system for clearing. • Annual review of clearing areas. • Progressive rehabilitation where feasible.

4.4.4 Significance Test

An assessment of the proposed action against the significance criteria for Vulnerable species in the Significant Impact Guidelines (DoE (Department of Environment), 2013) is presented in Table 4-8. The approved recovery plan (Pavey, 2006) states that identification of critical habitat is difficult and the draft recovery plan (CoA, 2019) applies the broad definitions below:

- **Important Population** – All populations are important populations.
- **Critical Habitat** – Any habitat where Bilbies are found to occur.

Western Wildlife(2023, p. 65) assessed the Sand Dune, Spinifex Sandplain and Sandplain Drainage habitats as critical. These are shown on Figure 4-4 and areas are provided in Table 4-7. Unlike critical habitat for most threatened species, critical Greater Bilby habitat is widespread and extends beyond the extent mapped in the fauna survey.

Table 4-7: Critical Greater Bilby Habitat Areas

Critical Habitat	Mapped Survey Area (ha)	Area inside Development Envelope (ha)	Area inside Provisional Disturbance Footprint (ha)
Sand dune	190.1	0	0
Sandplain drainage	9,349.5	6,029.4	721.2
Spinifex sandplain	22,718.6	15,809.8	5,037.1
Total	**32,258.2**	**21,839.2**	**5,758.3**

Table 4-8: Significant Impact Assessment for Greater Bilby

Significant Impact Criteria	Determination of Significance
Will the Project lead to a long-term decrease in the size of an important population of a species?	**No**. While signs of Greater Bilby were recorded during fauna surveys, the development envelope is not continuously inhabited, with the species thought to only pass through the area periodically. While clearing activities will impact local habitats present, the Greater Bilby does not depend on a single location and moves according to food availability and breeding purposes. As suitable habitat is common regionally, a significant decline in the population is not expected due to habitat loss. De Grey will implement a Fauna Management Plan (Attachment **8**) that includes measures to control feral fauna populations; ensure that the existing fire regime is not affected; and avoid injury or mortality on roads and during clearing.
Will the Project reduce the area of occupancy of an important population?	**No.** Records of Greater Bilby during fauna surveys demonstrate that it does not continuously inhabit the Project area. As suitable habitat is regionally common, the proposed action will not significantly reduce the area of occupancy of the Greater Bilby.
Will the Project fragment an existing important population into two or more populations?	**No.** Most signs of Greater Bilby were in the southwest of the survey area near the Yule River (excluded from the Development Envelope) with one record in the northeast (Figure 4-4). As suitable habitat is regionally common and the Greater Bilby does not continuously inhabit the Project area, the proposed action will not fragment the Greater Bilby population.

Significant Impact Criteria	Determination of Significance
Will the Project adversely affect habitat critical to the survival of a species?	**Yes**. Critical habitat is defined as any habitat where the Greater Bilby is found to occur and includes the Sand Dune, Sandplain Drainage and Spinifex Sandplain habitat in the project development envelope. While some of these habitats will be cleared for the Project, they are regionally common and clearing for the project is unlikely to have a significant impact on the survival of the Greater Bilby. Disturbance to areas where secondary signs of Greater Bilby have been recorded has been avoided from the disturbance footprint.
Will the Project disrupt the breeding cycle of an important population?	**Unlikely**. The Greater Bilby is adaptable and move with food availability, however burrows are important for breeding. Greater Bilby's may use multiple burrows in an area and reuse old burrows. The habitat identified within the Development Envelope is not critical to the breeding cycle of the Greater Bilby and is visited irregularly. No active burrows were identified during the field surveys. Pre-clearance fauna surveys will be undertaken to ensure there are no active burrows inside clearing areas.
Will the Project modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?	**No.** The project area is not continuously inhabited by Greater Bilby's and suitable habitat is regionally common. Most of the clearing will occur during construction and Greater Bilby's will be able to colonise other areas of suitable habitat. While a portion of suitable habitat will be cleared, the Project will not decrease the availability or quality of habitat to the extent the Greater Bilby is expected to decline.
Will the Project result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?	**Unlikely**. Foxes, cats and dingos are already present in the Project area. De Grey will implement measures to control feral fauna populations.
Will the Project introduce disease that may cause the species to decline?	**No**. The Project is not likely to introduce disease to the Greater Bilby population. Disease is not considered a key threat in the Draft Recovery Plan (CoA, 2019).
Will the Project interfere substantially with the recovery of the species?	**No**. With the above mitigation measures in place and the implementation of the Fauna Management Plan (Attachment 8), the Project is not anticipated to have a significant impact on the Greater Bilby or its recovery.

4.5 *Rhinonicteris aurantia* (Pilbara Leaf-nosed-Bat)

4.5.1 Species Overview

The Pilbara Leaf-nosed Bat (PLNB) roosts in warm and humid underground locations, such as caves and abandoned underground mines, during the day and forages at night in a variety of habitat types. The availability of suitable diurnal roost sites has a more significant impact on the local distribution of this species than habitat type (Western Wildlife, 2023). The PLNB is listed as Vulnerable under the EPBC Act.

4.5.2 Survey Results

The PLNB was recorded during fauna surveys and is expected to forage across all habitat types. No roosting habitat was recorded or considered likely to occur in the Project area. The closest known roosting site is at Yule River, 4.7 km west of the Development Envelope (Cramer et al., 2016).

The conservation advice defines habitat critical for the survival of the PLNB as underground diurnal roosts with warm temperatures and high humidity. Less important are nocturnal refuges used at night for resting, feeding or other purposes, which are not considered critical habitat, but are important for the species to persist locally (TSSC, 2016c).

According to the conservation advice, it is hard to define critical foraging habitat; however, priorities have been assigned based on habitat types where foraging bats are more frequently encountered. The assumption is that these are higher value foraging sites important for sustaining a nearby colony (TSSC, 2016c). The fauna habitats recorded in the survey area have been assessed on their foraging values and assigned a priority as follows:

a. Priority 1 – none recorded.
b. Priority 2 – none recorded.
c. Priority 3 – Rocky Outcrops (Excluded from development envelope).
d. Priority 4 – Major River.
e. Priority 5 – All other habitats.

The conservation advice for the PLNB defines important populations of the PLNB as a single interbreeding biological population in the Pilbara and Upper Gascoyne (TSSC, 2016c). The foraging individuals recorded during this survey are part of this important population.

Records and priority foraging habitat are shown on Figure 4-5 and areas are provided in Table 4-9.

Table 4-9: PLNB Priority Foraging Habitat

Foraging Habitat	Mapped Survey Area (ha)	Area inside Development Envelope (ha)	Area inside Provisional Disturbance Footprint (ha)
Priority 3 - Rocky Outcrop	1.5	0	0
Priority 4 - Major River	1,231.9	181.2	34.9
Priority 5 - all other habitats	33,454.6	22,012.1	5,791.6
Total	**34,688.0**	**22,193.3**	**5,826.5**

4.5.3 Potential Impacts and Mitigation Measures

Potential impacts are described in Table 4-10. Key threats are taken from the Species Profile and Threats (SPRAT) profile (DCCEEW, 2022e) and conservation advice (TSSC, 2016c) for the PLNB.

Table 4-10: Rhinonicteris aurantia (Pilbara Leaf Nosed-Bat) *Likelihood and Impact*

Threat	Detail	Likelihood and Impact (Prior to Mitigation Measures)	Mitigation Measures
Forced exodus of roost sites	The PLNB requires warm and humid roost sites. If a roost site is lost or vacated due to human activity, the most likely outcome is use of a sub-optimal roost site and higher mortality.	**Unlikely**. No roost sites have been detected in the Development Envelope.	N/A
Interruption of breeding activity	Works at or near diurnal roost sites during the breeding season (July to March) may disrupt the breeding cycle.	**Unlikely**. The Pilbara Leaf-nosed Bat is unlikely to breed in the Development Envelope as no roosting habitat has been detected.	N/A
Underground mine collapse and flooding causing direct mortality and loss of roost habitat	The PLNB uses historic underground workings as roosting habitat. The collapse or flooding of these workings results in loss of the roost site and a potential reduction in the area of occupancy.	**Unlikely**. The Project is a greenfields project and will not disturb any historic workings or dispose of surplus water into or near historic workings. No roost sites have been detected in the Development Envelope.	N/A
Mine development or exploration disturbing roost sites	The PLNB uses historic underground workings as roosting habitat. Re-entry, partial excavation or the disposal of surplus water into these workings results in loss of the roost site and a potential reduction in area of occupancy	**Unlikely**. The Project is a greenfields project and will not disturb any historic workings. No roost sites have been detected in the Development Envelope.	N/A
Blasting in adjacent mine pits and underground workings	Nearby blasting results in abandonment of roost sites for sub-optimal locations resulting in higher mortality and/or a reduction in area of occupancy.	**Unlikely**. No roost sites have been detected in the Development Envelope.	N/A
Human entry of roosts resulting in abandonment of site	Human entry may result in abandonment of roost sites for sub-optimal locations resulting in higher mortality and/or a reduction in area of occupancy.	**Unlikely**. No roost sites have been detected in the Development Envelope.	N/A
Roadkill	The PLNB flies relatively low and is curious about artificial light sources making it prone to vehicle collision.	**Possible.** The Project will result in additional light and heavy vehicle traffic and will operate at night-time when the PLNB is foraging.	Mortality or injury from vehicle interaction will be managed via the following measures: • Speed limits will be assigned and enforced. • Driving at night will be limited to the extent possible. • Mine vehicles will be required to stay on existing roads and tracks. • Hooning and misadventure will be prohibited. • Sightings and incidents will be reported. • Personnel will be educated on conservation significant fauna.

Attachment 1 - Assessment of Impacts To MNES
Hemi Gold Project

Threat	Detail	Likelihood and Impact (Prior to Mitigation Measures)	Mitigation Measures
Site rehabilitation – backfilling of old shafts and adits at closure	Backfilling of underground workings to meet closure or safety obligations deprives the PLNB of roost habitat	**Unlikely**. The Project is a greenfields project and will not disturb any historic workings. No roost sites have been detected in the Development Envelope.	N/A
Natural Predators	Predation is a normal part of PLNB ecology; however, effects may be exacerbated by human influences above.	**Unlikely**. Human influences on the PLNB resulting from the Project are anticipated to be minimal, likewise any effect of natural predation.	N/A

4.5.4 Significance Test

The significance of impacts is assessed according to the criteria in the conservation advice for the PLNB (TSSC, 2016c, pp. 6–7) in Table 4-11. Significant impacts to the PLNB as a result of the Project are unlikely to occur.

Table 4-11: Significant Impact Assessment for Pilbara Leaf-nosed Bat

Significance Test	Determination of Significance
Actions that are highly likely to have a significant impact:	
Will the Project lead to a long-term decrease in the size of the PLNB population?	**Unlikely**. The size of the PLNB population is largely determined by the availability of suitable diurnal roost sites. There are no roost sites in the Development Envelope.
Will the Project reduce the area of occupancy of the PLNB population?	**No**. The area of occupancy of the PLNB is largely determined by the availability of suitable diurnal roost sites. There are no roost sites in the Development Envelope.
Will the Project adversely affect individuals or habitat critical to the survival of the PLNB?	**Unlikely**. De Grey will implement measures to minimise the likelihood of mortality or injury due to vehicle strike. There is no Priority 1 or Priority 2 foraging habitat in the development envelope. All habitat classified as Priority 3 has been excluded from the Development Envelope. Some Priority 4 and 5 foraging habitats will be cleared for Project activities. These foraging habitats are regionally common and unlikely to be critical for the survival or local persistence of the PLNB. No critical habitat (roosting habitat) was located during fauna surveys and there are no known roost sites within 4.7 km of the Project's development envelope. The proposed action will not disturb any roost sites or areas in close proximity to roost sites.
Actions that may have a significant impact:	
Will the Project disrupt the breeding cycle of an important colony?	**No**. There are no diurnal roost sites in the Development Envelope and the Project will not disturb any roost sites or areas in close proximity to roost sites.
Will the Project modify, destroy, remove or isolate or decrease the availability or quality of PLNB habitat to the extent that the PLNB is likely to decline?	**No**. No roosting habitat was detected during fauna surveys and there are no known roost sites within 10 km of the Project's development envelope. No critical habitat will be impacted, and any loss of foraging habitat is unlikely to be critical for the survival or local persistence of the PLNB.
Actions that are unlikely to have a significant impact:	
Will the Project result in invasive species that are harmful to the PLNB becoming established in its habitat?	**Unlikely**. De Grey will implement measures to control existing populations of invasive species and the introduction of new species.
Will the Project introduce disease that may cause the PLNB to decline?	**No**. De Grey does not propose to enter any roost sites or interact directly with individuals.

4.6 *Macroderma gigas* (Ghost Bat)

4.6.1 Species Overview

The Ghost Bat is a carnivorous bat that persists as a relictual species in arid areas where there are suitable roosting caves present. The Ghost Bat's range has contracted northwards since European settlement and the species is listed as Vulnerable under the EPBC Act.

4.6.2 Survey Results

The Ghost Bat was not recorded during fauna surveys and no roosting habitat was recorded. The species is considered likely to occur as a foraging visitor to the Development Envelope as there are recent records nearby. The closest known roosting site is at the Wodgina mine site, 35 km to the south (Western Wildlife, 2023).

4.6.3 Potential Impacts and Mitigation Measures

Potential impacts and mitigation measures are summarised in Table 4-12. Key threats are listed from the conservation advice for the Ghost Bat (TSSC, 2016a).

Table 4-12: Macroderma gigas (Ghost Bat) *Likelihood and Impact*

Threats	Detail	Likelihood and Impact (Prior to Mitigation Measures)	Mitigation Measures
Habitat loss (destruction of or disturbance to roost sites and nearby areas) due to mining	Loss of roost sites due to mining activities or natural deterioration of historic underground workings.	**Unlikely**. There are no known roost sites in the Development Envelope.	N/A
Disturbance of breeding sites caused by human visitation	Ghost Bats are prone to disturbance and may abandon roost sites when this occurs. Approaching cars or people may result in bats leaving a roost site; larger disturbance by cavers or ecologists may result in roost site abandonment and/or the loss of pups.	**Unlikely**. There are no known roost sites in the Development Envelope.	N/A
Modification to foraging habitat	To persist in an area, Ghost Bats require a gully or gorge system that opens onto a plain or riparian line that provides good foraging opportunities, typically less than 5 km from the diurnal roost site. Livestock; grazing; fire; and weed encroachment can degrade habitat.	**Unlikely**. Foraging habitat in the Development Envelope is not considered to be critical for the Ghost Bat. The closest known roost site is 35 km to the south.	De Grey will limit impacts to foraging habitat via the following measures: • Limit clearing to amount required. • Use of previously disturbed areas where possible. • Avoid Major River habitat where possible. • Weed control measures. • Progressive rehabilitation of disturbed areas where feasible.
Collision with fences, especially those with barbed wire	Ghost bats fly at fence height and can be killed if they collide with fencing wire. Due to low fecundity, a single fence near a colony may kill all individuals over sufficient time.	**Unlikely**. Fences will be erected as part of the Project; however, the Project is not located in the vicinity of a diurnal roost site and Ghost Bats have not been recorded foraging in the Development Envelope.	De Grey will manage the potential impacts of fencing by: • Minimising fencing to amount required. • Not using barbed wire fencing where practicable. • Use of bat reflectors where required.
Collapse or reworking of old mine adits	Several known roost sites are in historic underground workings. These may collapse, flood or be re-entered resulting in loss of the roost site and deaths of individuals.	**Unlikely**. The Project is a greenfields project and will not disturb any historic workings. There are no known roost sites in the Development Envelope.	N/A
Contamination by mining residue at roost sites	Roost sites in old mines may be contaminated which may affect reproduction and survival.	**Unlikely**. There are no known roost sites or old underground mines in the Development Envelope.	N/A
Disease	A herpes-type virus may affect some populations	**Unlikely**. De Grey does not propose to enter any roost sites or handle individual bats.	N/A

Threats	Detail	Likelihood and Impact (Prior to Mitigation Measures)	Mitigation Measures
Poisoning by cane toads	Ghost bats are known to prey on cane toads and dead individuals have been found with chewed toad in their throats. They are likely to be affected by bufotoxins.	**Unlikely**. The cane toad has not yet reached the Pilbara.	De Grey will inspect vehicles arriving from the Northern Territory and Kimberly for cane toads to prevent inadvertent introduction to the Project area.
Competition for prey with foxes and feral cats	It is possible that population declines are attributable to competition with cats and foxes.	**Unlikely**. Without measures in place to prevent an increase in existing feral fauna populations is likely. However, given the distance to the closest known roosting site, increased competition with the Ghost Bat within feral faunas' range of the Project is unlikely.	Existing populations of feral fauna will be controlled by: • Implementing best practice waste management measures. • Limiting the creation of permanent water bodies. • Fencing of artificial water sources where practicable and the landfill. • Monitoring and control measures as required. • Feeding of feral fauna is prohibited. • Pets on site are prohibited.

4.6.4 Significance Test

An assessment of the proposed actions against the significance criteria for Vulnerable species in the Significant Impact Guidelines is presented in Table 4-13.

Critical habitat is not directly defined in the conservation advice (TSSC, 2016a) or SPRAT profile (DCCEEW, 2022b) for the species. Threats in the conservation advice cite disturbances to roost sites and the areas near roost sites and refer to foraging habitat within 5 km of a roost (TSSC, 2016a). Western Wildlife (2023) (referring to more recent study (Augusteyn et al., 2018) that determined lactating females forage within 3 km of diurnal roosts and bats forage on average 1.9 km from diurnal roosts) concluded that foraging habitat within 3 km of diurnal roost is important foraging habitat.

As the closest roost site is 35 km away, the Project is unlikely to host critical foraging habitat. Western Wildlife did identify the availability of suitable foraging habitat in the survey, however concluded that it was unlikely to be critical to the survival of the species as it is widespread and not close to roosting sites (Western Wildlife, 2023, p. 70).

Important populations are also not defined in the SPRAT profile or conservation advice. According to Western Wildlife (2023), as the Chichester sub-population is small (estimated 1,500 individuals), all populations in this region are likely important.

Table 4-13: Significant Impact Assessment for the Ghost Bat

Significant Impact Criteria	Determination of Significance
Will the Project lead to a long-term decrease in the size of an important population of a species?	**No**. No roosting sites are located near the project and no roost sites will be disturbed. Some suitable foraging habitats will be cleared; however, there is no evidence of a population utilising the Development Envelope.
Will the Project reduce the area of occupancy of an important population?	**No**. Roost site availability is a key factor in the area of occupancy of the Ghost Bat and no roost sites will be disturbed as part of the Project. Foraging habitats present in the Development Envelope is regionally common and not in close proximity to any known roosting sites.
Will the Project fragment an existing important population into two or more populations?	**No**. No roost sites will be impacted by the Project and foraging or migrating Ghost Bats will be able to fly over the Development Envelope.
Will the Project adversely affect habitat critical to the survival of a species?	**No**. No roost sites will be impacted by the Project. Foraging habitat to be cleared in the Project area is regionally common and not critical to the survival of the species.
Will the Project disrupt the breeding cycle of an important population?	**No**. No disturbance is proposed in or near diurnal roost sites where breeding occurs.
Will the Project modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?	**No**. As no roost sites are proposed to be impacted and no foraging habitat near roost sites will be impacted, the Project is not anticipated to result in a decline in the species.
Will the Project result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?	**Unlikely**. The fox and cat are already present in the Project area however, De Grey will implement measures to control feral fauna populations. The cane toad has not yet reached the Pilbara. De Grey will implement measures to prevent its accidental introduction as a result of the Project. If the cane toad does arrive, then De Grey will implement measures to manage its local persistence in consultation with regulators.
Will the Project introduce disease that may cause the species to decline?	**No**. De Grey does not propose to enter any roost sites or handle any ghost bats.
Will the Project interfere substantially with the recovery of the species?	**No**. With standard environmental management measures in place, the Project is not anticipated to have a significant impact on the Ghost Bat or its recovery.

4.7 *Liasis olivaceous barroni* (Pilbara Olive Python)

4.7.1 Species Overview

The Pilbara Olive Python occurs in the Pilbara region of Western Australia where it is widely distributed. It is usually associated with river systems in deep gorges and waterholes, and other riverine habitats. In winter the species shelters away from water in rocky areas and caves. The species is listed as vulnerable under the EPBC Act (Western Wildlife, 2023).

4.7.2 Survey Results

The Pilbara Olive Python was not recorded during terrestrial fauna surveys (Western Wildlife, 2023) or in eDNA analysis from the Yule and Turner Rivers (Stantec, 2022); however, it is considered likely to occur due to nearby records.

4.7.3 Potential Impacts and Mitigation Measures

Potential impacts and mitigation measures are described in Table 4-14. Threats and Key Impacts are taken from the approved conservation advice (DEWHA, 2008) and SPRAT profile (DCCEEW, 2022a) for the Pilbara Olive Python.

Table 4-14: Liasis olivaceous barroni (Pilbara Olive Python) Potential Impacts and Mitigation Measures

Threats and Key Impacts	Likelihood and Impact (Prior to Mitigation Measures)	Mitigation Measures
Major fire events	**Possible**. Hot work and sparks from heavy machinery may ignite bushfires.	De Grey does not propose to change the existing fire regime in the Project area. Potential impacts to the fire regime will be managed by: • Using a permit system for hot work. • Installation of fire breaks around critical infrastructure. • Effective maintenance of vehicles. • Provision of fire extinguishers in all vehicles. • Emergency response as required. • Conducting any controlled burns in consultation with DBCA. • Including fire education in the site induction.
Predation by feral cats and foxes	**Possible**. Foxes and cats are already present in the Development Envelope. Poor waste management and the creation of permanent water sources may cause existing feral fauna populations to increase.	Foxes and feral cats are already present in the Development Envelope. Populations of feral fauna will be controlled by: • Implementing best practice waste management measures. • Limiting the creation of permanent water bodies. • Control measures as required. • Feeding of feral fauna is prohibited. • Pets on site are prohibited.
Predation of food sources (including Northern Quoll and rock wallabies) by foxes and cats	**Possible**. Foxes and cats are already present in the Development Envelope. Poor waste management and the creation of permanent water sources may cause existing feral fauna populations to increase.	Existing populations of feral fauna will be controlled by: • Implementing best practice waste management measures. • Limiting the creation of permanent water bodies. • Fencing of artificial water sources where practicable and the landfill. • Monitoring and control measures as required. • Feeding of feral fauna is prohibited. • Pets on site are prohibited.
Destruction of habitat due to gas and mining development (particularly on the Burrup Peninsula)	**Unlikely**. The majority of the project is not located in or near critical habitat for the Pilbara Olive Python. Project is not on the Burrup Peninsula. Surplus water that cannot be reinjected will be discharged into the Turner River, which will alter the wet-dry cycle of the river. Disposal volumes of surplus water are expected to significantly decline in the third year of the Project. A sudden reduction after two years of high flow may impact habitat.	Habitat loss and Fragmentation will be managed by: • Limiting clearing to the minimum required. • Using previously disturbed areas to the extent possible. • Exclusion of Rocky Outcrop habitat from clearing footprint. • Exclusion of the Yule River from the Development Envelope. • Limiting clearing in the Turner River to low-impact disturbance for the dewatering outfall. The impacts of surplus water discharge will be managed by: • Ensuring discharge meets quality criteria in the site environmental licence.

Threats and Key Impacts	Likelihood and Impact (Prior to Mitigation Measures)	Mitigation Measures
		• Reinjection of a portion of surplus water to reduce disposal volumes. • Reuse of surplus water in the processing facility once this becomes operational in year three of the Project to reduce disposal volumes. • Phasing the reduction in discharge volumes after year three of the project to avoid a sudden shock to the ecosystem. • Explore other disposal options including third-party offtake to further reduce disposal volumes.
Accidental or deliberate road kills	**Unlikely.** While the project will create traffic, operational areas are located away from critical habitat.	De Grey will implement the following measures to prevent injury or mortality on project roads: • Speed limits will be assigned and enforced. • Driving at night will be limited to the extent possible. • Mine vehicles will be required to stay on existing roads and tracks. • Hooning and misadventure will be prohibited. • Sightings and incidents will be reported. • Personnel will be educated on conservation significant fauna. • Deliberate harm to any native fauna is prohibited and will result in disciplinary action (up to and including termination).
Death from mistaken identification as a poisonous brown snake.	**Unlikely.** Personnel are unlikely to deliberately harm any snakes onsite, venomous or otherwise.	Deliberate deaths will be prevented by the following measures: • Deliberate harm to any native fauna is prohibited. • Snakes will be relocated by authorised and trained reptile handlers only. • Personnel will be educated on conservation significant fauna.
Disturbance caused by increasing tourist visitors to water holes.	**Unlikely**: Development of a mining project is not anticipated to increase tourist numbers.	An increase in tourism due to the Project is not encouraged or anticipated. De Grey will implement the following measures: • Unauthorised personnel are excluded from mining tenements. • Any visitors will have to complete an environmental induction or be escorted by inducted staff.

4.7.4 Significance Test

An assessment of the proposed actions against the significance criteria for Vulnerable species in the Significant Impact Guidelines (DoE (Department of Environment), 2013) is presented in Table 4-16. No significant impacts to the Pilbara Olive Python from the Project are anticipated.

Critical habitat and important populations are not defined in the conservation advice (DEWHA, 2008) or SPRAT profile (DCCEEW, 2022a) for the species. In the absence of guidance, the local population is considered important and Western Wildlife (2023) consider the following habitats in the Project area critical:

- Major River.
- Rocky Outcrop.

Critical habitat is shown on Figure 4-6 and areas are provided in Table 4-15. Note that Figure 4-6 shows the extents mapped in the fauna survey and critical habitat extends to the north and south along the Yule and Turner Rivers.

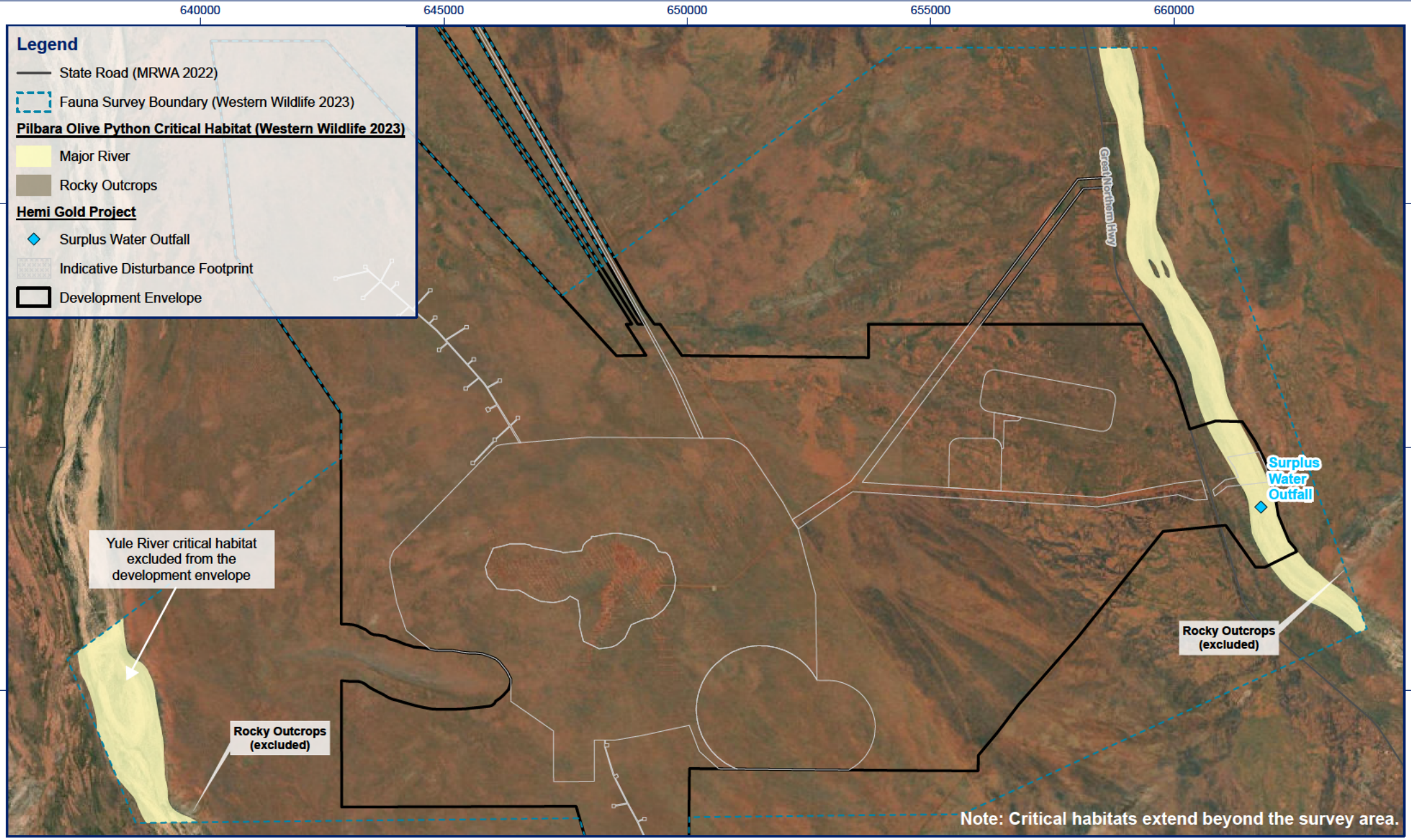
Table 4-15: Critical Pilbara Olive Python Habitat Areas

Critical Habitat	Mapped Survey Area (ha)	Area inside Development Envelope (ha)	Area inside Provisional Disturbance Footprint (ha)
Major River	1,231.9	181.2	34.9
Rocky Outcrops	1.5	0	0
Total	**1,233.4**	**181.2**	**34.9**

Table 4-16: Significance Impact Assessment for the Pilbara olive Python

Significant Impact Criteria	Determination of significance
Will the Project lead to a long-term decrease in the size of an important population of a species?	**No.** Most of the Development Envelope is not critical habitat for the Pilbara Olive Python, and no individuals have been recorded within it. De Grey will also implement measures to control feral fauna populations; prevent changes to the fire regime; and to avoid road kills.
Will the Project reduce the area of occupancy of an important population?	**No**. Most of the **Development Envelope** is not critical habitat for the Pilbara Olive Python, and no individuals have been recorded within it.
Will the Project fragment an existing important population into two or more populations?	**No**. Critical habitat for the Pilbara Olive Python is Rocky Outcrop and Major River habitat and direct disturbances to these have been avoided or minimised even though there are no recorded sightings within the Development Envelope or survey area. The Yule and Turner Rivers extend 150 km upstream, and the project will not significantly restrict movement between them.
Will the Project adversely affect habitat critical to the survival of a species?	**Yes**. Critical habitat for the Pilbara Olive Python is Major River habitat and Rocky Outcrop. Rocky Outcrop habitat and Major River habitat along the Yule River has been excluded from the Development Envelope even though there are not recorded sightings in these habitats. A minor amount of low-impact clearing is required for the dewatering outfall in the Turner River. This clearing is not anticipated to have any effect on the overall habitat quality in the Turner River or result in a decline in the Pilbara Olive Python.

Significant Impact Criteria	Determination of significance
Will the Project disrupt the breeding cycle of an important population?	**No**. Critical habitat for the Pilbara Olive Python is Rocky Outcrop and Major River habitat and direct disturbances to these have been avoided or minimised even though there are no recorded sightings in these habitats. Disruptions to the breeding cycle are not anticipated.
Will the Project modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?	**No**. Critical habitat for the Pilbara Olive Python is Rocky Outcrop and Major River habitat. Direct disturbance to these has been avoided or minimised via the exclusion of the Yule River and Rocky Outcrop habitat from the development envelope and limiting direct disturbance in the Turner River to low impact clearing for the dewatering outfall. The disposal of surplus water into the Turner River is not anticipated to affect the Pilbara Olive Python. The disposal volume has been minimised via aquifer reinjection and through reuse as process water after year three of the Project. Modelling indicates that the expected flow will be confined to the main channel of the river.
Will the Project result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?	**No**. De Grey will implement measures to control feral fauna species.
Will the Project introduce disease that may cause the species to decline?	**No.** It is unlikely a mining project will introduce animal diseases to an area. Personnel are not allowed to bring pets to site and vehicle hygiene measures will be implemented to prevent introduction of soil and plant diseases.
Will the Project interfere substantially with the recovery of the species?	**No**. With standard environmental management measures in place, the Project is not anticipated to have a significant impact on the Pilbara Olive Python.



Scale 1:100,000
Projection GDA2020 MGA Zone 50
Created/Reviewed By HC/SP
Aerial Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

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PROJECT		CLIENT
May 2023	Hemi Gold Project Proposal	DE GREY MINING LTD
Figure 4-6		
ADV-AU-00241	Pilbara Olive Python Survey Critical Habitat	

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4.8 *Falco hypoleucos* (Grey Falcon)

4.8.1 Species Overview

The Grey Falcon inhabits large portions of arid and semi-arid Australia; however, the total population may be <1,000 individuals. It is associated with inland drainages and forages on timbered plains and occasionally treeless plains. Grey Falcons nests in tall trees along watercourses and occasionally on transmission lines (Western Wildlife, 2023).

4.8.2 Survey Results

The Grey Falcon was not detected during fauna surveys; however, is considered likely to occasionally occur in the Project area. There is also potential breeding habitat along the Yule and Turner Rivers (Western Wildlife, 2023).

4.8.3 Potential Impacts and Mitigation Measures

Potential impacts and mitigation measures are described in Table 4-17. Threats and Key Impacts are taken from the approved conservation advice for the Grey Falcon (TSSC, 2020). An additional threat associated with the creation of water sources favouring the Peregrine Falcon was identified by Western Wildlife from the Action Plan for Australian Birds (Garnett S et al., 2011).

Table 4-17: Falco hypoleucos (Grey Falcon) Potential Impacts and Mitigation Measures

Threats and Key Impacts	Likelihood and Impact (Prior to Mitigation Measures)	Mitigation Measures
Provision of water in arid areas favouring closely related Peregrine Falcon	**Unlikely**. There are permanent pools on both the Yule and Turner Rivers and artificial water sources are already present on the Indee Pastoral lease, yet there were not recorded sightings of Peregrine Falcons. Artificial water sources may be created as part of the Project, and surplus water will be disposed of into the Turner River for the project. However, these actions are not anticipated to be significant in the context of the surface water already available to attract Peregrine Falcons.	De Grey will implement the following measures: • Location of dewatering discharge point in middle section of Turner River ensuring upper catchment is unimpacted. • Reinjection of surplus water to reduce discharge into Turner River. • Explore other disposal options including third-party offtake to further reduce disposal volumes. • Use of surplus water in the process facility from year three to avoid additional discharge into Turner River. • The creation of other artificial water sources is limited to extent practicable and away from Major River habitat
Habitat degradation due to overgrazing	**None**. The Project is located on an existing pastoral lease and De Grey does not propose to interfere with existing pastoral activities.	N/A
Predation by cats	**Possible**. The existing feral cat population may increase as a result of the Project due to improper handling and disposal of putrescible waste; and feeding.	Feral cats are already present in the Project area. Populations of feral fauna will be controlled by: • Implementing best practice waste management measures. • Limiting the creation of permanent water bodies. • Fencing of artificial water sources where practicable and the putrescible landfill. • Monitoring and control measures as required. • Feeding of feral fauna is prohibited. • Pets on site are prohibited.
Increased temperatures in arid and semi-arid Australia due to the effects of climate change.	**None**. Implementation of the Project will increase greenhouse gas emissions, however, will not have a detectable effect on climate change.	De Grey will: • Measure and Report GHG emissions in accordance with the National *Greenhouse and Energy Reporting Act 2007*. • Implement a greenhouse gas management plan for the project. • Adopt a GHG emissions reductions strategy that has a trajectory to achieve net zero by 2050.
Small population size is more susceptible to demographic and genetic stochastic effects	**None**. The Project does not have the capacity to cause demographic and stochastic effects in the species.	There are estimated to be <1,000 mature Grey Falcons in Australia. Management measures described in this table will limit impacts to the species that may cause this number to decrease further and increase the potential for demographic and stochastic effects.
Grazing by exotic herbivores reducing regeneration of nesting	**None**. The Project is located on an existing pastoral lease and De Grey does not propose to interfere with existing pastoral activities.	N/A

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Threats and Key Impacts	Likelihood and Impact (Prior to Mitigation Measures)	Mitigation Measures
trees and prey abundance		
Nest shortage	**Unlikely**. The grey falcon nests in tall trees along watercourses and on man-made structures such as powerlines. Trees may be cleared for the development of the Project, but only minimal clearing will be required within the Turner River to construct a dewatering outfall. The construction of a powerlines to the Project provides the opportunity for additional nesting habitat.	• Major river habitat has been excluded from the direct disturbance footprint, with the exception of for the dewatering outfall, which avoids any clearing of large trees. • An internal permitting system has been developed to prevent overcleaning or clearing outside of the proposed footprint.
Birdwatchers and photographers	**None**. Due to its rarity, the Grey Falcon is a popular species for bird enthusiasts. Large numbers of birdwatchers may disturb the species. Grey Falcons are uncommon in the Development Envelope, which due its remoteness and the security protocols associated with gold mines, will not attract bird watchers.	• Non-project personnel are excluded from the mining operation. • All visitors must complete an induction or be escorted by inducted personnel while on site.
Collision with traffic	**Unlikely**. Grey Falcons are only occasionally present in the Development Envelope.	• The potential for collision will be reduced by: • Speed limits will be assigned and enforced. • Driving at night will be limited to the extent possible. • Mine vehicles will be required to stay on existing roads and tracks. • Hooning and misadventure will be prohibited. • Sightings and incidents will be reported. • Personnel will be educated on conservation significant fauna.
Collision with fences and powerlines	**Unlikely**. Grey Falcons are likely to only be occasionally present in the Development Envelope.	• Limiting use of fencing to extent practicable. • Limiting extent of power corridor to minimum required.
Egg collecting	**Unlikely**. Egg collecting without a permit is prohibited in Western Australia and is unlikely to be undertaken by Project personnel.	• Collecting of birds' eggs by De Grey personnel or contractors is prohibited.
Falconry	**Unlikely**. Project personnel are unlikely to attempt to capture Grey Falcons for falconry.	• Personnel are prohibited from keeping any animals on site and will not be allowed to collect eggs or chicks for falconry. Trapping of native fauna will only be undertaken in consultation with DBCA and in accordance with a BC Act fauna licence.

4.8.4 Significance Test

An assessment of the proposed action against the significance criteria for Vulnerable species in the Significant Impact Guidelines is presented in Table 4-19. No significant impacts to the Grey Falcon are anticipated from the Project.

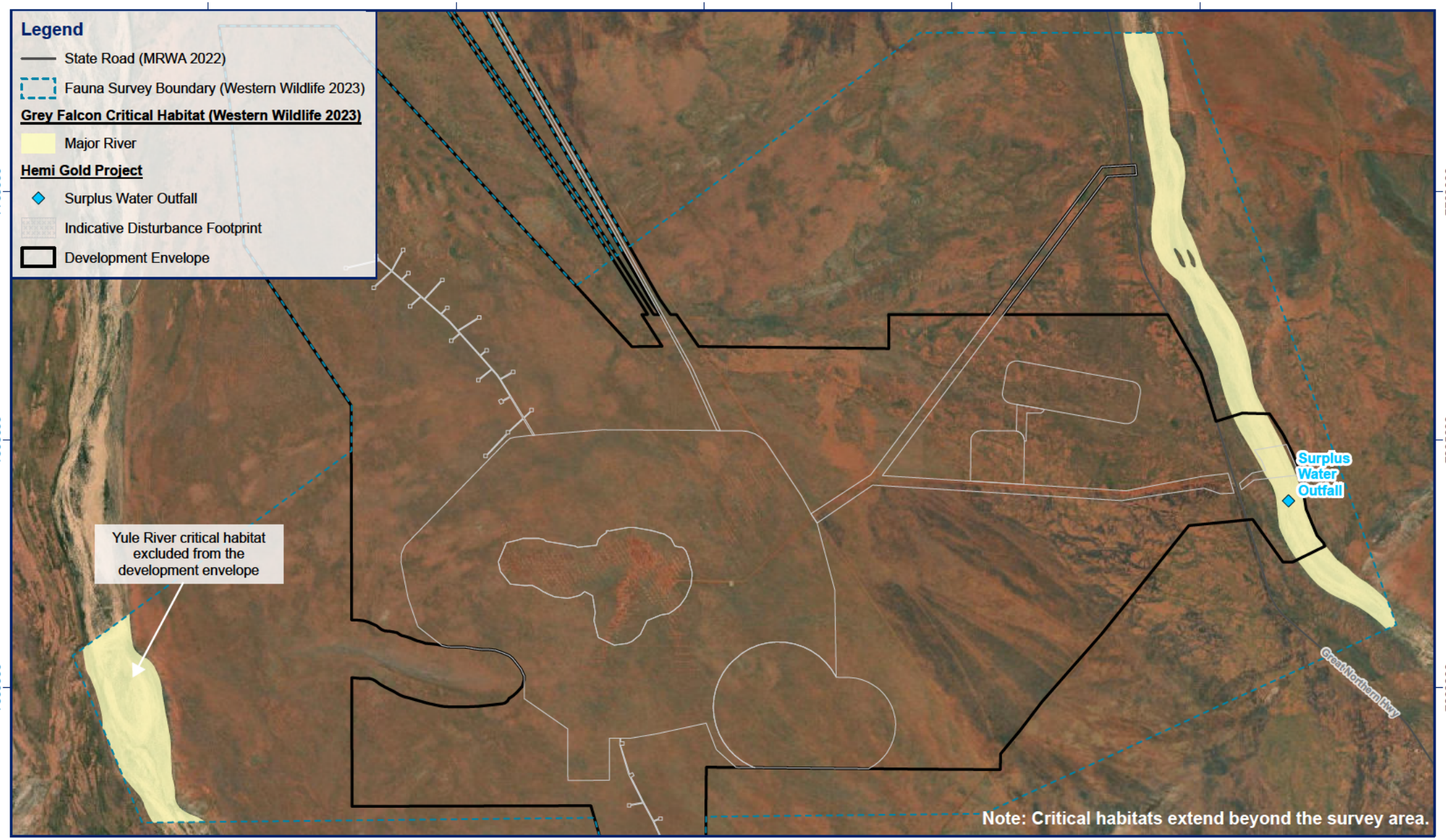
Critical habitat and important populations are not defined in the conservation advice (TSSC, 2020) and SPRAT profile (DCCEEW, 2022b) for the species. Given the small size of the population, any local occurrence is likely to be important and Western Wildlife consider Major River habitat critical.

A map of critical habitat is provided in Figure 4-7. Note that Figure 4-7 shows the extents mapped in the fauna survey and critical habitat extends upstream and downstream along the Yule and Turner Rivers.

Critical habitat areas are provided in Table 4-18. Disturbances in Major River habitat are limited to clearing for the dewatering pipeline and outfall and will be able to avoid large trees that serve as potential breeding sites.

Table 4-18: Critical Grey Falcon Habitat Areas

Critical Habitat	Mapped Survey Area (ha)	Area inside Development Envelope (ha)	Area inside Provisional Disturbance Footprint (ha)
Major River	1,231.9	181.2	34.9
Total	**1,231.9**	**181.2**	**34.9**



Scale 1:100,000
Projection GDA2020 MGA Zone 50
Created/Reviewed By HC/SP
Aerial Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

RPMGLOBAL

N

0 1 2 km

PROJECT		CLIENT
May 2023	Hemi Gold Project Proposal	DE GREY MINING LTD
Figure 4-7		
ADV-AU-00241	Grey Falcon Survey Critical Habitat	

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Table 4-19: Significant Impact Assessment for Grey Falcon

Significant Impact Criteria	Determination of Significance
Will the Project lead to a long-term decrease in the size of an important population of a species?	**No.** Grey falcons are sparsely distributed and only likely to occur in the Development Envelope occasionally. Direct disturbance avoids critical major river habitat and indirect disturbance associated with mine dewatering does not impact the Yule River and upper catchment of the Turner River. De Grey will implement measures to control feral fauna populations; to avoid traffic collisions; and will prohibit chick and egg collecting by personnel.
Will the Project reduce the area of occupancy of an important population?	**No.** Grey Falcons are sparsely distributed and likely to occur in the Development Envelope occasionally. Direct disturbance avoids critical major river habitat and indirect disturbance associated with mine dewatering does not impact the Yule River and upper catchment of the Turner River.
Will the Project fragment an existing important population into two or more populations?	**No.** Clearing of Major River habitat has been avoided along the Yule River and minimised along the Turner River and Grey Falcons will be able to fly around or over the Development Envelope when transiting between breeding habitats on the Yule and Turner Rivers.
Will the Project adversely affect habitat critical to the survival of a species?	**Unlikely**. Major River Habitat is critical habitat for the Grey Falcon. Direct disturbance of major river habitat is avoided or minimised, and measures will be implemented to limit the volume of dewatering into the Turner River.
Will the Project disrupt the breeding cycle of an important population?	**No**. Grey Falcons typically choose nests in the tallest trees along watercourses (TSSC, 2020) which will be avoided during clearing activities. Environmental management measures to prevent accidental over clearing will be implemented.
Will the Project modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?	**Unlikely.** Direct disturbance of critical Major River habitat has been avoided and measures will be implemented to limit the volume and duration of dewatering into the Turner River. The Yule River and upper catchment of the Turner River will not be impacted by dewatering discharge. Impacts to habitat are not anticipated to cause the species to decline.
Will the Project result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?	**Unlikely.** De Grey will implement measures to control feral fauna species.
Will the Project introduce disease that may cause the species to decline?	**No**. A mining project is unlikely to introduce animal diseases to any area. Personnel are not allowed to bring pets to site and vehicle hygiene measures will be implemented to prevent introduction of soil and plant pathogens.
Will the Project interfere substantially with the recovery of the species?	**No.** With standard environmental management measures in place, the Project is not anticipated to have a significant impact on the Grey Falcon.

4.9 *Pezoporus occidentalis* (Night Parrot)

4.9.1 Species Overview

The Night Parrot is a ground-dwelling parrot, historically distributed across much of the arid and semi-arid interior of Australia. There are very few recent records, and the species is listed as endangered under the EPBC Act. Chenopod shrublands and spinifex grasslands are considered key habitat for the Night Parrot and the species nests in mature spinifex (Western Wildlife, 2023).

4.9.2 Survey Results

Fauna surveys by Western Wildlife included a targeted Night Parrot survey using 12 passive acoustic detectors deployed across the survey area which did not detect the Night Parrot in the Development Envelope (Western Wildlife, 2023).

Since the current distribution in Western Australia is based on very few records, the likelihood of occurrence within the Project area is uncertain. Most habitats present in the Project's Development Envelope lack the large spinifex clumps required for breeding habitat, due to regular fires and grazing pressures. Large clumps are present in very small patches, at a scale far finer than habitat mapping, in areas naturally protected from fire or where natural water run-off promotes growth. As habitat suitable for breeding and roosting is present, despite the negative survey results, the possibility exists that the Night Parrot could in future occur in the Development Envelope (Western Wildlife, 2023).

Detail on the Night Parrot and its uncertain presence in the Development Envelope is provided on page 61 of the Fauna Report (Attachment 6).

4.9.3 Potential Impacts and Mitigation Measures

Potential impacts and mitigation measures are discussed in Table 4-20. Threats and key impacts are those listed by Western Wildlife from the 2020 Action Plan for Australian Birds (Garnett & Baker, 2021).

Table 4-20: Pezoporus occidentalis (Night Parrot) Potential impacts and Mitigation Measures

Threats and Key Impacts	Likelihood and Impact (Prior to Mitigation Measures)	Mitigation Measures
Habitat Degradation due to large scale grazing	**Unlikely.** The Project is located on an active stocked pastoral lease and cattle regularly graze in the Development Envelope. The Project does not propose to change pastoral activity in the undeveloped Development Envelope and is unlikely to alter the impacts of grazing within the Indee pastoral lease.	De Grey will limit the creation of artificial water sources in spinifex sandplain and sandplain drainage habitat that may attract additional cattle into the Development Envelope.
Habitat Loss due to potash mining	**Unlikely.** The Project is not a potash operation and will not disturb any chenopod shrubland associated with salt lakes or saline soils.	• N/A
Fires causing loss of mature spinifex	**Possible**. Unsupervised or unplanned hot work and vehicles straying from tracks and haul roads may result in bushfires starting in the Project area, which could cause loss of mature spinifex.	De Grey does not propose to change the existing fire regime in the Development Envelope. Potential impacts to the fire regime will be managed by: • Using a permit system for hot work. • Installation of fire breaks around critical infrastructure. • Effective maintenance of vehicles.

Threats and Key Impacts	Likelihood and Impact (Prior to Mitigation Measures)	Mitigation Measures
		• Provision of fire extinguishers in all vehicles. • Emergency response as required. • Conducting any controlled burns in consultation with DBCA. • Including fire education in the site induction.
Predation by cats	**Possible.** Existing feral predator populations may increase as a result of the Project.	De Grey will implement measures to control feral fauna species. • Implementing best practice waste management measures. • Limiting the creation of permanent water bodies. • Fencing artificial water bodies where possible and any putrescible landfills. • Ongoing feral fauna monitoring. • Control measures as required. • Prohibit feeding of feral fauna. • Prohibit pets on site.

4.9.4 Significance Test

The significance of impacts to the Night Parrot as a result of the proposed action are assessed in Table 4-21. Note that critical habitat is not defined in the conservation advice (TSSC, 2016b) or SPRAT Profile (DCCEEW, 2022d) for the Night Parrot.

Table 4-21: Significant Impact Assessment for Night Parrot

Significant Impact Criteria	Determination of Significance
Will the Project lead to a long-term decrease in the size of a population?	**Unlikely**. A long-term decrease may be caused by habitat loss, fire and predation by cats. Although clumps of mature spinifex that provide suitable habitat are present in the Development Envelope. Spinifex grassland is abundant in the region and localised habitat loss is unlikely to cause a decrease in the population. De Grey will also implement management measures to ensure the existing fire regime in unimpacted area and control feral cat populations.
Will the Project reduce the area of occupancy of a species?	**Unlikely.** The current range of the of the Night Parrot is uncertain, but as suitable habitat is abundant outside of the Development Envelope, the proposed action is unlikely to impact the area of occupancy.
Will the Project fragment an existing population into two or more populations?	**Unlikely**. Suitable habitat is abundant outside of the Development Envelope and the project is unlikely to fragment a population of the species.
Will the Project adversely affect habitat critical to the survival of a species?	**Unlikely**. While mature spinifex is present in the Development Envelope, it is in very small patches. As spinifex is abundant in the Pilbara, the habitat in the Development Envelope is unlikely to be critical for the species.
Will the Project disrupt the breeding cycle of a population?	**Unlikely**. Night Parrots are unlikely to be present in the Development Envelope and the majority of clearing will take place over a short period.

Significant Impact Criteria	Determination of Significance
Will the Project modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline?	**Unlikely**. Large clumps of spinifex suitable for nesting are present in small, isolated patches in the Development Envelope. Spinifex clumps are present across the Pilbara and the Project is unlikely to decrease habitat availability or quality to the extent that a decline will occur.
Will the Project result in invasive species that are harmful to a critically endangered or endangered species becoming established in the critically endangered or endangered species' habitat?	**Unlikely**. Feral cats and foxes are already present in the Development Envelope. De Grey will implement measures to control the populations.
Will the Project introduce disease that may cause the species to decline?	**No**. De Grey does not propose to handle any night parrots as part of the project or introduce any bird species. Site inductions will stress that no fauna is to be handled.
Will the Project interfere with the recovery of the species?	**Unlikely**. With standard environmental management measures in place, the Project is unlikely to interfere with the recovery of the night parrot.

4.10 Migratory Species

4.10.1 Survey Results

Detailed fauna surveys for the Project were undertaken in September 2021 and March 2022 in accordance with the: Survey Guidelines for Australia's Threatened Birds (DEWHA 2010).

The migratory species that are known to occur or likely to occur in the Project area and potential impacts from the proposed action are discussed in Table 4-22. The table also shows which species are listed in the:

- Shorebird Policy – EPBC Act Policy Statement 3.21 Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species (DEE, 2017).
- Draft Referral Guideline – Draft Referral guideline for 14 birds listed as migratory species under the EPBC Act (DoE, 2015).

Each migratory species and the significance of the Development Envelope is discussed in Section 5.2.2 (page 75) of the fauna report (Attachment 6).

Table 4-22: Migratory Species in Survey Area

Species	Species listed in Shorebird Policy	Species listed in Draft Referral Guideline	Likelihood of occurrence and importance of Project Area to the Species	Potential Impacts
Fork-tailed Swift (*Apus pacificus*)	No	Yes	**Recorded.** Likely to be a regular summer visitor in small numbers, but as it is a largely aerial species in Australia it is unlikely to be affected by changes to the Development Envelope.	• Clearing of all habitats. • Possible increase in predator fauna species. • Noise and vibration. • Light spill from active mining and processing area. • Potential for mortality from aircraft strikes.

Species	Species listed in Shorebird Policy	Species listed in Draft Referral Guideline	Likelihood of occurrence and importance of Project Area to the Species	Potential Impacts
Oriental Plover (*Charadrius veredus*)	Yes	No	**Possible Occurrence.** May be a non-breeding summer visitor to open plains and recently burnt areas. Very few records of this species in the region. An ecologically important proportion of the population is not likely to be affected by the Project.	• Clearing of habitat (preference for open areas such as recently burnt and claypans). • Possible increase in predator fauna species. • Noise and vibration. • Light spill from active mining and processing area. • Possible introduction and spread of weed species. • Possible mortality from aircraft or vehicle strikes.
Sharp-tailed Sandpiper (*Calidris acuminata*)	Yes	No	**Potential Occurrence.** Non-breeding summer visitor to waterholes on Major Rivers, possibly also to claypans in the Sandplain Drainage habitat. These habitats are not likely to regularly support more than a few individuals.	• Clearing of Sandplain Drainage habitat in the Development Envelope. • Surplus water discharge into the Turner River causing a temporary continual flow. • Dewatering activities drying out the Sandplain Drainage habitat reducing the suitability of the habitat. • Possible increase in predator fauna species. • Noise and vibration. • Light spill from active mining and processing area. • Possible mortality from aircraft or vehicle strikes.
Pectoral Sandpiper (*Calidris melanotos*)	Yes	No	**Possible Occurrence.** May be a non-breeding summer visitor to waterholes on Major Rivers, possibly also to claypans in the Sandplain Drainage habitat. These habitats are not likely to regularly support more than a few individuals.	• Clearing of Sandplain Drainage habitat in the Development Envelope. • Surplus water discharge into the Turner River causing a temporary continual flow. • Dewatering activities drying out the Sandplain Drainage habitat reducing the suitability of the habitat. • Possible increase in predator fauna species. • Noise and vibration. • Light spill from active mining and processing area. • Possible mortality from aircraft or vehicle strikes

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Species	Species listed in Shorebird Policy	Species listed in Draft Referral Guideline	Likelihood of occurrence and importance of Project Area to the Species	Potential Impacts
Red-necked Stint (*Calidris ruficollis*)	Yes	No	**Potential Occurrence.** Non-breeding summer visitor to waterholes on Major Rivers, possibly also to claypans in the Sandplain Drainage habitat. These habitats are not likely to regularly support more than a few individuals.	• Clearing of Sandplain Drainage habitat in the Development Envelope. • Surplus water discharge into the Turner River causing a temporary continual flow. • Dewatering activities drying out the Sandplain Drainage habitat reducing the suitability of the habitat. • Possible increase in predator fauna species. • Noise and vibration. • Light spill from active mining and processing area. • Possible mortality from aircraft or vehicle strikes.
Wood Sandpiper (*Tringa glareola*)	Yes	No	**Likely Occurrence.** Non-breeding summer visitor to waterholes on Major Rivers, possibly also to claypans in the Sandplain Drainage habitat. These habitats are not likely to regularly support more than a few individuals.	• Clearing of Sandplain Drainage habitat in the Development Envelope. • Surplus water discharge into the Turner River causing a temporary continual flow. • Dewatering activities drying out the Sandplain Drainage habitat reducing the suitability of the habitat. • Possible increase in predator fauna species. • Noise and vibration. • Light spill from active mining and processing area. • Possible mortality from aircraft or vehicle strikes.
Common Greenshank (*Tringa nebularia*)	Yes	No	**Likely Occurrence.** Non-breeding summer visitor to waterholes on Major Rivers, possibly also to claypans in the Sandplain Drainage habitat. These habitats are not likely to regularly support more than a few individuals.	• Clearing of Sandplain Drainage habitat in the Development Envelope. • Surplus water discharge into the Turner River causing a temporary continual flow. • Dewatering activities drying out the Sandplain Drainage habitat reducing the suitability of the habitat. • Possible increase in predator fauna species. • Noise and vibration. • Light spill from active mining and processing area. • Possible mortality from aircraft or vehicle strikes.

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Species	Species listed in Shorebird Policy	Species listed in Draft Referral Guideline	Likelihood of occurrence and importance of Project Area to the Species	Potential Impacts
Marsh Sandpiper (*Tringa stagnatilis*)	Yes	No	**Potential Occurrence.** Non-breeding summer visitor to waterholes on Major Rivers, possibly also to claypans in the Sandplain Drainage habitat. These habitats are not likely to regularly support more than a few individuals.	• Clearing of Sandplain Drainage habitat in the Development Envelope. • Surplus water discharge into the Turner River causing a temporary continual flow. • Dewatering activities drying out the Sandplain Drainage habitat reducing the suitability of the habitat. • Possible increase in predator fauna species. • Noise and vibration. • Light spill from active mining and processing area. • Possible mortality from aircraft or vehicle strikes.
Common Sandpiper (*Actitis hypoleucos*)	Yes	No	**Likely Occurrence.** Non-breeding summer visitor to waterholes on Major Rivers, possibly also to claypans in the Sandplain Drainage habitat. These habitats are not likely to regularly support more than a few individuals.	• Clearing of Sandplain Drainage habitat in the Development Envelope. • Surplus water discharge into the Turner River causing a temporary continual flow. • Dewatering activities drying out the Sandplain Drainage habitat reducing the suitability of the habitat. • Possible increase in predator fauna species. • Noise and vibration. • Light spill from active mining and processing area. • Possible mortality from aircraft or vehicle strikes.
Eastern Osprey (*Pandion cristatus*)	No	Yes	**Potential Occurrence.** Foraging visitor to waterholes on Major Rivers. The study area lacks breeding habitat and river pools are not likely to be important foraging habitat for this species.	• Surplus water discharge into the Turner River causing a temporary continual flow. • Possible increase in predator fauna species. • Possible mortality from aircraft or vehicle strikes.
Oriental Pratincole (*Glareola maldivarum*)	Yes	No	**Potential Occurrence.** Non-breeding summer visitor to open plains or claypans in the Sandplain Drainage habitat. It is unlikely that a large proportion of the national or international population would be present.	• Surplus water discharge into the Turner River causing a temporary continual flow. • Possible increase in predator fauna species. • Possible mortality from aircraft or vehicle strikes.

Species	Species listed in Shorebird Policy	Species listed in Draft Referral Guideline	Likelihood of occurrence and importance of Project Area to the Species	Potential Impacts
Gull-billed Tern (*Gelochelidon nilotica*)	No	No	**Potential Occurrence.** Foraging visitor to waterholes on Major Rivers. No breeding habitat present. The habitats in the study area are unlikely to be important for the Gull-billed Tern.	• Clearing of Sandplain Drainage habitat in the Development Envelope. • Surplus water discharge into the Turner River causing a temporary continual flow. • Dewatering activities drying out the Sandplain Drainage habitat reducing the suitability of the habitat. • Possible increase in predator fauna species. • Noise and vibration. • Light spill from active mining and processing area. • Possible mortality from aircraft or vehicle strikes.
Caspian Tern (*Hydroprogne caspia*)	No	No	**Likely Occurrence.** Foraging visitor to waterholes on Major Rivers. No breeding habitat present.	• Surplus water discharge into the Turner River causing a temporary continual flow. • Possible increase in predator fauna species. • Possible mortality from aircraft strikes.
Glossy Ibis (*Plegadis falcinellus*)	No	No	**Potential Occurrence.** Occasional foraging visitor to waterholes on Major Rivers. No breeding habitat present.	• Surplus water discharge into the Turner River causing a temporary continual flow. • Possible increase in predator fauna species. • Possible mortality from aircraft strikes

An additional six migratory species were identified in the EPBC Act Protected Matters Search Tool or DBCA's Threatened and Priority Fauna Database as potentially occurring in the Project area. These species were assessed by Western Wildlife (2023) as unlikely to occur in the Project area. A list of excluded species and justifications for exclusion is provided in Appendix 9 (Page 152) of the fauna report (Attachment 6) and information for the six excluded species is shown in Table 4-23.

Table 4-23: Excluded Migratory Species

Species	Reason for exclusion
Curlew Sandpiper (*Calidris ferruginea*)	Shorebird that primarily uses coastal habitats (mudflats, mangroves, beaches)
Greater Sand Plover (*Charadrius leschenaultii*)	Shorebird that primarily uses coastal habitats (mudflats, mangroves, beaches)
Barn Swallow (*Hirundo rustica*)	Vagrant to the region.
Grey Wagtail (*Motacilla cinera*)	Vagrant to the region.
Eastern Curlew (*Numenius madagascariensis*)	Shorebird that primarily uses coastal habitats (mudflats, mangroves, beaches)
Yellow Wagtail (*Motacilla flava*)	Vagrant to the region.

4.10.2 Potential Impacts and Mitigation Measures

The 'EPBC Act Policy Statement 3.21 Industry Guideline for Avoiding Assessing and Mitigating Impacts on EPBC Act Listed Migratory Shorebirds' (DEE, 2017) defines when an action is likely to have an impact on Important habitats to migratory species. An assessment of the potential impacts from the actions proposed habitat of migratory birds are outlined in Table 4-24.

Table 4-24: Potential Impacts to Migratory Birds

Threats	Likelihood and Impact (Prior to Mitigation Measures)	Mitigation Measures
Loss of habitat	**Unlikely**. The proposed area to be cleared within the Project's development envelope is not significant habitat for migratory species	• Clearing of riparian vegetation/wetland fringes has been avoided or minimised. • Clearing of floodplain systems has been avoided.
Degradation of habitat leading to a substantial reduction in migratory shorebird numbers.	**Unlikely**. The Development Envelope is primarily used as a visiting ground for migratory birds and does not provide breeding habitat. The Project will not degrade the surrounding environment so a corresponding reduction in migratory shore bird numbers is not anticipated.	• The degradation of habitat due to the introduction of exotic species will be avoided by prohibiting pets on site, implementation of vehicle hygiene procedures and pest control programs. • De Grey will implement measures to avoid changing the existing fire regime.
Increased disturbance leading to a substantial reduction in migratory shorebird numbers.	**Unlikely**. The Development Envelope is primarily used as a visiting ground for migratory birds and does not provide breeding habitat.	Disturbance to possible habitat where migratory birds may forage is mitigated by: • Excluding Yule River from development envelope. • Minimising disturbance to Turner River
Direct mortality of birds leading to a substantial reduction in migratory shorebird numbers.	**None**. As the migratory birds only visit the Project area, it is anticipated that any direct mortality of individual birds will not constitute a substantial reduction in numbers.	De Grey will implement the following to prevent direct mortality from vehicle interaction: • Speed limits will be assigned and enforced. • Driving at night will be limited to the extent possible. • Mine vehicles will be required to stay on existing roads and tracks. • Hooning and misadventure will be prohibited. • Sightings and incidents will be reported. • Personnel will be educated on conservation significant fauna. De Grey will implement the following measures to control existing populations of feral predators which may kill migratory birds: • Implementing best practice waste management measures. • Limiting the creation of permanent water bodies. • Fencing of artificial water sources where practicable and the putrescible landfill. • Monitoring and control measures as required. • Feeding of feral fauna is prohibited. • Pets on site are prohibited.

4.10.3 Significance Test

An assessment of the proposed action against the significant impact criteria for migratory species (DoE (Department of Environment), 2013) is outlined in Table 4-25. No significant impacts to migratory species are anticipated as a result of the Project.

The Significant impact guidelines (DoE (Department of Environment), 2013) define important migratory bird habitat as:

- Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or
- Habitat that is of critical importance to the species at particular life-cycle stages, and/or
- Habitat utilised by a migratory species which is at the limit of the species range, and/or
- Habitat within an area where the species is declining.

Additional guidance on internationally and nationally important habitat in the Shorebird Policy (DEE, 2017). A wetland is Internationally important if it supports:

- 1% of the population.
- At least 20,000 water birds.

Nationally important habitat is defined as habitat that supports:

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

The habitat in the Development Envelope does not meet any of the above criteria as ecologically significant populations of migratory birds were not recorded during any of the fauna surveys.

Table 4-25: Significant Impact Assessment for Migratory Species

Significant Impact Criteria	Determination of Significance
Will the project 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?	**None.** Important habitat is not present in the Development Envelope.
Will the project result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species?	**None.** Important habitat is not present in the Development Envelope. De Grey will implement measures to control feral fauna populations.
Will the project seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species?	**None.** Migratory birds are unlikely to breed in the Development Envelope. The Project area does not host an ecologically significant population of any migratory species.

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