

Conservation Significant Fauna Management Plan

Mulga Downs Iron Ore Mine – Western Australia

Hancock Prospecting Pty Ltd
ABN 69 008 676 417

EPBC Assessment Number: 2022/09255
EPA Assessment Number: 2326

10 April 2025

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Mulga Downs Iron Ore Mine – Western Australia

Revision Register

REV	DATE	DESCRIPTION	PREPARED BY	REVIEWED BY	AUTHORISED BY
0	April 2023	Draft Management Plan for EPA and DCCEEW initial review.	JBS&G Australia	V. Campagna	
1	June 2023	Draft Management Plan for EPA initial review.	JBS&G Australia	V. Campagna	
2	November 2023	Draft Management Plan for HPPL initial review.	JBS&G Australia		
3	December 2024	Revision addressing DCCEEW Review	JBS&G Australia		B McGuire
4	April 2025	Revision addressing BNTAC and DCCEEW Comments	JBS&G Australia	HanRoy	B McGuire

Declaration of Accuracy:

In making this declaration, I am aware that section 491 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth). The offence is punishable on conviction by imprisonment or a fine, or both. I am authorised to bind the approval holder to this declaration and that I have no knowledge of that authorisation being revoked at the time of making this declaration.

Signed

Full name (please print)

Organisation (please print)

Date

Brett McGuire

HanRoy

10 April 2025

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Executive Summary

Hancock Prospecting Pty Ltd (HPPL, the Proponent) is proposing to construct and operate the Mulga Downs Iron Ore Mine (MDIOM, the Proposal), located approximately 210 kilometres (km) south of Port Hedland and 180 km north-west of Newman in the Pilbara Region of Western Australia.

The purpose of this Conservation Significant Fauna Management Plan (CSFMP) is to outline the Proponent's approach to managing potential impacts on conservation significant terrestrial fauna from implementation of the Proposal. This CSFMP addresses terrestrial fauna species listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as Matters of National Significance (MNES), fauna species listed under the State *Biodiversity Conservation Act 2016* (BC Act), for assessment under Part IV of the State *Environmental Protection Act 1986* (EP Act) and/or are listed as priority species by the Department of Biodiversity, Conservation and Attractions (DBCA).

Table E- 1: Conservation Significant Fauna Management Plan Summary

Proposal Name	Mulga Downs Iron Ore Mine (MDIOM, the Proposal)
Proponent Name	Hancock Prospecting Pty Ltd (HPPL, the Proponent)
Short Description	<p>The Proposal is for the development of the MDIOM, located 210 km south of Port Hedland and 180 km north west of Newman in the Pilbara Region of Western Australia. The Proposal includes but is not limited to the following:</p> <ul style="list-style-type: none">• The development of a series of above and below water table mine pits;• Dry ore crushing and screening plant(s);• Groundwater abstraction for water supply (for the mine and all associated infrastructure) and for the dewatering to facilitate the recovery of ore below water table in the mine pits;• Surplus water management via managed aquifer recharge (MAR) and/or in pit infiltration;• Waste rock dumps (WRD);• Infrastructure to manage surface water (diversion of creeks and surface water flows);• Linear infrastructure (haul roads, powerlines, pipelines and conveyor corridors);• Mine associated infrastructure and support facilities (including, but not limited to accommodation camp, energy supply infrastructure, airstrip; wastewater treatment plant; landfill, offices, workshops, laydown areas, etc.); and• Transport of the ore via the Great Northern Highway to Port Hedland or via road to a siding along the existing Roy Hill railway and then via that railway to Port Hedland for export. Future transport options (e.g. rail) will be subject to a separate referral.
Ministerial Statement Number	To be determined <i>Note: This document has been prepared to support the EPA's and the Commonwealth DCCEEW's assessment of the Proposal.</i>
EP Act Assessment No.	2326
EPBC Reference No.	2022/09255

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Purpose of CSFMP	To provide a management framework for conservation significant vertebrate fauna and their habitats to avoid, minimise and mitigate potential adverse impacts associated with the implementation of the Proposal.
Key environmental factor/s and objectives relevant to this CSFMP	<p>Terrestrial Fauna: <i>“To protect terrestrial fauna so that biological diversity and ecological integrity are maintained”</i></p> <p>Flora and Vegetation: <i>To protect flora and vegetation so that biological diversity and ecological integrity are maintained.</i></p>
Controlling Provisions - MNES	<ul style="list-style-type: none"> Threatened species and communities (s.18 & s.18A) Migratory Species (s.20 & s.20A)
Condition clauses	<p>This CSFMP satisfies item 10 of the Environmental Scoping Document (ESD) for the Proposal under EP Act Assessment No. 2326.</p> <p>Given the Proposal is under assessment (Part IV of EP Act) and is a Controlled Action under EPBC Act approval conditions are yet to be issued.</p>
Key components in the CSFMP	<p>An outcome and objective-based management plan addressing the following:</p> <ul style="list-style-type: none"> Establishing limits of clearing of conservation significant fauna habitat. Protection of retained Category 4 caves for conservation significant bat species. Establishing a Fauna Habitat Exclusion Zone (FHEZ) and FHEZ Corridor. Minimising the extent of clearing of conservation significant fauna habitat. Minimising the degradation of significant fauna habitat from implementation, related to: <ul style="list-style-type: none"> dust emissions; altered fire regimes; weed invasion; altered hydrological changes. Minimise the extent of habitat degradation/loss from dust suppression by using saline water below salinity thresholds (i.e. less than 5,000 mg/L TDS) Minimising disturbance to native fauna from noise, vibration and lighting during Proposal implementation. Minimising population decline of conservation significant fauna due to predation from introduced fauna (including cane toads) as a result of the Proposal. Minimising incidental mortality or injury of conservation significant terrestrial fauna from clearing activities, vehicle strike or mining related activities resulting from the Proposal. Minimising conservation significant terrestrial fauna population decline due to entrapment within mine infrastructure and equipment, as a result of the Proposal. <p><i>Note this CSFMP is to move towards outcome based as the residual impacts are finalised.</i></p>
Proposed construction date	Construction of the Proposal is anticipated to commence in FY2026 (subject to approvals) and is forecast to take approximately two years.
CSFMP required pre-construction?	Yes

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1 Introduction

1.1 Proposal Background

HPPL is proposing to develop a greenfield iron ore mine at Mulga Downs, located in the Fortescue River valley and on the flanks of the adjacent Chichester Range (MDIOM; Proposal). The Proposal is approximately 210 km south of Port Hedland and 180 km north-west of Newman in the Pilbara Region of Western Australia (**Figure 1-1**).

The Proposal involves the construction and operation of an iron ore mine and associated infrastructure. Once operational, the Proposal will involve mining of up to 12 million tonnes per annum (Mtpa) of iron ore from above and below the water table using conventional drill and blast, load and haul techniques. Operations will be continuous throughout the year, running 24 hours a day, seven days a week, over an 18 year mine life.

Table 1-1 provides a summarised description of the Proposal. **Figure 1-1** shows the regional location of the Proposal.

Table 1-1: Proposal Summary

Proposal title	Mulga Downs Iron Ore Mine (Proposal)
Proponent name	Hancock Prospecting Pty Ltd (HPPL)
Short description	<p>The Proposal is for the development of the Mulga Downs Iron Ore Mine (MDIOM) located approximately 210 km south of Port Hedland and 180 km north-west of Newman in the Pilbara Region of Western Australia. The Proposal includes and is not limited to the following:</p> <ul style="list-style-type: none">• The development of a series of above and below water table mine pits;• Dry ore crushing and screening plant(s);• Groundwater abstraction for water supply (for the mine and all associated infrastructure) and for the dewatering to facilitate the recovery of ore below water table in the mine pits;• Surplus water management via managed aquifer recharge (MAR) and/or in pit infiltration;• Waste rock dumps (WRD);• Infrastructure to manage surface water (diversion of creeks and surface water flows);• Linear infrastructure (haul roads, powerlines, pipelines and conveyor corridors);• Mine associated infrastructure and support facilities (including, but not limited to accommodation camp, energy supply infrastructure, airstrip; wastewater treatment plant; landfill, offices, workshops, laydown areas, etc.); and• Transport of the ore via the Great Northern Highway to Port Hedland or via road to a siding along the existing Roy Hill railway and then via that railway to Port Hedland for export. Future transport options (e.g. rail) will be subject to a separate referral.

1.2 Purpose and Scope

The purpose of this Conservation Significant Fauna Management Plan (CSFMP) is to outline the Proponent's approach to managing potential impacts on conservation significant terrestrial fauna and supports the assessment of the Proposal under both the *Environmental Protection Act 1986* (EP Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

This CSFMP applies to potential direct and indirect impacts resulting from the implementation of the Proposal on terrestrial fauna and their habitat. The objective of this CSFMP is to:

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- Identify the key aspects and activities of the Proposal with the potential to directly or indirectly impact conservation significant fauna and / or their habitat;
- Describe mitigation measures that will be implemented to avoid or minimise the adverse impacts on the conservation significant fauna and their habitat;
- Describe the outcomes, consistent with relevant legislation, policies and guidance; and
- Provide the rationale and approach undertaken to enable compliance criteria to be met.

This CSFMP applies to all phases of the proposed MDIOM, including construction, operation, closure and rehabilitation.

This CSFMP has been prepared in consideration of, and should be read in conjunction with, the Water Management Plan which addresses ecohydrological impacts, and responds to item 13 and 14 of the Environmental Scoping Document (ESD) prepared for the Proposal.

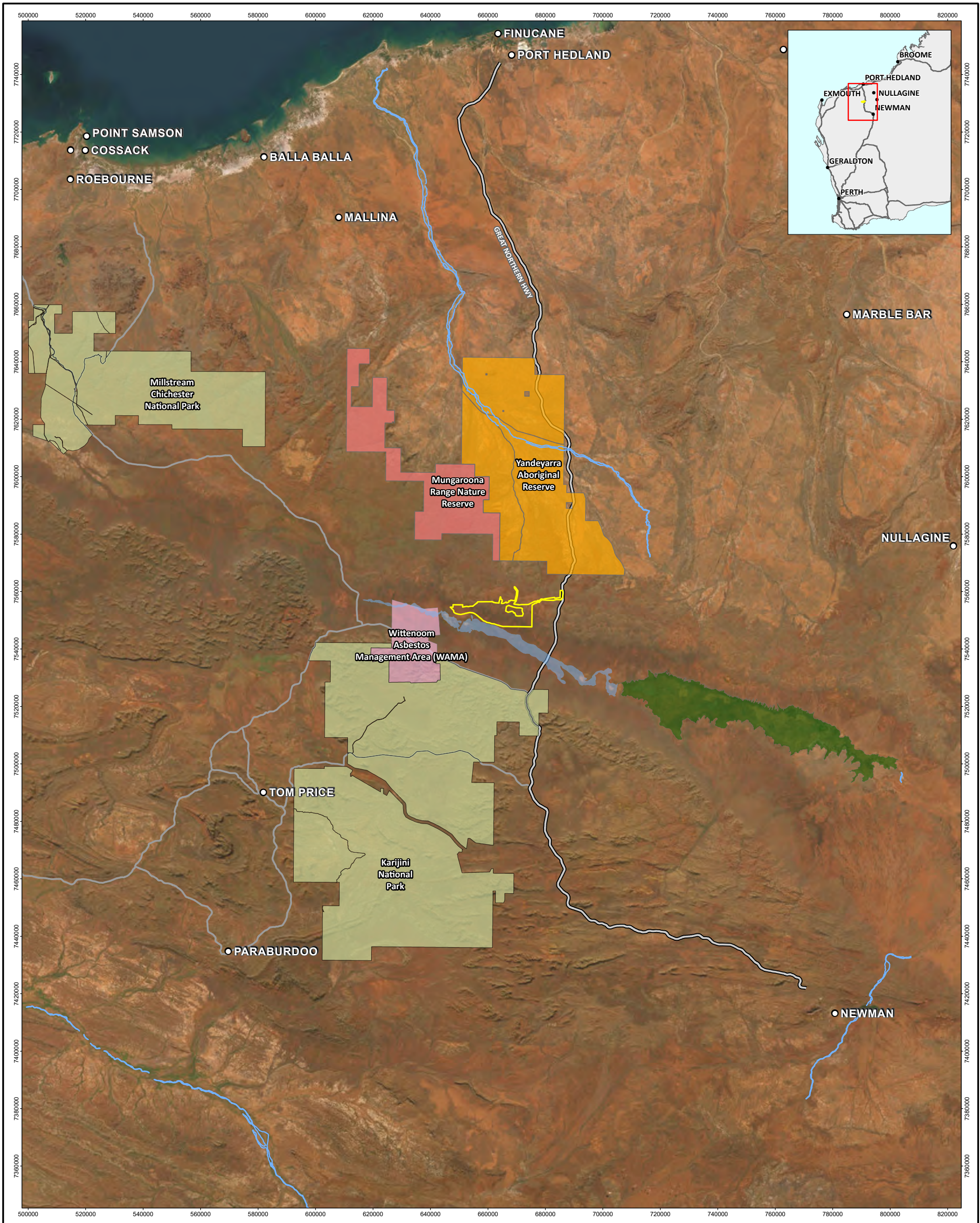
The Proposal is subject to separate assessments under the EP Act and the EPBC Act due to a difference in the Proposal extent (Development Envelope / Proposed Action Area) under assessment within each jurisdiction. This CSFMP has therefore been prepared in accordance with:

- *'Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plans'* (EPA, 2020), as stated in the ESD, and addresses any specific work additional work required for assessment of the Proposal under the EP Act; and
- Information required under the *'Environmental Management Plan Guidelines'* (DoE, 2014) and supports the Public Environmental Report (PER) for the Proposal.

For ease of reference, the term Proposal is referred to throughout this document. However, given the difference between the Proposed Action Area and Development Envelope, reference is made to either or both where relevant in this document.

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Legend Development Envelope / Proposed Action Area Wittenoom Asbestos Management Area (WAMA)(DWER-059) Legislated Lands and Waters (DBCAs-011) National Park Nature Reserve Yandeyarra Aboriginal Reserve (LGATE-227) Directory of important wetlands (DBCAs-045) Lower Fortescue River Upper Fortescue River including the Fortescue Marsh Watercourses (LGATE-053) Roads (LGATE-195) Highway Major road					Mulga Downs Iron Ore Mine Central Pilbara, Western Australia	
	Job Number: 67751		Scale 1:1,200,000 at A3			
	Client: Hancock Prospecting Pty Ltd		Coord. Sys. GDA2020 MGA Zone 50		REGIONAL LOCATION OF THE PROPOSAL (EPBC 2022/09255 and EP Act 2326)	
	Drawn By: droberts	Checked By: VC	Version: Rev A	Date: 31-Oct-2024	FIGURE: 1.1	

Conservation Significant Fauna Management Plan

Mulga Downs Iron Ore Mine – Western Australia

1.3 Environmental Impact Assessment

1.3.1 Environmental Protection Act 1986

The Proposal was referred to the WA EPA under Part IV of the EP Act (Assessment No: 2326) in December 2021. The EPA provided notice that the Proposal would be assessed (assessment number 2326) and the level of assessment was set at PER with a 6-week public review period for the Environmental Review Document (ERD).

The Proposal currently under assessment by the EPA under the EP Act will involve the clearing of up to 4,339.16 ha of native vegetation within a Development Envelope of 16,848.83 ha (**Figure 1-2**).

The key environmental factors relevant to the assessment of the Proposal include:

- Flora and Vegetation;
- Subterranean Fauna;
- Terrestrial Environmental Quality;
- Terrestrial Fauna;
- Inland Waters
- Greenhouse Gas Emissions;
- Social Surroundings; and
- Air Quality.

1.3.2 Terrestrial Fauna

This CSFMP specifically addresses the EPA's environmental factor for Terrestrial Fauna. The EPA (EPA, 2016) defines the factor of Terrestrial Fauna as:

Animals living on land or using land (including aquatic systems) for all or part of their lives. Terrestrial fauna includes vertebrate (birds, mammals including bats, reptiles, amphibians, and freshwater fish) and invertebrate (arachnids, crustaceans, insects, molluscs and worms) groups. It also includes aquatic fauna which occurs in standing, flowing or temporary waters.

Fauna habitat is also included as part of the terrestrial fauna environmental factor. The EPA (EPA, 2016) defines fauna habitat as:

The natural environment of an animal or assemblage of animals, including biotic and abiotic elements, that provides a suitable place for them to live (e.g. breed, forage, roost or seek refuge). The scale at which fauna habitat is defined will depend on the ecological requirements of the species considered.

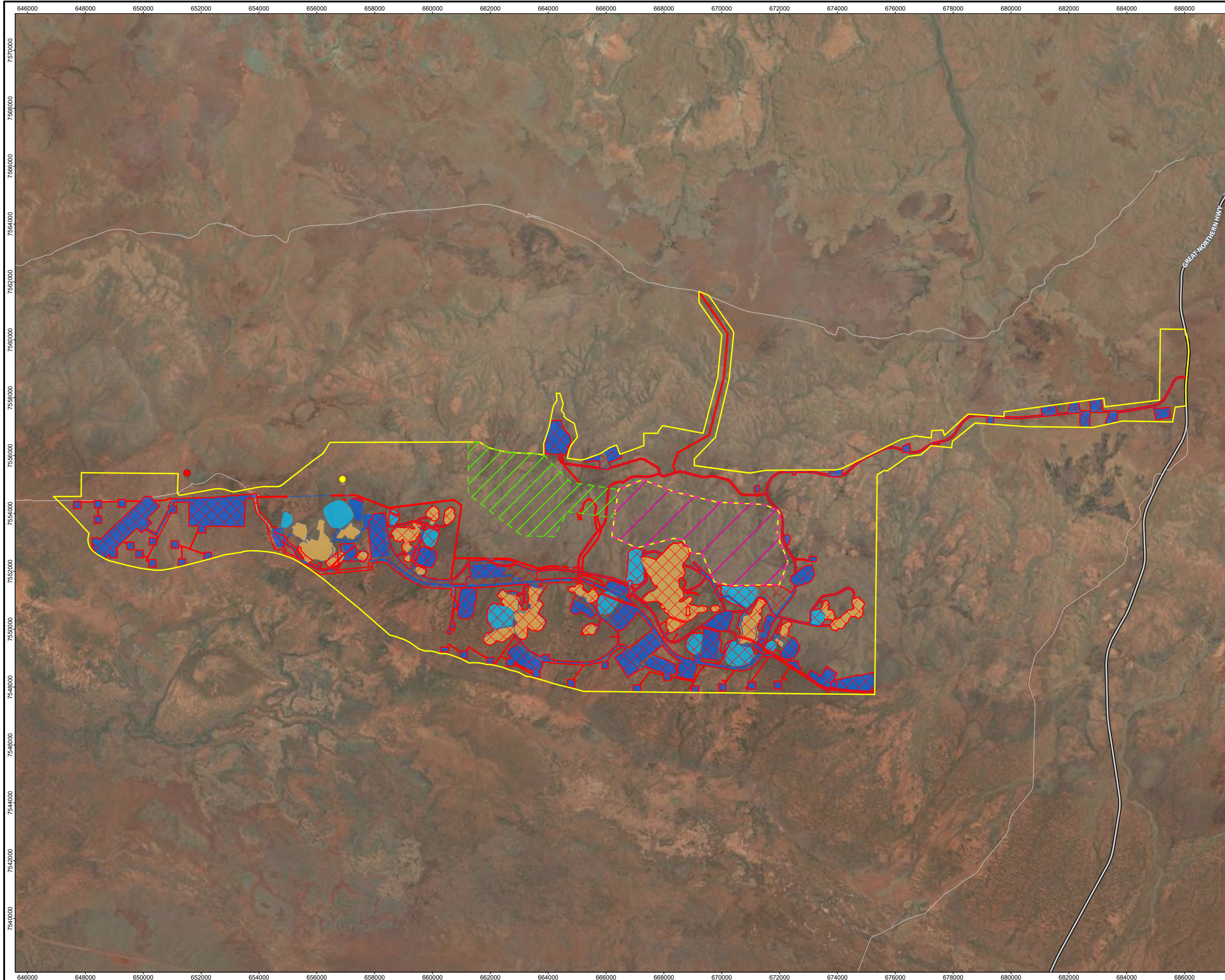
1.3.3 Condition Requirements

Conditional requirements will be added from the Ministerial Statement once issued.

This CSFMP responds to Item 10 of the ESD prepared for the Proposal.

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- Legend**
- Development Envelope
 - Indicative Footprint
 - Fauna Habitat Exclusion Zone (FHEZ)
 - FHEZ Corridor
- Mine Layout**
- Supporting infrastructure
 - Pit
 - Waste Dump
 - Mulga Downs Exploration Camp (LGATE-013)
 - Mulga Downs Homestead (LGATE-013)
- Roads (LGATE-195)**
- Highway
 - Minor Road

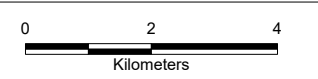


Job No: 67751

Client: Hancock Prospecting Pty Ltd

Version: A	Date: 26-Mar-2025
Drawn By: dmills	Checked By: VC

Scale 1:120,000 at A3



Coord. Sys. GDA2020 MGA Zone 50

**Mulga Downs Iron Ore Mine
Central Pilbara, Western Australia**

**PROPOSAL LOCATION,
DEVELOPMENT ENVELOPE AND
INDICATIVE FOOTPRINT**

FIGURE 1.2

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Mulga Downs Iron Ore Mine – Western Australia

1.3.4 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places — defined in the Act as Matters of National Environmental Significance (MNES).

The Commonwealth is currently assessing the Proposal via a Public Environmental Report under Assessment Number: EPBC 2022/09255. The MDIOM is not being assessed as an accredited assessment under Section 87 of the EPBC Act as the Development Envelope/Proposed Action Areas and indicative footprints are different. The Proposal being assessed under the EP Act does not include the Murray’s Hill Project, which is a component of the Proposal being assessed under the EPBC Act. The Proposal for the purpose of EPBC 2022/09255 is displayed on **Figure 1-3**.

The Proposal being assessed under the EPBC Act will involve the clearing of up to 4,733.66 ha of native vegetation within a Proposed Action Area of 16,848.83 ha (**Figure 1-3**). The Proposal has the potential to impact upon the following Matters of National Environmental Significance (MNES):

- Listed Threatened Species and Communities (Sections 18 & 18A); and
- Listed Migratory Species (Sections 20 & 20A).

DCCEEW issued Public Environmental Review guidelines to HPPL in October 2022. DCCEEW identified the following MNES as relevant to the assessment of the Proposal:

- Northern Quoll (*Dasyurus hallucatus*) – Endangered;
- Pilbara Leaf-nosed Bat (*Rhinioncteris aurantia*) – Vulnerable;
- Ghost Bat (*Macroderma gigas*) – Vulnerable;
- Pilbara Olive Python (*Liasis olivaceus barroni*) – Vulnerable;
- Greater Bilby (*Macrotis lagotis*) – Vulnerable;
- Night Parrot (*Pezoporus occidentalis*) – Endangered;
- Grey Falcon (*Falco hypoleucos*) – Vulnerable; and
- Blind Cave Eel (*Ophisternon candidum*) – Vulnerable.

The following listed migratory species (sections 20 & 20A) were also identified:

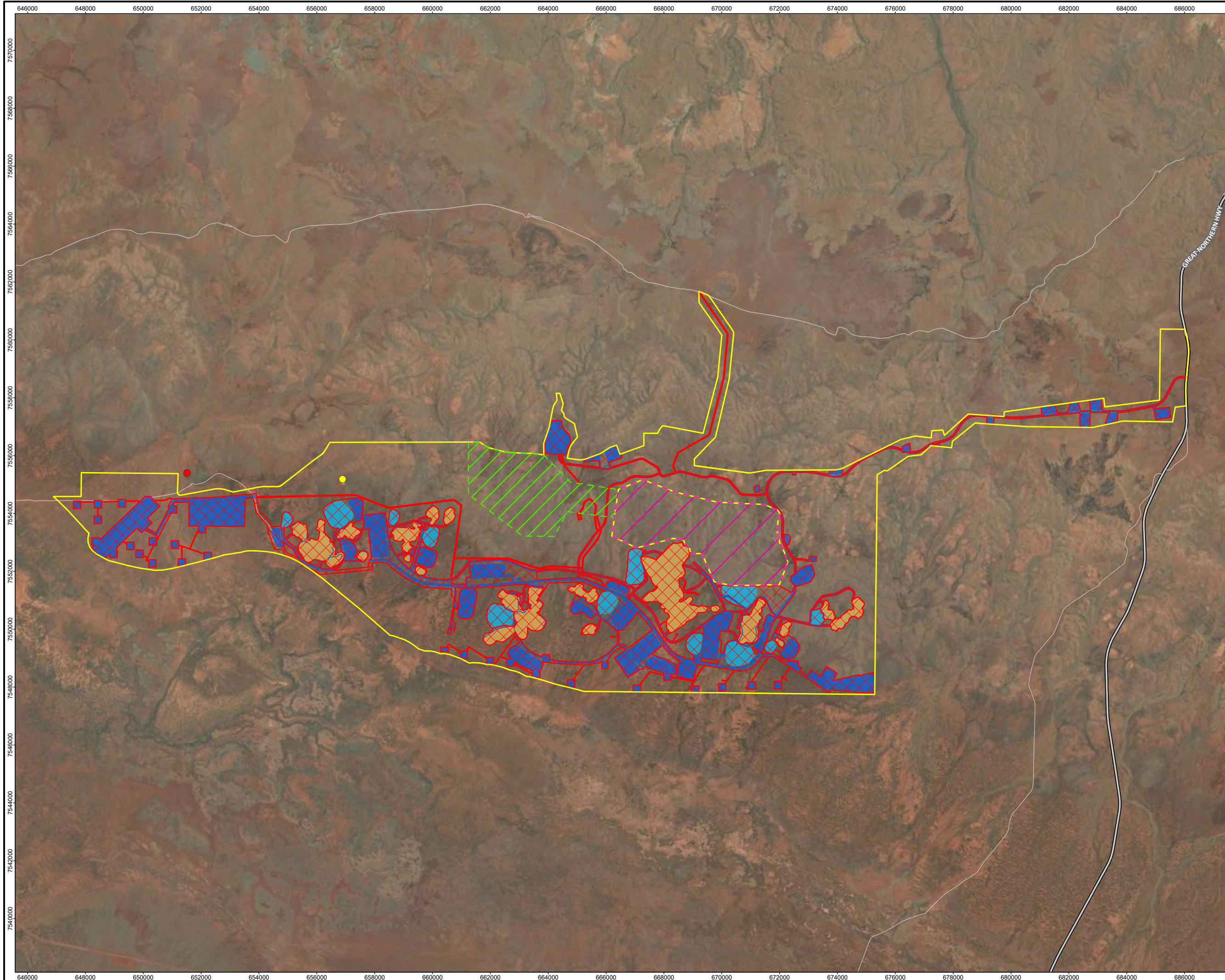
- Common Greenshank (*Tringa nebularia*) – Migratory;
- Wood Sandpiper (*Tringa glareola*) – Migratory;
- Red-necked Stint (*Calidris ruficollis*) – Migratory;
- Glossy Ibis (*Plegadis falcinellus*) – Migratory; and
- Fork Tailed Swift (*Apus pacificus*) – Migratory.

1.3.5 Condition Requirements

Conditional requirements will be added from the EPBC Act Approval once issued.

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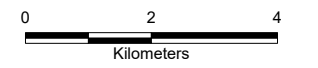


- Legend**
- Proposed Action Area
 - Disturbance Footprint
 - Fauna Habitat Exclusion Zone (FHEZ)
 - FHEZ Corridor
 - Mine Layout**
 - Supporting infrastructure
 - Pit
 - Waste Dump
 - Mulga Downs Exploration Camp (LGATE-013)
 - Mulga Downs Homestead (LGATE-013)
 - Roads (LGATE-195)**
 - Highway
 - Minor Road



Job No: 67751
 Client: Hancock Prospecting Pty Ltd
 Version: A Date: 19-Mar-2025
 Drawn By: droberts Checked By: VC

Scale 1:120,000 at A3



Coord. Sys. GDA2020 MGA Zone 50

**Mulga Downs Iron Ore Mine
 Central Pilbara, Western Australia**

**PROPOSED ACTION AREA
 DISTURBANCE FOOTPRINT**

FIGURE 1.3

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 Image Reference: World Imagery: Earthstar Geographics

Conservation Significant Fauna Management Plan

Mulga Downs Iron Ore Mine – Western Australia

1.4 Potential Impacts

Key aspects of the MDIOM have the potential to directly and/or indirectly impact conservation significant fauna and fauna habitat within or near the Proposed Action Area / Development Envelope during all phases of the proposed MDIOM. The potential direct and indirect impacts of the Proposal have been identified and presented inclusively for all conservation significant fauna in **Table 1-2**.

Table 1-2: Potential Impacts of the Proposal

Impact	Impact Type	Potential Outcome
Clearing activities	Direct	Clearing of native vegetation reduces habitat available to fauna and clearing with heavy machinery can also directly result in injury or mortality of fauna.
Entrapment	Direct	Fauna may become trapped in containers, uncapped drill holes, trenches, excavations or water storage structures resulting in injury or death.
Vehicle strike	Direct	Fauna are at a higher risk of injury or death from vehicle strikes due to increased vehicle usage.
Attraction of feral animals	Indirect	Increase in introduced fauna species which thrive in modified landscapes. Access to additional water sources, food via rubbish tips and increased accessibility due to clearing and increased roads and tracks. Introduced fauna species cause increased competition, habitat degradation and increased predation of native fauna species.
Changed fire regimes	Indirect	Mining activities can cause accidental fire. Accidental fire can also be caused by road accidents, arson or lightning. Large, unplanned bushfires can impact fauna species as they can cause injury or death and have the potential to substantially change habitats.
Dust	Indirect	Increased dust due to excavation, vehicle movement and clearing activities may cause behavioural changes in some fauna species through reduced visibility, navigational ability or disturbance responses. Dust has the potential to modify habitat due to degradation of vegetation or topsoil modification.
Habitat loss or fragmentation	Indirect	Fragmentation of habitat from land clearing can reduce the ability for individuals of a species to move freely across a landscape. This can result in the isolation of populations and reduce gene flow. Habitat fragmentation has the potential to exacerbate other threats, such as predation by feral species, by providing improved access into habitats which were previously difficult to access. Habitat may also be lost due to the use of saline water for dust suppression.,
Hydroecology	Indirect	Interruptions of hydroecological processes can have negative effects due to underpinning primary production in ecosystems. Fauna may be impacted by potential changes to groundwater levels and chemistry and altered flow regime. These changes may alter vegetation across large areas and may lead to habitat degradation or loss. Impacts upon fauna can be widespread. Changes to flow regime across the landscape may alter vegetation and may lead to habitat degradation or loss.
Introduction and spread of weeds	Indirect	Introduction and establishment of weed species may be caused through lack of vehicle hygiene procedures. The introduction of weeds can alter fuel loads and have the potential to increase fire intensity. Weeds can lead to habitat modification by reducing flora diversity and consequently fauna diversity.
Light spill	Indirect	Light spill caused by lighting of the Proposal has the potential to cause disturbance to light sensitive species or cause other behavioural changes, e.g. changes in prey item distribution and aggregation for insectivorous species, resulting in changes to foraging behaviour.
Noise	Indirect	Noise has the potential to cause behavioural changes in fauna, with fauna likely to avoid loud areas. Species using audible cues for breeding such as birds and bats may experience disruption to breeding cycles or reduced breeding success.

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Impact	Impact Type	Potential Outcome
Vibration	Indirect	Vibration has the potential to cause behavioural changes in fauna and their habitat, especially with respect to fauna such as bats. Vibrations from blasting can result in disruption from refuges.

1.5 Rationale and Approach

Results of baseline surveys, assumptions and Proposal uncertainties have been used to inform the management approach that is best suited to meeting the objectives and outcomes of this CSFMP. The identified management actions and targets include a combination of outcome-based and objective-based measures. Monitoring data will be used to evaluate compliance against management targets and will be used as an assessment tool to verify management action effectiveness in meeting the CSFMP objective.

All fauna surveys have been conducted in accordance with the relevant guidance outlined in **Table 1-3**.

Table 1-3: Relevant Policy and Guidance for Terrestrial Fauna

EPA Objective: 'To protect terrestrial fauna so that biological diversity and ecological integrity are maintained' (EPA 2016)	
Author, Year	Title
EP Act - 2326 (Guidance and Policy)	
EPA, 2016a	Environmental Factor Guideline: Terrestrial Fauna
EPA, 2016b	Technical guidance: Sampling of short-range endemic invertebrate fauna
EPA, 2016c	Technical Guidance: Sampling methods for Terrestrial Vertebrate Fauna
EPA, 2020	Technical Guidance: Terrestrial vertebrate fauna surveys for environmental impact assessment
EPA, 2021a	Instructions on how to prepare an Environmental Review Document
EPA, 2021b	Instructions – Environmental outcomes and outcomes-based conditions
EPA, 2021c	Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plans.
EPBC (Commonwealth Guidance and Policy)	
Commonwealth of Australia, 2017c	Pilbara Conservation Strategy
DBCA 2011b	Survey Guidelines for Australia's Threatened Reptiles
DBCA, 2017a	Guidelines for surveys to detect the presence of bilbies and assess the importance of habitat in Western Australia.
DCCEE, 2022	Threatened Species Strategy Action Plan 2022–2032
DCCEE 2023a	Recovery Plan for the Greater Bilby <i>Macrotis lagotis</i> . Department of Climate Change Energy Environment and Water.
DCCEE 2023b	National Light Pollution Guidelines for Wildlife. Department of Climate Change Energy Environment and Water.
DoEE, 2011a	Survey Guidelines for Australia's Threatened Mammals. Department of Energy and Environment
DoEE (TSSC), 2005	Threatened Species Scientific Committee: Commonwealth Listing Advice on Northern Quoll (<i>Dasyurus hallucatus</i>).
DoEE (TSSC), 2008	Threatened Species Scientific Committee: Conservation Advice for <i>Liasis olivaceus barroni</i> (Olive Python- Pilbara subspecies) Canberra: Department of the Environment, Water, Heritage and the Arts.

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EPA Objective: 'To protect terrestrial fauna so that biological diversity and ecological integrity are maintained' (EPA 2016)	
Author, Year	Title
DOEE, 2014	Environmental Management Plan Guidelines
DoEE (TSSC), 2016a	Threatened Species Scientific Committee: Conservation Advice <i>Pezoporus occidentalis</i> Night Parrot. Canberra: Department of the Environment.
DoEE (TSSC), 2016b	Threatened Species Scientific Committee: Conservation Advice <i>Macroderma gigas</i> Ghost Bat. Canberra: Department of the Environment.
DoEE (TSSC), 2016d	Threatened Species Scientific Committee: Conservation Advice <i>Macrotis lagotis</i> Greater Bilby. Canberra: Department of the Environment.
DoEE (TTSC), 2016c	Threatened Species Scientific Committee: Conservation Advice <i>Rhinioncteris aurantia</i> (Pilbara form) (Pilbara Leaf-nosed Bat). Canberra: Department of the Environment.
DoEE, 2017	Wildlife Conservation Plan for Migratory Shorebirds. Canberra, ACT: Department of the Environment.
DSEWPaC, 2010	Survey Guidelines for Australia's Threatened Bats
DSEWPaC, 2016	EPBC Act Referral Guideline for the Endangered Northern Quoll
Hill and Ward, 2010	National Recovery Plan for the Northern Quoll <i>Dasyurus hallucatus</i> . Department of Natural Resources, Environment, The Arts and Sport, Darwin
EPBC Threat Abatement Plans	
DoEE, 2008	Commonwealth of Australia (2008) Threat Abatement Plan for predation by the European red fox. Canberra, ACT: Department of the Environment, Water, Heritage, and the Arts
DoEE, 2011	Commonwealth of Australia (2011) Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads: Department of Sustainability, Environment, Water, Population and Communities.
DSEWPaC 2012	DSEWPC (2012). <i>Threat abatement plan to reduce the impacts on northern Australia's biodiversity by the five listed grasses</i> . Department of Sustainability, Environment, Water, Population and Communities
DoEE, 2015	Commonwealth of Australia (2015) Threat abatement plan for predation by feral cats. Canberra, ACT.
DoEE, 2016e	Commonwealth of Australia (2016) Threat abatement plan for competition and land degradation by rabbits. Canberra, ACT.

1.5.1 Survey Effort

This CSFMP identifies management and monitoring measures to minimise the loss of conservation significant fauna occurring or potentially occurring within the Proposed Action Area / Development Envelope (**Table 1-5**). Numerous basic (level 1), detailed (level 2) and targeted fauna baseline studies have been undertaken across the Proposed Action Area/Development Envelope since 2008 (**Table 1-4**). The results of these surveys adequately describe the terrestrial fauna habitat and values in the Proposed Action Area/Development Envelope, whilst also providing confidence on the presence/absence of conservation significant fauna species.

Table 1-4: Fauna Surveys

Report Title	Survey Type
Coffey (2008) Level 2 terrestrial vertebrate fauna assessment for the Solomon Project.	Detailed
<i>Ecologia</i> (2009a). Murray's Hill level 1 fauna survey.	Detailed

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Report Title	Survey Type
Coffey (2010) Level 1 vertebrate fauna assessment - Solomon Rail Project.	Basic
<i>Ecologia</i> (2010). Solomon Project: Kings Area vertebrate fauna assessment.	Detailed
Ecoscape (2010a). Solomon Project - Rail camp sites 1, 2 and 3, fauna assessment.	Basic and targeted
Ecoscape (2010b). Solomon Project - Rail realignment fauna assessment.	Basic and targeted
Ecoscape (2010c). Vertebrate fauna and fauna habitat assessment for the Firetail Project.	Detailed
Thompson <i>et al.</i> (2010). Spatial and temporal variations in the trapped terrestrial vertebrate fauna of the Hamersley Range, Western Australia.	Detailed
Coffey (2011) Targeted surveys - Northern Quolls, mulgara and Pilbara Olive Pythons. Solomon Rail Project.	Targeted
Terrestrial Ecosystems (2013). Level 2 fauna assessment for the Mulga Downs Project Area.	Detailed and targeted
Bell <i>et al.</i> (2014). Winter bird assemblages of the Fortescue Marshes and surrounding vegetation, Pilbara Region, Western Australia.	Targeted
<i>ecologia</i> (2014). Investigator Project terrestrial vertebrate fauna assessment.	Detailed
<i>ecologia</i> (2020a). Mulga East Baseline Terrestrial Fauna Assessment.	Detailed and targeted
<i>ecologia</i> (2021a) Mulga East Baseline Terrestrial Vertebrate Fauna Assessment. Version 2.	Reconnaissance, detailed and targeted
<i>ecologia</i> (2021) Mulga East Pilbara Leaf-nosed Bat Assessment.	Targeted
Biologic (2022a) Mulga Downs Iron Ore Project: Transport Corridor to Great Northern Hwy Terrestrial Fauna Survey	Detailed and targeted
Biologic (2022b) Mulga East Iron Ore Project: Mulga West Borefield and Mulga East Southern Corridor Terrestrial Fauna Survey	Basic and detailed
Biologic (2022c) Mulga East Iron Ore Project: Mulga West Borefield and Mulga East Corridors Terrestrial Fauna Survey	Basic and detailed
Spectrum (2023a) MDIOM Solar Farm, Haul Road and Pipeline Report	Detailed and targeted
Spectrum (2023b) MDIOM Targeted Grey Falcon Survey Memo	Targeted
Spectrum (2024b) Mulga Downs Iron Ore Mine Supplementary Targeted Fauna Surve	Targeted

1.5.2 Survey Findings

The terrestrial fauna habitat and values in the Proposed Action Area are well understood with numerous fauna surveys/assessments having been conducted for the Proposal since 2008. The results of the surveys conducted between 2008 and 2023 (Table 1-4) form the basis for this CSFMP.

1.5.2.1 Conservation Significant Terrestrial Vertebrate Fauna

Up to 304 terrestrial fauna species were recorded cumulatively from surveys undertaken within the Development Envelope / Proposed Action Area. Of these, 11 significant fauna species were listed under the EPBC Act, BC Act, or the DBCA Priority list, including ten species listed as threatened or migratory MNES. An additional six conservation significant species were also identified as likely to occur within the Proposed Action Area / Development Envelope.

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It is important to note that the Proposed Action Area/ Development Envelope has been varied over time from an original 39,207 ha Proposed Action Area and 40,653 ha Development Envelope to its current 16,848.83 ha (for both the Proposed Action Area and Development Envelope). Similarly, the proposed Disturbance Footprint has also been reduced from an original 11,521 ha and 9,628 ha respectively, to its current 4733.66 ha and 4,339.16 ha. A conservative approach has been taken and the species proposed for management include those identified in any survey over the course of evaluation and refinement of the Proposal. The species listed in Table 1-5 will be managed under this CSFMP.

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Table 1-5: Occurrence of Conservation Significant Fauna in the Proposed Action Area/Development Envelope

Species		Conservation Status			Occurrence
Scientific Name	Common Name	EPBC Act Status	BC Act Status ¹	DBCA Status	
Mammals					
<i>Dasyurus hallucatus</i>	Northern Quoll	EN	EN	-	Recorded
<i>Macroderma gigas</i>	Ghost Bat	VU	VU	-	Recorded
<i>Pseudomys chapmani</i>	Western Pebble-mound Mouse	-	-	P4	Recorded
<i>Rhinonicteris aurantia</i> (Pilbara form)	Pilbara Leaf-nosed Bat	VU	VU	-	Recorded
<i>Dasyercus blythi</i>	Brush-tailed Mulgara	-	-	P4	Likely
<i>Leggadina lakedownensis</i>	Northern Short-tailed Mouse	-	-	P4	Likely
<i>Macrotis lagotis</i>	Bilby	VU	VU	-	Likely (Low)
Birds					
<i>Calidris ruficollis</i>	Red-necked Stint	MI	MI	-	Recorded
<i>Falco hypoleucos</i>	Grey Falcon	VU	VU	-	Recorded
<i>Falco peregrinus</i>	Peregrine Falcon	-	OS	-	Recorded
<i>Tringa glareola</i>	Wood Sandpiper	MI	MI	-	Recorded
<i>Tringa nebularia</i>	Common Greenshank	MI	MI	-	Recorded
<i>Pezoporus occidentalis</i>	Night Parrot	EN	CR	-	Likely (Low)
<i>Plegadis falcinellus</i>	Glossy Ibis	MI	MI	-	Likely
Reptiles					
<i>Anilius ganei</i>	Gane's Blind Snake	-	-	P1	Recorded
<i>Liasis olivaceus barroni</i>	Pilbara Olive Python	VU	VU	-	Recorded
<i>Ctenotus uber johnstonei</i>	Spotted Ctenotus	-	-	P2	Likely

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1.5.2.2 Introduced Species

Five introduced predatory fauna species were recorded within the Proposed Action Area / Development Envelope. These include:

- Domestic mouse (*Mus musculus*);
- Feral cat (*Felis catus*);
- Feral dog/dingo (*Canis lupus*);
- Domestic cattle (*Bos Taurus*); and
- European red fox (*Vulpes vulpes*).

Introduced species occur broadly across the Pilbara region and are not restricted to specific habitat types. Cats and foxes are classified as declared pests under the *Biosecurity Agriculture Management Act 2007* (BAM Act).

Within the Proposed Action Area / Development Envelope 13 introduced flora taxa (weeds) were recorded, none of which are listed as Weeds of National Significance (WoNS), and no weed species declared as a pest in Western Australia were identified. Eight of the introduced flora taxa recorded within the Development Envelope are listed as environmental weeds (**bold text**):

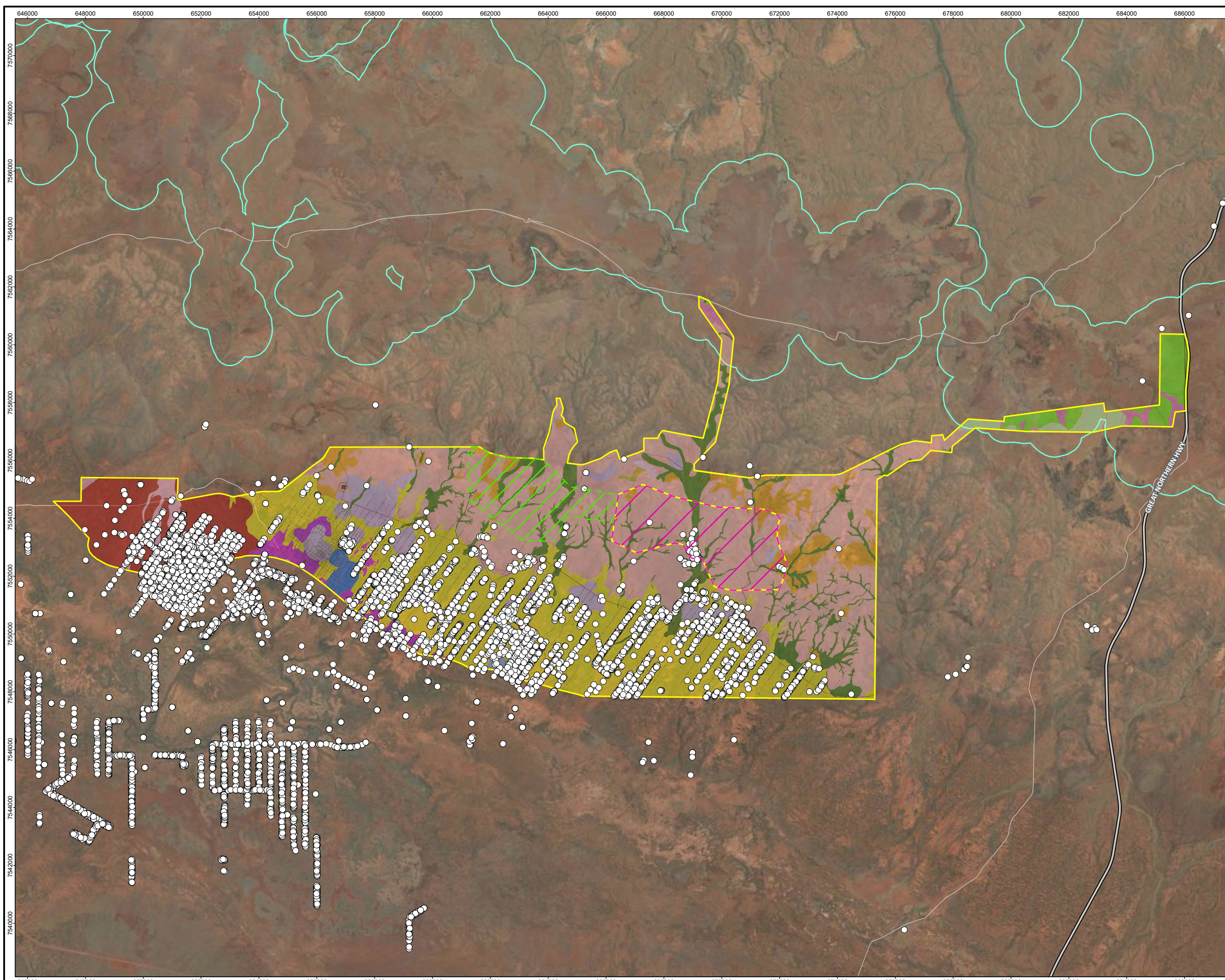
- **Aerva javanica (Kapok Bush).**
- *Bidens bipinnata* (Bipinnate Begger's Tick).
- **Cenchrus ciliaris (Buffel Grass).**
- **Cenchrus setiger (Birdwood Grass).**
- **Chloris virgata (Feathertop Rhodes Grass).**
- *Citrullus amarus* (Pie Melon).
- *Citrullus colocynthis* (Colocynth).
- *Flaveria trinervia* (Speedy Weed)
- **Malvastrum americanum (Spiked Malvastrum).**
- **Rumex vesicarius (Ruby Dock).**
- **Setaria verticillata (Whorled Pigeon Grass).**
- *Tribulus terrestris* (Caltrop).
- **Vachellia farnesiana (Mimosa Bush).**

The distribution of these weeds for both the Proposed Action Area / Development Envelope can be seen in **Figure 1-4**.

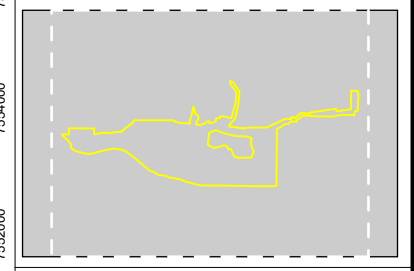
Introduced species and their management actions are further discussed in **Section 1.5.2.2**.

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- Legend**
- Development Envelope/ Proposed Action Area
 - FHEZ Corridor
 - Fauna Habitat Exclusion Zone (FHEZ)
- Priority Ecological Communities (DBCAs)
- Four plant assemblages of the Wona Landsystem (Priority 1)
- Vegetation type
- AaAxSL
 - AdEvWL
 - ASL (1)
 - ASL (2)
 - AWL (1)
 - AWL (2)
 - AWL (3)
 - AxAsSL
 - MSW
 - MTG (1)
 - MTGW
 - THG (1)
 - THG (2)
 - THGB
 - TvHG
 - Cleared/Disturbed
- Weed records
- Roads (LGATE-195)
- Highway
 - Minor Road

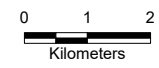


Job No: 67751

Client: Hancock Prospecting Pty Ltd

Version: A	Date: 10-Apr-2025
Drawn By: droberts	Checked By: VC

Scale 1:120,000 at A3 ↑



Coord. Sys. GDA2020 MGA Zone 50

Mulga Downs Iron Ore Mine
Central Pilbara, Western Australia

WEEDS IDENTIFIED WITHIN THE STATE DEVELOPMENT ENVELOPE (EP ACT - 2326) AND COMMONWEALTH PROPOSED ACTION AREA (EPBC 2022/09255)

FIGURE 1.4

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Image Reference: World Imagery: Earthstar Geographics www.nearmap.com© - Imagery Date: 28. May 2022.

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1.5.2.3 Conservation Significant Fauna Habitat

Nine broad fauna habitat types have been identified within the Proposed Action Area / Development Envelope **Table 1-6** of which eight will be impacted by the Proposal (**Table 1-6**). The condition of fauna habitats identified within the Proposed Action Area / Development Envelope range from 'Good' to 'Excellent'.

Mulga Downs Station has been an operational pastoral lease for over 100 years which has resulted in long-term impacts such as overgrazing, trampling, and spreading weeds by cattle (*Bos taurus*). The cleared exploration drill lines and disturbance associated with exploration activities within the Mulga Woodland also contributed to a lower habitat condition rating (*ecologia 2020a*).

Table 1-6: Fauna Habitats within the Proposed Action Area / Development Envelope

Habitat Type	Habitat Description	Potential to Support Conservation Significant Vertebrate Fauna
Drainage Line/Floodplain	The banks provide shallow burrowing substrates while trees and shrub species provide habitat for birds.	<p>Moderate to High: Drainage lines are of low to moderate conservation value as they provide foraging and dispersal habitat for fauna. They are considered high value when they are within the home range for the Northern Quoll breeding habitat. Conservation significant species known to utilise drainage lines include:</p> <ul style="list-style-type: none"> Northern Quoll (EN EPBC, BC Act) – Dispersal and foraging habitat. Ghost Bat (VU EPBC, BC Act) -Foraging habitat. Pilbara Leaf-nosed Bat (VU EPBC, BC Act) - Priority 4 foraging habitat. Potential foraging habitat for Peregrine Falcon (OS) Greater Bilby (VU EPBC, BC Act) – Critical foraging habitat. Grey Falcon (VU EPBC, BC Act) – Potential nesting habitat. Pilbara Olive Python (VU EPBC, BC Act) – Potential foraging habitat.
Rocky Hills	The Rocky Hills provides quality refugia, shelter and caves for conservation significant species. Ridgelines, boulders, crevices and caves provide shelter, denning and roosting habitat for species including Northern Quolls (Endangered), Pilbara Leaf-nosed Bat (Vulnerable), Ghost Bat (Vulnerable), Pilbara Olive Python (Vulnerable) Rocky Hills are considered common and widespread throughout the Pilbara.	<p>High: The Pilbara Leaf-nosed Bat and Northern Quoll were recorded within this habitat type within and outside of the Development Envelope. Provides shelter, denning and roosting habitat for species including:</p> <ul style="list-style-type: none"> Northern Quolls (EN EPBC, BC Act) – Critical habitat. Pilbara Leaf-nosed Bat (VU EPBC, BC Act) Priority 2 and 3 foraging habitats. Ghost Bat (VU EPBC, BC Act) - Foraging habitat. Pilbara Olive Python (VU EPBC, BC Act) - Potential foraging habitat. Ganes Blind Snake. Potential foraging habitat for the Peregrine Falcon. Western Pebble-mound Mouse.

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Habitat Type	Habitat Description	Potential to Support Conservation Significant Vertebrate Fauna
Mulga Woodland	Compacted alluvial loamy clay soils with occasional surface stones are generally not favourable for burrowing species with few burrows recorded during the surveys. Dead wood, peeling bark, stumps and leaf litter provide shelter. The Mulga Woodland has been disturbed by exploration activities (clearing tracks and drill pads) and evidence of grazing by cattle is present. Regionally this habitat type is generally well represented.	<p>Low: Considered generally of low value to conservation significant fauna.</p> <p>Fauna recorded:</p> <ul style="list-style-type: none"> Gane's Blind Snake (Priority 1, DBCA); was recorded within this habitat in the Development Envelope; <p>This habitat type is foraging habitat for:</p> <ul style="list-style-type: none"> Priority 5 foraging habitat for the Pilbara Leaf-nosed Bat (Priority 5); Potential foraging habitat for Bilby (not burrowing); Potential foraging habitat for Peregrine Falcon (OS); Spotted Ctenotus; and Northern Short-tailed Mouse.
Chenopod/Cracking Clay Floodplain	This habitat type exhibits little to no leaf litter and woody debris providing few niches for trappable fauna such as marsupials and reptiles. Due to the condition of this habitat type it is considered low value to species of conservation significance. This habitat type is not considered widespread in the Pilbara.	<p>Low: Due to the condition of this habitat type within the Development Envelope, it is considered low value to species of conservation significance.</p> <ul style="list-style-type: none"> Priority 5 foraging habitat for the Pilbara Leaf-nosed Bat (VU). Night Parrot (EN EPBC, CR BC Act) – Foraging habitat, in proximity to mature unburnt spinifex only. Foraging habitat for Night Parrot (EN)– in proximity to mature spinifex only.
Stony Spinifex Plains and Hillslopes	Coarse stony red clay soils provide habitat for the Western Pebble-mound Mouse (P4) which has been recorded multiple times during surveys conducted within the Proposed Action Area. The substrates and vegetation present support termitaria which are a known refuge for vertebrate fauna. Stony Spinifex Plains and Hillslopes are considered as low value offering minimal refugia to species of conservation significance. Stony Spinifex Plains and Hillslopes are considered common and widespread in local and regional scale.	<p>Moderate: Stony Spinifex Plains and Hillslopes are considered as low value generally offering minimal refugia to species of conservation significance; however, where they are adjacent to high value breeding habitat they are a supporting habitat.</p> <p>The following conservation significant species are known to forage within this habitat type:</p> <ul style="list-style-type: none"> Northern Quoll (EN EPBC, BC Act) – Foraging habitat. Pilbara Leaf-nosed Bat (VU EPBC, BC Act) - Priority 5 foraging habitat. Ghost Bat (VU EPBC, BC Act) – Foraging habitat. Pilbara Olive Python (VU EPBC, BC Act) – Potential foraging habitat. Night Parrot (EN EPBC, CR BC Act) – Potential foraging habitat, in proximity to unburnt samphire only. Western Pebble-mound Mouse (P4 DBCA) – Potential foraging habitat. Potential foraging habitat for Peregrine Falcon (OS), Spotted Ctenotus.
Gibber Cracking Clay	This habitat was previously known as the 'Cracking clays of the Chichester and Mungaroo Range' (P1) Priority Ecological Community (PEC). This PEC	<p>Moderate: This habitat type is known to be breeding, foraging and dispersal habitat for:</p> <ul style="list-style-type: none"> Short-tailed Mouse (P4 DBCA) –High value habitat.

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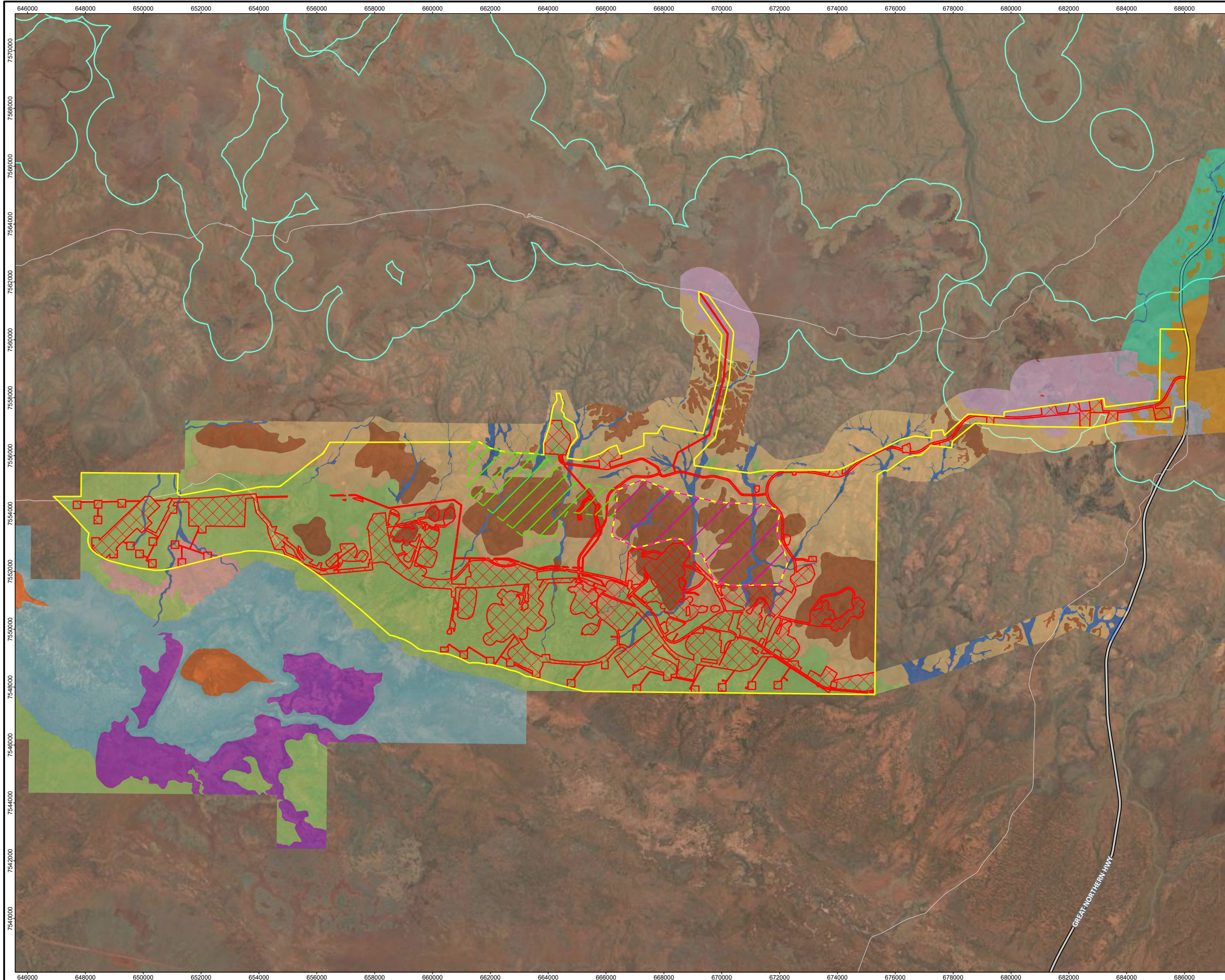
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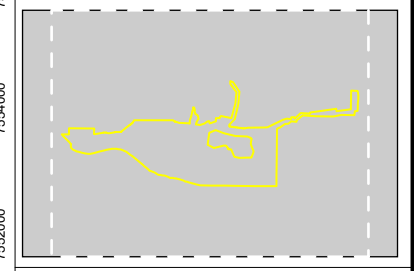
Habitat Type	Habitat Description	Potential to Support Conservation Significant Vertebrate Fauna
	<p>is a stony gibber community occurring on the tablelands and forms one of the plant assemblages of the 'Four plant assemblages of the Wona Land System' P1 PEC.</p> <p>While sporadic in nature, this habitat is considered widespread in the Pilbara.</p>	<ul style="list-style-type: none"> Western Pebble-mound Mouse (P4 DBCA) - High value habitat. <p>This habitat also supports non-critical foraging habitat for the following species:</p> <ul style="list-style-type: none"> Ghost Bat (VU EPBC, BC Act) -Foraging habitat; Peregrine Falcon (OS BC Act) – Foraging habitat.
Cracking Clay	<p>Cracking Clay habitat overlaps the 'Four plant Assemblages of the Wona Land System' Priority Ecological Community (PEC) (Priority 1). The land system consists of cracking clays with little vegetation cover during the dry season.</p> <p>With the onset of the wet season numerous ephemerals/annuals and short-lived perennials emerge.</p> <p>Vegetation type: Sparse chenopod shrubland of <i>Sclerolaena trigona</i>, <i>S. bicornis</i>, <i>S. densiflora</i> over low tussock grasses of <i>Eragrostis xerophila</i> on a substrate of cracking clays.</p> <p>Vegetation is generally very sparse with patches of scattered Snakewood (<i>Acacia xiphophylla</i>) and occasional Mulga over Buffel and scattered native grasses. Leaf and wood litter was sparse or absent due to lack of vegetation; however, basalt rock cover was found to be abundant.</p> <p>While sporadic in nature, this habitat is considered widespread in the Pilbara.</p>	<p>Low: This habitat type exhibits little to no leaf litter and woody debris providing few niches for trappable fauna such as marsupials and reptiles. Due to the condition of this habitat type it is considered low value to species of conservation significance. Marginally suitable as foraging habitat for the Night Parrot.</p> <p>This habitat type has the potential to support (provide foraging habitat):</p> <ul style="list-style-type: none"> Short-tailed mouse; Grey Falcon; Marginally suitable as foraging habitat for the Night Parrot; and Greater Bilby.
Snakewood	<p>Vegetation type: Vegetation dominated by discrete patches of Snakewood (<i>Acacia xiphophylla</i>).</p> <p>The Snakewood (<i>Acacia xiphophylla</i>) habitat is restricted to scattered patches within the cracking clay habitat type. Other vegetation recorded in this habitat type included <i>Acacia inaequilatera</i> and scattered Mulga and Mesquite over Buffel grass. Leaf and wood litter was very sparse and basalt rock cover was abundant.</p> <p>This habitat occurs within the 'Four plant Assemblages of the Wona Land System' PEC (Priority 1) in association with the Cracking Clay habitat and support the same MNES species.</p>	<p>Low: Provides potential foraging for fauna which occur on Cracking Clay habitat.</p> <p>This habitat type has the potential to support (provide foraging habitat):</p> <ul style="list-style-type: none"> Short-tailed mouse; Grey Falcon; Marginally suitable as foraging habitat for the Night Parrot; and Greater Bilby.

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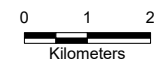


- Legend**
- Development Envelope
 - Indicative Footprint
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 - FHEZ Corridor
 - Priority Ecological Communities (DBCAs)
 - Four plant assemblages of the Wona Landsystem (Priority 1)
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 - Hilltops, Mesas & Outcrops
 - Mixed Eucalypt/ Mulga Floodplain
 - Mulga Woodland
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 - Rocky Plains & Footslopes
 - Snakewood
 - Stony Spinifex Plains and Hillslopes
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 Central Pilbara, Western Australia**

**MAPPED VERTEBRATE FAUNA
 HABITAT WITHIN THE STATE
 DEVELOPMENT ENVELOPE AND
 COMMONWEALTH PROPOSED ACTION
 AREA**

FIGURE 1.5

Conservation Significant Fauna Management Plan

Mulga Downs Iron Ore Mine – Western Australia

1.5.2.4 Fauna Habitat Exclusion Zone

The Proposal design has been modified to avoid direct impacts and to minimise indirect impacts to key environmental values. Since referral of the Proposal, the Development Envelope has been amended to exclude a 1,320.82 ha area that is referred to as the Fauna Habitat Exclusion Zone (FHEZ). Habitats mapped within the FHEZ corridor comprises (Figure 1-5):

- Rocky Hills (950.81 ha);
- Drainage Line/Floodplain (107.62 ha); and
- Stony Spinifex Plains and Hillslopes (262.39 ha).

This area supports 36 Category 4 caves¹. The FHEZ will not be developed and contains habitat considered high value to the Pilbara Leaf-nosed and Ghost Bats, as well as the Northern Quoll and Pilbara Olive Python.

Connectivity of the FHEZ shall be maintained through the establishment of a FHEZ corridor to the west of the FHEZ, that will provide connectivity of critical habitat (primarily Rocky Hills habitat), from the FHEZ to the northern boundary of the Development Envelope. Preservation of riparian corridors along drainage lines will also be prioritised within and external to the FHEZ and FHEZ Corridor. This is shown in **Figure 1-6**.

Where haulage routes intersect drainage lines or run adjacent to the FHEZ or FHEZ Corridor, fauna friendly underpasses shall be installed. These underpasses are likely to be drainage culverts with diameter greater than 600mm as these can also act as fauna culverts (ecological, 2011). As per recommendations from Roy Hill Fauna Friendly Culvert Audit Report (Roy Hill, 2016), culverts shall be installed flush with natural ground level (ie. rock protection areas or concrete footings underlying culvert should be below ground level to avoid obstructing access by fauna).

1.5.2.5 Fauna Habitat Exclusion Zone Corridor

In addition to the establishment of the FHEZ, a FHEZ Corridor has been created to further protect and enhance movement and ecological connectivity of local wildlife. This corridor is designed to facilitate the safe passage of species, ensuring critical habitat for conservation significant species are preserved and protected from disturbance.

The creation of the corridor supports the preservation of critical habitat, helping to safeguard biodiversity and providing essential support for the long term survival and resilience of protected species in the region.

The FHEZ corridor is 991.45 ha (in addition to the 1,320.82 ha FHEZ) and will retain connectivity between the FHEZ and habitats both within and outside the Development Envelope / Proposed Action Area. Habitats mapped within the FHEZ corridor comprise:

- Drainage Area/ Floodplain (39.73 ha);
- Drainage Line (5.49 ha);
- Drainage Lines/ Floodplains (29.79 ha);

¹ The additional 20 caves recorded within the FHEZ were assessed as not suitable for either Pilbara Leaf-nosed Bat or Ghost Bat.

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- Mulga Woodland (37.15 ha);
- Rocky Hills (548.14 ha);
- Stony Plains and Slopes (123.21 ha); and
- Stony Spinifex Plains and Hillslopes (207.95 ha).

An additional six Category 4 caves are also located within the FHEZ corridor, of which five were found suitable for Ghost Bat and six were found suitable for Pilbara Leaf-nosed Bat.

Disturbance within the FHEZ corridor will be limited to no more than 5 ha following approval of the Hub and Spur Proposal.

1.5.2.6 Caves – Category 4 Roosts

The Proposal is located within an area that contains rocky outcrops with numerous caves, which may provide habitat for fauna, specifically Pilbara Leaf-nosed Bats and Ghost Bats. A total of 82 caves were assessed for characteristics required for bat roosts. Of these 82 cave assessments, 51 were determined as having characteristics of a Category 4 roost (nocturnal refuges; not considered critical habitat) (*ecologia* 2023a). The remaining 31 caves were found not suitable for Pilbara Leaf-nosed Bats nor Ghost Bats. These are shown in **Figure 1-7** below.

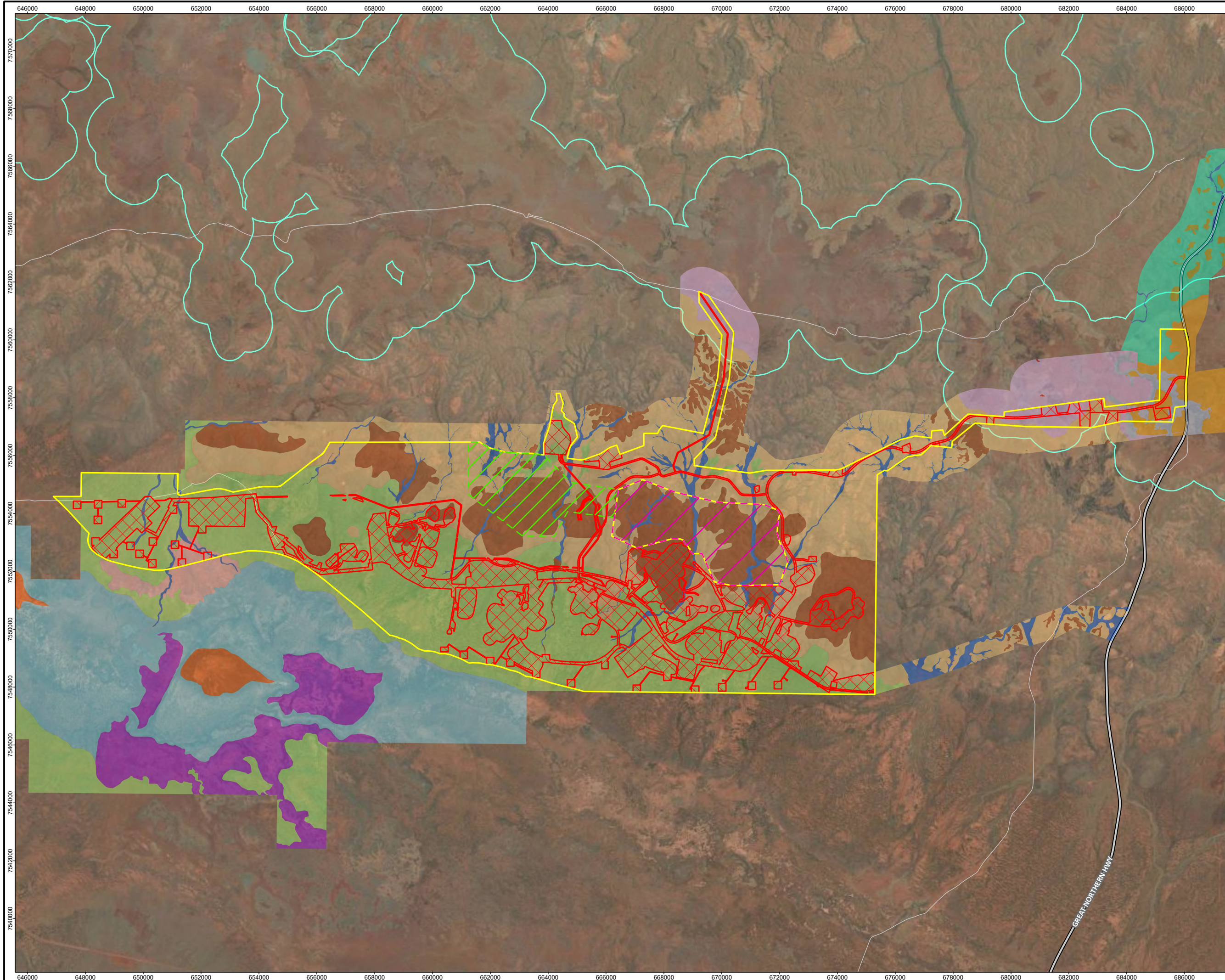
All of the 51 Category 4 caves were found suitable for Pilbara Leaf-nosed Bat species, whereas 20 of the 51 were found suitable for Ghost Bat. A total of 15 Category 4 caves are located within the Development Envelope, the remaining 36 caves are located outside the Development Envelope, within the FHEZ (36 assessed as suitable for Pilbara Leaf-nosed Bat and 15 found suitable for Ghost Bat). From the 51 Category 4 caves, 42 will be retained within the FHEZ and FHEZ corridor, with 9 caves being possible disturbed. Appendix 2 provided the location of 51 Category 4 caves, including the latitude and longitude of each cave, and indicating whether each is located within the FHEZ, FHEZ corridor, proposed action area, or disturbance footprint, as well as which caves will be retained.

Of the 15 Category 4 caves located inside the Development Envelope, six are located within the FHEZ corridor and will be retained. Of these, five were found suitable for Ghost Bat and all six were found suitable for Pilbara Leaf-nosed Bat.

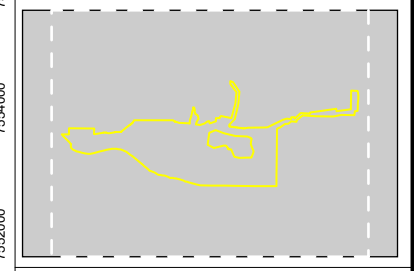
Potential indirect impacts to retained Category 4 caves, such as structural damage from blasting and vibration, have been identified following the completion of geotechnical stability analysis (PSM, 2024) and are identified in Table 1-7 below. Caves that are 200 m or less to the nearest pit edge will be considered as monitoring sites with additional control caves (which will be outside of any impact areas) to be identified prior to construction at which time this CSFMP will be updated accordingly.

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 - Mulga Woodland
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 - Rocky Plains & Footslopes
 - Snakewood
 - Stony Spinifex Plains and Hillslopes
 - Cleared/Disturbed
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 - Highway
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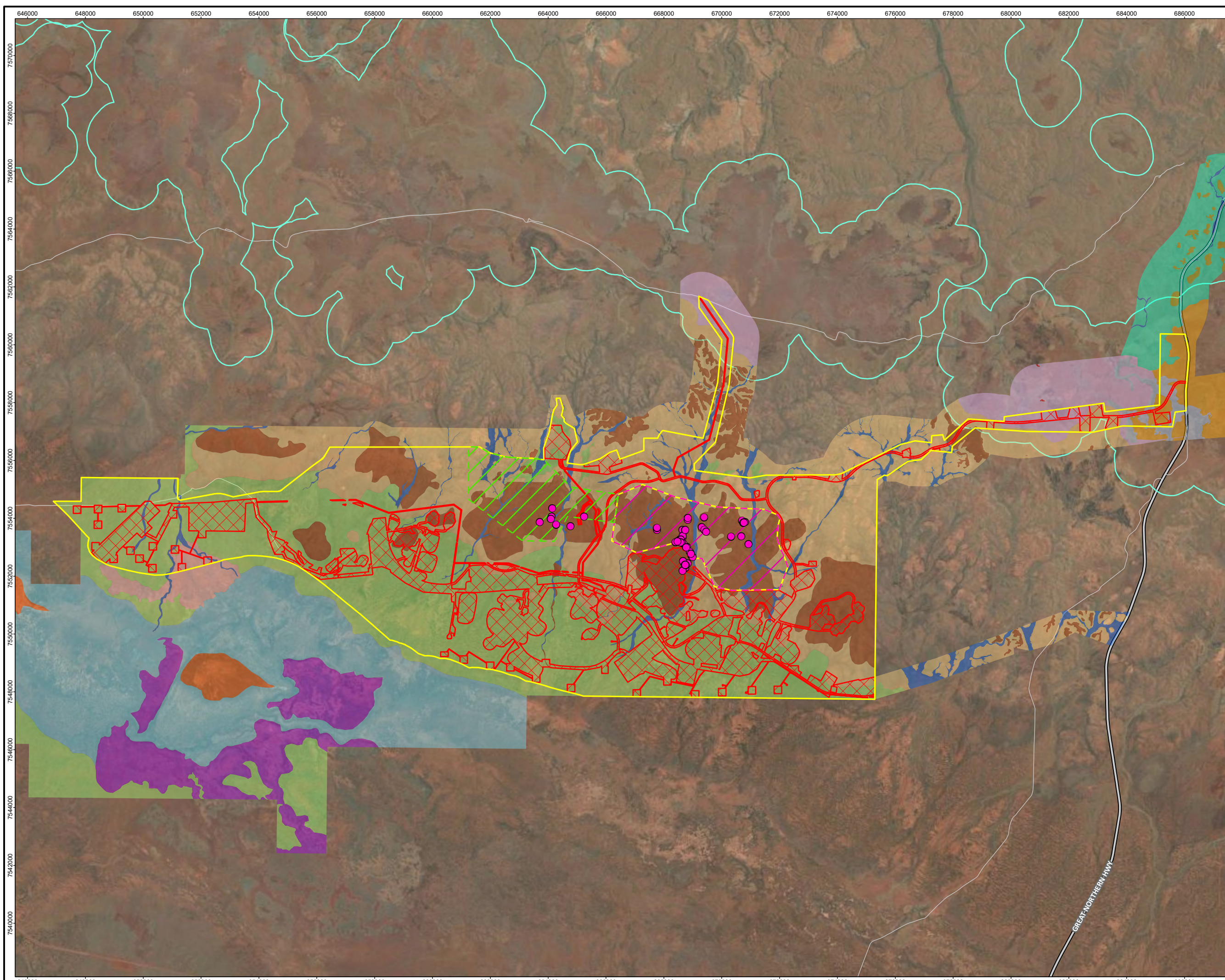
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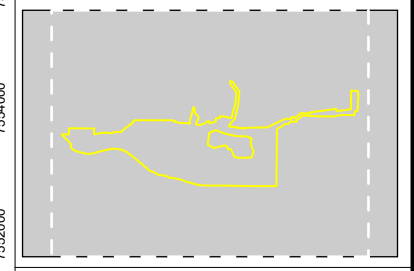
**Mulga Downs Iron Ore Mine
 Central Pilbara, Western Australia**

**HABITAT CONNECTIVITY, FHEZ AND
 FHEZ CORRIDOR**

FIGURE 1.6



- Legend**
- Development Envelope/ Proposed Action Ara
 - Indicative Footprint
 - Fauna Habitat Exclusion Zone (FHEZ)
 - FHEZ Corridor
 - Fauna habitat**
 - Boulder Piles
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 - Snakewood
 - Stony Spinifex Plains and Hillslopes
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 - Four plant assemblages of the Wona Landsystem (Priority 1)
 - Category 4 Cave records
 - Roads (LGATE-195)**
 - Highway
 - Minor Road



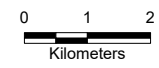
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Central Pilbara, Western Australia

CAVES WITHIN THE PROPOSED ACTION AREA/DEVELOPMENT ENVELOPE (2022/09255)

FIGURE 1.7 Map 1 of 4

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 Image Reference: World Imagery; Earthstar Geographics www.nearmap.com© - Imagery Date: 28. May 2022.

Conservation Significant Fauna Management Plan

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PSM (2024) was engaged to undertake geotechnical assessments of caves located in close proximity to the proposed mining activities to understand potential impacts of the Proposal to caves that will be retained in the FHEZ as a result of blasting and operational vibration.

The caves to be retained within the FHEZ located closest to pits were selected for the assessment as these are considered most susceptible to vibration impacts. Caves located further away from the pits would be expected to experience reduced vibration levels.

The assessed caves are hosted within outcropping bedrock escarpments of the Marra Mamba Iron Formation. The flat-lying orientation of these lithologies at Mulga Downs results in cave profiles that are generally relatively low and wide. They are commonly highly weathered and hydrated, with pervasive overprinting of the original rock fabric. The exposed escarpments themselves are typically 10-15 m in height.

The purpose of the geotechnical assessment was to assess the geotechnical stability of the caves in consideration of impacts from blasting and operational vibration, and to recommend maximum blast and operational vibration limits that should be achieved at the cave entrances to reduce the likelihood of collapse.

Table 1-7: Geotechnically Assessed Bat Caves (located within the FHEZ and retained)

Cave ID	Habitat Value to Ghost Bat	Roost Category	Habitat Value to PLNB	Distance from Cave to Nearest Pit (m)	Geotechnical Assessment	Cave Orientation
MEC-003	-	4	Potential nocturnal shelter only	1230	Yes	S
MEC-007	Potential nocturnal shelter only	4	Potential nocturnal shelter only	575	Yes	E
MEC-012	Potential nocturnal shelter only	4	Potential nocturnal shelter and potential roost site	65	Yes	SE
MEC-013	-	4	Potential nocturnal shelter and potential roost site	70	Yes	N
MEC-014	-	4	Potential roost site	60	Yes	E
MEC-016	-	4	Potential nocturnal shelter and potential roost site	100	Yes	S
MEC-025	-	4	Potential roost site	120	Yes	E
MEC-033	-	4	Potential nocturnal shelter only	595	Yes	E
MEC-039	Potential nocturnal shelter and potential roost site	4	Potential nocturnal shelter and potential roost site	100	Yes	E

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Cave ID	Habitat Value to Ghost Bat	Roost Category	Habitat Value to PLNB	Distance from Cave to Nearest Pit (m)	Geotechnical Assessment	Cave Orientation
MEC-042	Potential nocturnal shelter only	4	Potential nocturnal shelter only	25	Yes	N
MEC-049	-	4	Potential nocturnal shelter and potential roost site	1250	Yes	S
MEC-060	-	4	Potential nocturnal shelter only	960	Yes	N
MEC-061	-	4	Potential nocturnal shelter only	940	Yes	NE
MEC-062	Potential nocturnal shelter only	4	Potential nocturnal shelter only	950	Yes	NE
MEC-063	Potential nocturnal shelter only	4	Potential nocturnal shelter only	1015	Yes	ESE
MEC-065	-	4	Potential nocturnal shelter only	580	Yes	S
MEC-072	-	4	Potential roost site	40	Yes	N
MEC-073	-	4	Potential nocturnal shelter and potential roost site	100	Yes	NE
MEC-074	-	4	Potential nocturnal shelter and potential roost site	130	Yes	SE

An unconstrained blast size may be up to 530 kg in some cases – this value has been highlighted in **Table 1-8** for reference. The outcome is that such a blast is suitable if a maximum vibration velocity of 25mm/s is achieved to preserve structures roost sites at least 150m away.

Table 1-8: Permitted Charge Mass per Delay (kg) for Various Vibration Velocities (LGA, 2024)

Distance to Receptor	Charge Mass per Hole (kg) to Achieve Peak Ground Vibration Velocity Level (mm/s)								
	Free Face – Hard / Highly Structured Rock			Free Face – Average Rock			Heavily Confined		
	25 mm/s	50 mm/s	75 mm/s	25 mm/s	50 mm/s	75 mm/s	25 mm/s	50 mm/s	75 mm/s
100m	240	565	940	85	204	335	14	32	53
150m	530	1280	3000	190	460	1080	30	72	170
200m	950	2270	3750	340	810	1350	54	126	210

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Blast impacts can be managed and mitigated using a variety of blast design parameters within HPPL's control such as hole diameter, charge size per hole, composition of holes and firing/timing pattern. Other fixed parameters (i.e. physical environmental characteristics) are also factored in, such as distance of a receptor from a proposed blast and the rock mass characteristics. Blast modelling and design will be used to ensure that proposed blast vibration limits, will be achieved during all blasting events in proximity to the FHEZ.

Table 1-9 is provided as a guideline for planning blasting activities at known distances. The table highlights complying with a 125 dBL_{in} Peak limit level.

Table 1-9: Potential Airblast Impact Levels (Confined Blast) (LGA, 2024)

Charge Mass per Hole (kg)	Airblast Level (dB LLinear peak) at Distance (metres)				
	50m	100m	200m	300m	500m
1	124	116	107	102	96
5	130	123	114	109	102
10	134	126	119	112	105
20	137	129	120	114	108
30	139	130	122	116	110
40	140	131	123	117	111
50	141	132	124	118	112
60	142	133	124	119	113
70	143	134	125	120	114
80	143	134	126	120	114
90	144	135	126	121	115
100	144	135	127	121	115
110	144	136	127	121	115
120	145	136	127	121	116

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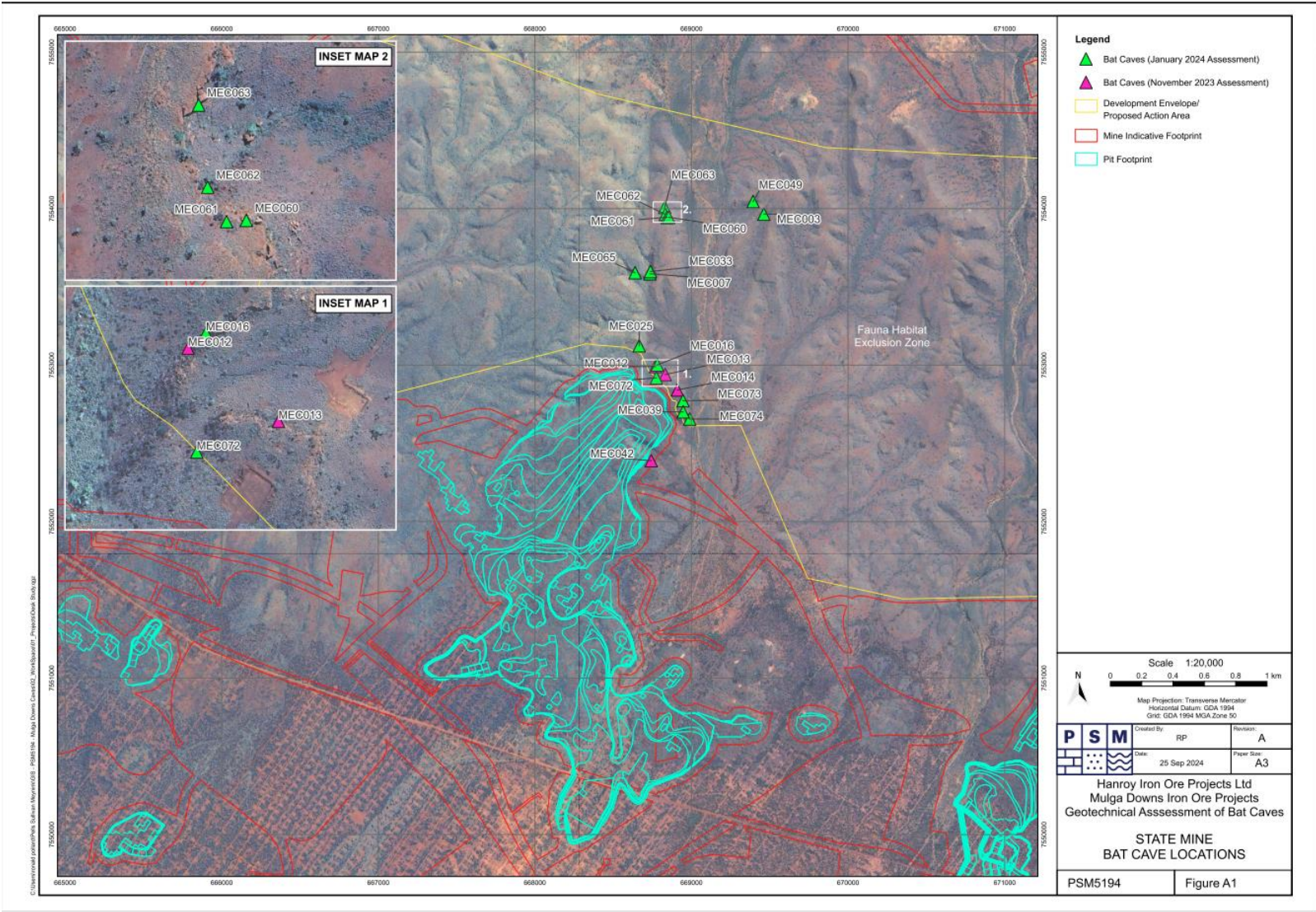


Figure 1-8: Geotechnical Stability Assessed Bat Caves (PSM 2024)

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1.5.3 Management Approach

HPPL’s Environmental Management System (EMS) Framework provides a basis for achieving the key environmental management objectives during the construction and operational phases of the Mine. The framework is illustrated in Figure 1-9. Implementation of the EMS Framework ensures environmental performance is achieved through environmental management practices that are consistent with HPPL’s Environmental Policy and objectives.



Figure 1-9: Environmental Management System Framework

1.5.4 Key Assumptions and Uncertainties

The CSFMP relies on the accuracy of field surveys and baseline investigation information (Table 1-4). The field surveys and baseline investigations have been completed in compliance with EPA and DCCEE requirements. Where requirements for both agency requirements do not align, the compliance with the agency, to which the impact is greater has been used. This CSFMP has been prepared based on the assumptions below.

The key assumptions specifically regarding conservation significant fauna include:

- The field surveys, undertaken by suitably qualified organisations and individuals with experience in the fauna taxa likely to be encountered, provide sufficient information to confirm the presence and abundance of significant fauna taxa with the potential to occur within the area of the Proposal and surrounds;

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- The conservation significant fauna species identified are highly mobile with notably large home ranges, such that point location records for individuals represent the usage of available foraging/breeding habitat (rather than fixed permanent locations of individuals);
- Point locations for nesting represent the current/historical usage of the available breeding habitat, rather than fixed permanent locations of breeding (as specific nesting locations may change from year to year);
- Based upon local and regional records of the conservation significant fauna species identified, the extent of potentially suitable breeding/foraging habitat is expected to extend beyond the fixed area of the field surveys; and
- Where practicable, rehabilitation of disturbed areas will take place following completion of construction to minimise the timeframe of habitat disturbance.

The key assumptions regarding the mitigation of impacts to Category 4 caves within the Proposed Action Area / Development Envelope and FHEZ:

- The caves within the Proposed Action Area / Development Envelope have all been identified as Category 4 caves, with no permanent water source within the 10 km of the Proposed Action Area / Development Envelope (Bullen, 2021); and
- Blast design, blast monitoring, cave inspections and cave monitoring are proposed to ensure no indirect impacts from blasting to the structural integrity of the retained caves.

The key assumptions regarding dust and increased predation have been made:

- Dust suppression techniques will effectively minimise dust and associated degradation of habitat; and
- Feral predators cannot be fully eradicated from areas surrounding the Proposed Action Area / Development Envelope, as feral predators will migrate from adjacent areas.

1.5.5 Risk Based Management Approach

Construction will be completed over approximately two years and the Proposal will operate for a further 18 years.

Management and mitigation measures will apply for the duration of construction, operation and closure. Management targets and associated actions have been developed through risk-based assessment (provided in 1) and have included the application of the mitigation hierarchy, to ensure impacts to key environmental factors have been avoided or reduced to as low as reasonably practicable (ALARP). Management actions have been identified and prioritised based on the risk assessment, which was based on survey outcomes and potential Proposal impacts during construction, operation and closure.

The relevant potential impacts to terrestrial fauna resulting from the Proposal include:

- Direct loss of habitat for species of conservation significance;
- Mortality or injury through entrapment or vehicle strike;
- Fragmentation of significant habitat;
- Decline in health and/or change in habitat composition;
- Mortality or injury from predatory feral animals;
- Behaviour changes in fauna individuals to avoid areas previously used for foraging or breeding; and
- Disrupted breeding activities.

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2 CSFMP Provisions

The CSFMP includes both **outcome-based** and **objective-based** management frameworks, which are described below:

- **Outcome-based:** elements that are performance based. Focused on monitoring and evaluating specific measurable outcomes, usually driven by trigger and threshold criteria.
 - Trigger criteria, threshold criteria, response actions, monitoring, timing/frequency of monitoring, and reporting.
- **Objective-based:** elements relate to monitoring and management actions that are required to achieve an objective.
 - Management actions, management targets, monitoring, and reporting.

Outcome-based and objective-based management actions will be implemented to manage direct impacts, for example from native vegetation clearing, and minimise indirect impacts, for example from habitat fragmentation from clearing. The management actions focus on all key Proposal activities identified as potentially having a medium or higher risk on significant fauna. The provisions within this CSFMP have been informed by the results of baseline surveys as detailed in Table 1-4, the characteristics of the Proposal and EPA and DCCEEW guidelines (EPA, 2020; DoE, 2014).

Overall, the controls are considered in line with similar proposals approved in the region, and consistent with industry practices. This CSFMP provides for:

- Early response indicators and criteria (**Section 2.2**);
- Expected changes in the intensity, duration, magnitude or geographic footprint of the impact;
- Expected changes and rate of changes in the environment;
- Possible effects of issues external to the Proposal (e.g. rainfall, land use, other users); and
- Expected timeframe for mitigation to take effect.

2.1 Environmental Outcomes & Objectives

The objective of this CSFMP is *“To protect terrestrial fauna so that biological diversity and ecological integrity are maintained”*.

This CSFMP has been developed to ensure that Proposal activities are managed to minimise impacts to conservation significant fauna species. The CSFMP also includes monitoring indicators to evaluate the effectiveness of management measures for direct and indirect impacts on conservation significant fauna species. Whilst this CSFMP has been targeted towards management actions applicable to conservation significant fauna, many of the management actions identified can be applied to minimise the potential impacts to, and the effect of the Proposal, to other fauna taxa which are not of listed conservation significance, therefore management actions are not divided by conservation significant fauna species.

The specific trigger and threshold criteria, management targets and actions defined in **Table 2-1** and **Table 2-2** have been chosen to provide a basis for detecting, avoiding and/or managing potential impacts to ensure

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environmental outcomes and management targets are met and are based on current advice provided through baseline surveys and assessments of the Proposal.

The trigger criteria are based on best practice and are set at a level to ensure management actions are implemented well in advance of the threshold criteria being reached. The exceedance of trigger criteria is not considered to be a non-compliance event; however, the breach of a threshold will be deemed to be a possible non-compliance, a stop work will be implemented and will be investigated internally, with suitable contingency actions implemented as required.

Reporting methods are included in both **Table 2-1** and **Table 2-2**. Monitoring will be used to measure ongoing performance against the environmental criteria and management targets to determine if trigger or threshold criteria have been breached.

2.2 Management Plan Components

The management approach is informed by results of baseline surveys and the Proposal parameters. The Proposal aims to minimise the Indicative Footprint over the life of operation with priority given to using areas of existing disturbed areas and applying progressive rehabilitation.

Management and mitigation measures have been designed for the life of the mine, and as such, may require adaptive solutions in subsequent revisions of this draft CSFMP.

2.2.1 Management Actions

To meet the over-arching Proposal objectives, a series of Proposal specific, risk-based management actions have been developed and prioritised in order to minimise potential impacts to terrestrial fauna and fauna habitat. The management actions have been identified to address the potential impacts detailed in **Table 1-2**, and the actions focus on proposed activities that have the highest likelihood of causing adverse impacts to the following MNES:

- Night Parrot (Endangered, EPBC; Critically Endangered, BC Act);
- Northern Quoll (Endangered, EPBC and BC Act);
- Ghost Bat (Vulnerable, EPBC and BC Act);
- Pilbara Leaf-nosed Bat (Vulnerable, EPBC and BC Act);
- Pilbara Olive Python (Vulnerable, EPBC and BC Act);
- Greater Bilby (Vulnerable, EPBC and BC Act);
- Grey Falcon (Vulnerable, EPBC and BC Act);
- Peregrine Falcon (Other Specially protected fauna, BC Act);
- Red-necked Stint (Migratory Species, EPBC and BC Act);
- Wood Sandpiper (Migratory Species, EPBC and BC Act);
- Common Greenshank (Migratory Species, EPBC and BC Act); and
- Glossy Ibis (Migratory Species, EPBC and BC Act).

And the following DBCA State listed Priority species:

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- Western Pebble-mound Mouse (Priority 4, DBCA);
- Brush-tailed Mulgara (Priority 4, DBCA);
- Northern Short-tailed Mouse (Priority 4, DBCA); and
- Spotted Ctenotus (Priority 2, DBCA).

Risk assessment tables and a risk assessment of potential impacts resulting from the Proposal are provided as **Appendix 1**. The risk assessment addressed and mitigated the risks associated with terrestrial fauna (and fauna habitat) to as low as reasonably practicable (ALARP). The risk management process utilised a hierarchy of controls to avoid (eliminate risk first), then undertake alternative risk management strategies (such as substitution by utilising alternative areas for infrastructure or previously disturbed areas) to minimise the impacts or implement engineering controls (such as the installation of egress mats, fencing etc to prevent fauna access); and administration (such as the use of inspections, clearing permits etc).

The residual risk rating (**Appendix 1**) remains moderate for two management objectives:

- Minimise incidental mortality or injury of conservation significant terrestrial fauna from clearing activities, vehicle strike or mining related activities; and
- Minimise conservation significant terrestrial fauna population decline due to entrapment within mine infrastructure and equipment.

2.3 Outcome-based Provisions

Outcome-based provisions are performance-based and are used where a potential impact on the environment is suited to objective measurement and reporting. These are grouped into two themes:

- Limits on clearing of conservation significant fauna habitat (item 1a, 1b (EPA) 1c, 1d (EPBC), and 2).
- Protection of caves for the Pilbara Leaf-nosed Bat and Ghost Bat (item 3, 4 & 5).

The outcome-based environmental criteria have been identified in **Table 2-1**. For each of the criteria trigger and threshold indicators, response actions and corresponding monitoring and reporting requirements are outlined.

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Table 2-1: Outcome-based Provisions

EPA factors and objectives:	Terrestrial Fauna: To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.
Key environmental values:	Conservation significant fauna species that will be disturbed.
Key impacts and risks	Direct impact due to loss of conservation significant species and fragmentation of habitat. Behavioural changes in conservation significant species causing avoidance in areas previously used for foraging or breeding and disrupted breeding activities.

No.	Indicators Trigger Criteria Threshold Criteria	Response actions Trigger Level Actions Threshold Contingency Actions	Monitoring Indicator, Methods and Locations	Timing/frequency of monitoring	Reporting																																				
Limits on clearing of conservation significant fauna habitat within Development Envelope (Assessment No. EPA 2326)																																									
1a	<table border="1"> <thead> <tr> <th>Fauna Habitat</th> <th>85% Trigger Value (ha)</th> <th>Threshold Value (95%) (ha)</th> <th>Total Fauna Habitat (ha)</th> </tr> </thead> <tbody> <tr> <td>Drainage Line/Floodplain</td> <td>60.56</td> <td>67.69</td> <td>71.25</td> </tr> <tr> <td>Rocky Hills</td> <td>4442.68</td> <td>494.76</td> <td>520.80</td> </tr> <tr> <td>Stony Spinifex Plains and Hillslopes</td> <td>691.88</td> <td>773.27</td> <td>813.97</td> </tr> <tr> <td>Gibber Cracking Clay</td> <td>48.01</td> <td>53.66</td> <td>56.48</td> </tr> <tr> <td>Mulga Woodland</td> <td>2401.03</td> <td>2683.50</td> <td>2824.74</td> </tr> <tr> <td>Chenopod Cracking Clay Floodplain</td> <td>113.36</td> <td>14.93</td> <td>15.72</td> </tr> <tr> <td>Cracking Clay</td> <td>23.89</td> <td>26.69</td> <td>28.10</td> </tr> <tr> <td>Snakewood</td> <td>6.83</td> <td>7.64</td> <td>8.04</td> </tr> </tbody> </table>	Fauna Habitat	85% Trigger Value (ha)	Threshold Value (95%) (ha)	Total Fauna Habitat (ha)	Drainage Line/Floodplain	60.56	67.69	71.25	Rocky Hills	4442.68	494.76	520.80	Stony Spinifex Plains and Hillslopes	691.88	773.27	813.97	Gibber Cracking Clay	48.01	53.66	56.48	Mulga Woodland	2401.03	2683.50	2824.74	Chenopod Cracking Clay Floodplain	113.36	14.93	15.72	Cracking Clay	23.89	26.69	28.10	Snakewood	6.83	7.64	8.04	<p>Trigger Level Actions:</p> <ul style="list-style-type: none"> No further Ground Disturbance Permits (GDPs) to be authorised if threshold criteria will exceed. Confirm extent of existing approved ground disturbance against assessment of infrastructure yet to be constructed. <p>Threshold Contingency Actions:</p> <ul style="list-style-type: none"> Immediate cease of clearing activities. Undertake aerial audit on current disturbance. A rehabilitation plan may be prepared and implemented for the area of habitat in the event the total area of fauna habitat is exceeded. Investigation into threshold breach. Undertake further education and awareness training. <p>Offset via IRP.</p>	<p>Indicator:</p> <ul style="list-style-type: none"> Actual clearing Clearing authorised by a GDP but not yet undertaken. <p>Methods:</p> <ul style="list-style-type: none"> Monitoring will be line with HanRoy Environmental Compliance Standard (ECS). Visual inspection during vegetation clearing. Internal GDP procedure and tracking of allocated clearing via Ground Disturbance Permit process (GDP), to ensure compliance with State and Commonwealth approved clearing allocations. <p>Locations:</p> <ul style="list-style-type: none"> Within the Development Envelope. 	<p>Prior to commencement of construction and once for each ground disturbance area (GDP inspection) during ground disturbing activities until completion.</p> <p>Monthly survey of cleared areas and annual reconciliation of land disturbance data with the respective year's aerial imagery.</p> <p>Aerial audits will be undertaken in the event of a clearing breach identified.</p>	<p>Impact Reconciliation Report (IRR).</p> <p>Exceedance of threshold criteria – notify regulatory authorities (DWER and DCCEEW) within 7 days of exceedance being identified, and provide a written report within 21 days.</p>
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Limits on clearing of conservation significant fauna habitat within Cwth Proposed Action Area EPBC 2022/09255																																									

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No.	Indicators Trigger Criteria Threshold Criteria	Response actions Trigger Level Actions Threshold Contingency Actions	Monitoring Indicator, Methods and Locations	Timing/frequency of monitoring	Reporting																																				
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2	<p>Trigger Criteria:</p> <p>Clearing in a 10 m buffer zone outside of the FHEZ or FHEZ Corridor boundary.</p> <p>Threshold Criteria:</p> <p>Clearing reaches the FHEZ or FHEZ Corridor boundary.</p>	<p>Trigger Level Actions:</p> <ul style="list-style-type: none"> Review approved GDPs to ensure proposed clearing does not intersect the FHEZ or FHEZ Corridor (unless otherwise authorised). Review proposed future clearing areas to ensure proposed clearing does not intersect the FHEZ or FHEZ Corridor (unless otherwise authorised). <p>Threshold Contingency Actions:</p> <ul style="list-style-type: none"> Immediate cease of clearing activities. Conduct aerial audit on current disturbance. A rehabilitation plan will be prepared and implemented for the area of habitat. Investigation into threshold breach. Undertake further education and awareness training. 	<p>Indicator:</p> <ul style="list-style-type: none"> Actual clearing. Prior to clearing authorised by a GDP. <p>Methods:</p> <ul style="list-style-type: none"> FHEZ and FHEZ Corridor will be clearly demarcated onsite to ensure no clearing within the FHEZ or FHEZ Corridor. Monitoring will be line with HanRoy Environmental Compliance Standard (ECS). Visual inspection during vegetation clearing. <p>Locations:</p> <p>Within and immediately adjacent to, the FHEZ or FHEZ Corridor.</p>	<p>Monthly survey of cleared areas and annual reconciliation of land disturbance data with the respective year's aerial imagery.</p> <p>Aerial audits will be conducted in the event of a clearing breach identified.</p>	<p>Impact Reconciliation Report (IRR).</p> <p>Exceedance of threshold criteria – notify regulatory authorities (DWER and DCCEEW) within 7 days of exceedance being identified, and provide a written report within 21 days.</p>																																				

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No.	Indicators Trigger Criteria Threshold Criteria	Response actions Trigger Level Actions Threshold Contingency Actions	Monitoring Indicator, Methods and Locations	Timing/frequency of monitoring	Reporting
Protection of retained Category 4 caves for conservation significant bats					
3	<p>Trigger Criteria: Ground disturbance in a 50 m buffer zone of cave(s) boundary/s identified as to be retained within the Development Envelope.</p> <p>Threshold Criteria: Ground disturbance in a 25 m buffer zone of cave(s) boundary/s identified as to be retained within the Development Envelope and are viable for significant bat usage.</p> <p><i>*Note, caves to be retained will be identified as Proposal design progresses. These criteria will be updated accordingly</i></p>	<p>Trigger Level Action:</p> <ul style="list-style-type: none"> Check approved GDP areas do not intersect the proposed cave(s) that are identified as to be retained. Review relevant clearing instruments and discuss additional control measures with all relevant personnel, including supervisors and plant operators. <p>Threshold Level Action:</p> <ul style="list-style-type: none"> Check areas have been demarcated per relevant procedures. Review trigger level actions. Undertake corrective rehabilitation and/or seek amendment to relevant approvals, in consultation with DWER and DCCEEW. <p>Undertake further education and awareness training.</p>	<p>Indicator: Ground disturbance outside of demarcated boundary.</p> <p>Methods:</p> <ul style="list-style-type: none"> Demarcation of caves buffer zones identified to be avoided. Inspection during ground disturbance. Monitoring will be line with HanRoy Environmental Compliance Standard (ECS). <p>Locations: Caves identified as to be retained within the Development Envelope and are viable for significant bat usage within the Development Envelope/Proposed Action Area.</p>	<p>Prior to commencement of construction and once for each ground disturbance area (GDP inspection) during ground disturbing activities until completion.</p>	<p>Annual Environmental Report (AER).</p> <p>Exceedance of threshold criteria – notify regulatory authorities (DWER and DCCEEW) within 7 days of exceedance being identified, and provide a written report within 21 days.</p>
4	<p>Trigger Criteria: Vibration level exceeds recommended PPV limits of:</p> <ul style="list-style-type: none"> High susceptibility caves = 25 mm/s; and Low to medium susceptibility caves = 75 mm/s. <p>Threshold Criteria: Structural damage or minor/moderate rockfall that would prevent significant bat usage within a cave identified as to be retained within the Development Envelope and are viable for significant bat species usage.</p> <p><i>*Note, caves to be retained will be identified as Proposal design progresses. These criteria will be updated accordingly</i></p>	<p>Trigger Level Action:</p> <ul style="list-style-type: none"> Undertake geotechnical assessment to reassess structural integrity and the susceptibility of the cave structural changes, considering blast monitoring details. Investigate extent and severity of damage. Review blast and vibration levels. Design next blast to achieve a lower blast vibration at all relevant caves. Review training and inductions. <p>Threshold Level Action:</p> <ul style="list-style-type: none"> Cease blasting near relevant area and review blasting parameters. Undertake any practical corrective rehabilitation (remove rock fall or sealing of significant fractures), where any damage is considered to have potential ongoing effects to use by bats. <p>Investigate cause of damage and significance of loss for fauna.</p>	<p>Indicator: Rockfall, cave structure alteration.</p> <p>Refer to Section 2.5 for relevant monitoring programs.</p> <p>Methods: Implement blasting limitations as per results of geotechnical caves assessment. Remote inspections via camera footage.</p> <p>Locations: Caves identified as to be retained within the Development Envelope and are viable for significant bat usage during baseline studies, and those identified during geotechnical instability assessment, that are located closest to the blast location.</p>	<p>Prior to first blast within 500 m and after each benchtop blast within 500 m.</p>	<p>Annual Environmental Report (AER).</p> <p>Exceedance of threshold criteria – notify regulatory authorities (DWER and DCCEEW) within 7 days of exceedance being identified, and provide a written report within 21 days.</p>

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5	<p>Peak particle velocity</p> <table border="1"> <thead> <tr> <th>Cave Susceptibility</th> <th>85% Trigger Value (mm/s)</th> <th>Threshold Value (95%) (mm/s)</th> <th>Blast Vibration Limit (mm/s)</th> </tr> </thead> <tbody> <tr> <td>Low to medium susceptibility caves within FHEZ</td> <td>63.75</td> <td>71.25</td> <td>75</td> </tr> <tr> <td>High susceptibility caves within FHEZ</td> <td>21.25</td> <td>23.75</td> <td>25</td> </tr> </tbody> </table> <p><i>* Note, caves to be retained will be identified as Proposal design progresses. These criteria will be updated accordingly</i></p>	Cave Susceptibility	85% Trigger Value (mm/s)	Threshold Value (95%) (mm/s)	Blast Vibration Limit (mm/s)	Low to medium susceptibility caves within FHEZ	63.75	71.25	75	High susceptibility caves within FHEZ	21.25	23.75	25	<p>Trigger Level Action:</p> <ul style="list-style-type: none"> Review blast and vibration levels and redesign of next blast to achieve lower blast vibration at relevant caves. Review of all relevant management plans. Visual inspection of relevant cave(s). Review training and inductions. <p>Threshold Level Action:</p> <ul style="list-style-type: none"> Cease blasting near relevant area and review blasting parameters. Investigate and identify cause. Undertake visual inspection of relevant cave(s). 	<p>Indicator: Blast vibration measurement measured as peak mm/s. Refer to Section 2.5 for relevant monitoring programs</p> <p>Methods: Blast vibration measurements from caves closest to blast / pit.</p> <p>Locations: Caves identified as viable for significant bat species during baseline studies and those identified during geotechnical instability assessment, that are located closest to the blast location.</p>	For each blast within 200 m, pre, during and post blasting.	Annual Environmental Report (AER). Exceedance of threshold criteria – notify regulatory authorities (DWER and DCCEEW) within 7 days of exceedance being identified, and provide a written report within 21 days.
Cave Susceptibility	85% Trigger Value (mm/s)	Threshold Value (95%) (mm/s)	Blast Vibration Limit (mm/s)														
Low to medium susceptibility caves within FHEZ	63.75	71.25	75														
High susceptibility caves within FHEZ	21.25	23.75	25														
6	<p>Trigger Criteria Humidity changes in the form of one standard deviation is observed during Proposal implementation.</p> <p>Threshold Criteria Humidity changes in the form of three standard deviations is observed during Proposal implementation.</p>	<p>Trigger Level Action:</p> <ul style="list-style-type: none"> Undertake assessment of cave structural integrity. Review groundwater level data to establish whether changes to groundwater levels could be affecting humidity levels within the caves. Review blast and vibration levels and redesign of next blast to achieve lower blast vibration at relevant caves. Review of all relevant management plans. Visual inspection of relevant cave(s). Review training and inductions. <p>Threshold Level Action:</p> <ul style="list-style-type: none"> Cease blasting near relevant area and review blasting parameters. Investigate and identify cause. Undertake visual inspection of relevant cave(s). 	<p>Indicator: Humidity measurements. Refer to Section 2.5 for relevant monitoring programs.</p> <p>Methods: Humidity measurements from caves closest to blast / pit.</p> <p>Locations: Caves identified as viable for significant bat species during baseline studies and those identified during geotechnical instability assessment, that are located closest to the blast location.</p>	Continuous monitoring pre, during and post blasting activities within 200m.	Annual Environmental Report (AER). Exceedance of threshold criteria – notify regulatory authorities (DWER and DCCEEW) within 7 days of exceedance being identified, and provide a written report within 21 days.												

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2.4 Objective-based Provisions

Objective-based provisions related to management actions are used when the environment is not suited to objective measurement and reporting.

Table 2-2 outlines the management objectives that have been identified for the Proposal. All objectives and outcomes of potential impacts cover both State and Commonwealth assessments. Management actions, monitoring and reporting requirements are outlined for each of the management objectives.

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Table 2-2: Objective-based Provisions

EPA factors and objectives:	Terrestrial Fauna: To protect terrestrial fauna so that biological diversity and ecological integrity are maintained
Key environmental values:	Conservation significant fauna species that will be disturbed.
Key impacts and risks	Direct impact due to loss and fragmentation of terrestrial fauna habitat from clearing or ground vibration. Direct impact through mortality or injury through entrapment or vehicle strike. Direct impact through mortality or injury from predatory fauna.

	Management target	Management action	Monitoring Indicators, Methods and Locations	Timing/frequency of monitoring	Reporting
Minimise impacts to MNES species (EPBC 2022/09255)					
1	Minimise impacts to Northern Quoll habitat from clearing of: <ul style="list-style-type: none"> Critical habitat being; <ul style="list-style-type: none"> Rocky Hills. Foraging habitat being; <ul style="list-style-type: none"> Drainage Line/Floodplain habitat; and Stony Spinifex Plains and Hillslopes habitat. 	<ul style="list-style-type: none"> No clearing permitted within the FHEZ. No clearing within the FHEZ corridor unless otherwise approved (through revision and approval of this plan). Prior to clearing, any areas proposed to be cleared will be approved through the internal GDP process. Fauna specialist to undertake pre-clearance survey of Northern Quoll critical habitat (Rocky Hills) assessing species presence (primary/secondary evidence) within GDP area. Known records of Northern Quoll to be included on GDP maps. Environmental inductions to provide detailed MNES species information, and employee and contractor responsibilities. Clearing of critical habitat for Northern Quoll (Rocky Hills) shall be outside breeding season (Jun-Sep) unless pre-clearance ground inspections are completed. 	<p>Indicator: Clearing of Northern Quoll habitat outside of demarcated GDP boundary.</p> <p>Method: Visual inspection of the ground disturbance outside of demarcated clearing area identified in the approved GDP boundary.</p> <p>Location: Northern Quoll habitat: Rocky Hills, Drainage Line/Floodplain, Stony Spinifex Plains and Hillslopes habitat within the Proposed Action Area.</p>	<ul style="list-style-type: none"> Clearing to be approved through GDP application prior to commencement of clearing during construction or operation. Visual inspections monthly during clearing activities. Confirm clearing within approval GDP boundary post completion of clearing activities under each GDP. 	<ul style="list-style-type: none"> Induction and training records. GDP records. Recording as per internal GDP procedure. Annual compliance reporting.
2	Minimise impacts to Pilbara Olive Python habitat from clearing of: <ul style="list-style-type: none"> Foraging habitat being; <ul style="list-style-type: none"> Rocky Hills. 	<ul style="list-style-type: none"> No clearing permitted within the FHEZ. No clearing within the FHEZ corridor unless otherwise approved (through revision and approval of this plan). Prior to clearing, any areas proposed to be cleared will be approved through the internal GDP process. Known records of Pilbara Olive Python to be included on GDP maps. Identify any waterholes on the GDP maps (potential habitat). Environmental inductions to provide detailed MNES species information, and employee and contractor responsibilities. 	<p>Indicator: Clearing of Pilbara Olive Python habitat outside of demarcated GDP boundary.</p> <p>Method: Visual inspection of the ground disturbance outside of demarcated clearing area identified in the approved GDP boundary</p> <p>Location: Pilbara Olive Python habitat: Rocky Hills habitat, permanent waterholes within the Proposed Action Area.</p>	<ul style="list-style-type: none"> Clearing to be approved through GDP application prior to commencement of clearing during construction or operation. Visual inspections monthly during clearing activities. Confirm clearing within approval GDP boundary post completion of clearing activities under each GDP. 	<ul style="list-style-type: none"> Induction and training records. GDP records. Recording as per internal GDP procedure. Annual compliance reporting
3	Minimise impacts to habitat considered critical to the Bilby from clearing of: <ul style="list-style-type: none"> Foraging /Dispersal habitat being; <ul style="list-style-type: none"> Mulga Woodland Habitat (critical); Drainage Line /Floodplain (critical). 	<ul style="list-style-type: none"> No clearing permitted within the FHEZ. No clearing within the FHEZ corridor unless otherwise approved (through revision and approval of this plan).. Prior to clearing, any areas proposed to be cleared will be approved through the internal GDP process. Environmental inductions to provide detailed MNES species information, and employee and contractor responsibilities. Verified Bilby sightings within the Proposed Action Area / Development Envelope will be recorded and investigated via a targeted ground survey. In the event resident bilbies are located, relocate individuals in accordance with <i>Guidelines for relocation of bilbies prior to vegetation clearing</i> (DBCA 2018b) 	<p>Indicator: Clearing of critical Bilby habitat outside of demarcated GDP boundary.</p> <p>Method: Visual inspection of the ground disturbance outside of demarcated clearing area identified in the approved GDP boundary in accordance with <i>The conservation and management of the bilby (Macrotis lagotis) in the Pilbara: Annual Report 2017-18</i> (DBCA, 2018).</p> <p>Location: Bilby habitat: Mulga Woodland habitat within the Proposed Action Area.</p>	<ul style="list-style-type: none"> Clearing to be approved through GDP application prior to commencement of clearing during construction or operation. Visual inspections monthly during clearing activities. Confirm clearing within approval GDP boundary post completion of clearing activities under each GDP. 	<ul style="list-style-type: none"> Induction and training records. GDP records. Recording as per internal GDP procedure. Annual compliance reporting

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4	<p>Minimise impacts to Night Parrot habitat from clearing of:</p> <ul style="list-style-type: none"> Foraging habitat (in close proximity to unburnt old growth spinifex only) being: <ul style="list-style-type: none"> Stony Spinifex Plains and Hillslopes. 	<ul style="list-style-type: none"> No clearing permitted within the FHEZ. No clearing within the FHEZ corridor unless otherwise approved (through revision and approval of this plan). Prior to clearing, any areas proposed to be cleared will be approved through the internal GDP process. Identify areas of long unburnt spinifex on GDP maps. Environmental inductions to provide detailed MNES species information, and employee and contractor responsibilities. 	<p>Indicator: Clearing of Night Parrot habitat outside of demarcated GDP boundary.</p> <p>Method: Visual inspection of the ground disturbance outside of demarcated clearing area identified in the approved GDP boundary.</p> <p>Location: Night Parrot habitat: Chenopod Cracking Clay and Stony Spinifex Plains and Hillslopes habitat within the Proposed Action Area</p>	<ul style="list-style-type: none"> Clearing to be approved through GDP application prior to commencement of clearing during construction or operation. Visual inspections monthly during clearing activities. Confirm clearing within approval GDP boundary post completion of clearing activities under each GDP. 	<ul style="list-style-type: none"> Induction and training records. GDP records. Recording as per internal GDP procedure. Annual compliance reporting.
5	<p>Minimise impacts to Significant Bat species (Pilbara Leaf-nosed Bat and Ghost Bat) habitat through clearing of:</p> <ul style="list-style-type: none"> Pilbara Leaf-nosed Bat foraging habitat being: <ul style="list-style-type: none"> Rocky Hills (Priority 1 & 2 foraging); Drainage Line/Floodplain (Priority 4 foraging); Stony Spinifex Plains and Hillslopes (Priority 5 foraging). Ghost Bat foraging habitat being: <ul style="list-style-type: none"> All habitats within the Proposed Action Area. 	<ul style="list-style-type: none"> No clearing permitted within the FHEZ. No clearing within the FHEZ corridor unless otherwise approved (through revision and approval of this plan). Prior to clearing, any areas proposed to be cleared will be approved through the internal GDP process. Known records of Significant Bat species to be included on GDP maps. Caves will be recorded in a site database and mapped on all mine plans. Access to caves known to be occupied by Ghost Bat and/or Pilbara Leaf-nosed Bat will be restricted, specifically during breeding season. Environmental inductions to provide detailed MNES species information, and employee and contractor responsibilities. A minimum of 42 of the 51 Category 4 caves identified within the Proposed Action Area / Development Envelope and the FHEZ, will be retained (refer to Appendix XX).. 	<p>Indicator: Clearing of Significant Bat species habitat outside of demarcated GDP boundary.</p> <p>Method: Visual inspection of the ground disturbance outside of demarcated clearing area identified in the approved GDP boundary.</p> <p>Location: Within all habitats within the Proposed Action Area</p>	<ul style="list-style-type: none"> Clearing to be approved through GDP application prior to commencement of clearing during construction or operation. Visual inspections monthly during clearing activities. Confirm clearing within approval GDP boundary post completion of clearing activities under each GDP. 	<ul style="list-style-type: none"> Induction and training records. GDP records. Recording as per internal GDP procedure. Annual compliance reporting.
6	<p>Minimise impacts to Grey Falcon habitat through clearing of:</p> <ul style="list-style-type: none"> Breeding (nesting) habitat which consists of: <ul style="list-style-type: none"> Drainage Line/Floodplain. 	<ul style="list-style-type: none"> No clearing permitted within the FHEZ. No clearing within the FHEZ corridor unless otherwise approved (through revision and approval of this plan).. Prior to clearing, any areas proposed to be cleared will be approved through the internal GDP process. Known records of the 27 nesting sites for the Grey Falcon to be included on GDP maps prior to the commencement of ground disturbance. Environmental inductions to provide detailed MNES species information, and employee and contractor responsibilities. Pre-clearance surveys will be required prior to any impact within 10 m of the buffer zones of the 27 recorded potential nesting trees No impact to Grey Falcon nesting trees supporting active nests, will be permitted. A minimum 100 m protection buffer will be applied from the trunk of any active nesting tree to minimise potential direct and indirect impacts to Grey Falcon. 	<p>Indicator: Clearing of mapped nesting trees habitat outside of demarcated GDP boundary.</p> <p>Method: Visual inspection of the ground disturbance outside of demarcated clearing area identified in the approved GDP boundary. Inspection of recorded potential nesting trees</p> <p>Location: Within all habitats within the Proposed Action Area</p>	<ul style="list-style-type: none"> Clearing to be approved through GDP application prior to commencement of clearing during construction or operation. Visual inspections of nesting sites monthly during clearing activities undertaken from August to November (breeding season).. Confirm clearing within approval GDP boundary post completion of clearing activities under each GDP. 	<ul style="list-style-type: none"> Induction and training records. GDP records. Recording as per internal GDP procedure. Annual compliance reporting.

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Minimise impacts to Priority species (EP 2326)					
7	<p>Minimise impacts to Priority species habitat through clearing of the following:</p> <ul style="list-style-type: none"> • Western Pebble-mound Mouse habitat consisting of: <ul style="list-style-type: none"> ○ Gibber cracking clay (breeding and foraging); ○ Stony Spinifex Plains and Hillslopes (foraging); ○ Rocky Hills (foraging). • Brush-tailed Mulgara habitat consisting of: <ul style="list-style-type: none"> ○ Drainage Area/Floodplain (foraging). • Northern Short-tailed Mouse habitat consisting of: <ul style="list-style-type: none"> ○ Drainage Area/Floodplain (foraging); ○ Mulga Woodland (foraging); ○ Gibber Cracking Clay (foraging). 	<ul style="list-style-type: none"> • No clearing permitted within the FHEZ. • No clearing within the FHEZ corridor unless otherwise approved (through a revision and approval of this plan). • Prior to clearing, any areas proposed to be cleared will be approved through the internal GDP process. • Known records of the Priority species to be included on GDP maps and excised from proposed disturbance areas where possible. • Environmental inductions to provide detailed Priority species information, and employee and contractor responsibilities. • Fauna relocation program (undertaken by a suitably trained/qualified fauna practitioner) will be implemented where proposed disturbance intersects with recent and verified survey record. 	<p>Indicator: Clearing of Priority species habitat outside of demarcated GDP boundary.</p> <p>Method: Visual inspection of the ground disturbance outside of demarcated clearing area identified in the approved GDP boundary.</p> <p>Location: Within all habitats within the Development Envelope.</p>	<ul style="list-style-type: none"> • Clearing to be approved through GDP application prior to commencement of clearing during construction or operation. • Visual inspections monthly during clearing activities. • Confirm clearing within approval GDP boundary post completion of clearing activities under each GDP. 	<ul style="list-style-type: none"> • Induction and training records. • GDP records. • Recording as per internal GDP procedure. • Annual compliance reporting.
Direct and indirect impacts within the EPA Development Envelope 2326 and EPBC Proposed Action Area 2022/09255					
8	<p>No unauthorised clearing or disturbance of vegetation to occur outside of Development Envelope or Proposed Action Area during and attributable to implementation of the Proposal.</p>	<ul style="list-style-type: none"> • No clearing permitted within the FHEZ. • No clearing within the FHEZ corridor unless otherwise approved (through revision and approval of this plan). • All site personnel and contractors to be inducted/trained on environmental responsibilities. • Prior to clearing, any areas proposed to be cleared will be approved through the internal GDP process. • Prior to clearing activities, areas proposed to be cleared will be demarcated on-site (using appropriate visual markers or Global Positioning System based software), with areas in accordance with the approved GDP. • Vehicles and equipment access of existing designated roads/access tracks and cleared areas will be preference over clearing new roads/access tracks. 	<p>Indicator: Ground disturbance outside of demarcated boundary.</p> <p>Method: Visual inspection of the ground disturbance outside of demarcated clearing area identified in the approved GDP boundary.</p> <p>Location: Development Envelope/Proposed Action Area.</p>	<ul style="list-style-type: none"> • Clearing to be approved through GDP application prior to commencement of clearing during construction or operation. • Visual inspections monthly during clearing activities. • Confirm clearing within approval GDP boundary post completion of clearing activities under each GDP. 	<ul style="list-style-type: none"> • Induction and training records. • GDP records. • Recording as per internal GDP procedure. • Inspection records. • Incident reporting system. • Annual audit. • Annual reporting on compliance.

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	Management target	Management action	Monitoring Indicators, Methods and Locations	Timing/frequency of monitoring	Reporting
9	Minimise clearing of conservation significant fauna habitat required for implementation of the Proposal.	<ul style="list-style-type: none"> All site personnel and contractors to be inducted/trained on environmental responsibilities including conservation significant fauna habitat within the Proposed Action Area. Design measures implemented to avoid the clearing of conservation significant fauna habitat (including locating infrastructure within existing disturbed areas). Site layout designed to reduce habitat fragmentation and provide corridors allowing fauna to move through the landscape on all sides of development. Clearing of fauna habitat to occur only within the Proposed Action Area and to be managed through the internal GDP process. No clearing permitted within the FHEZ. No clearing within the FHEZ corridor unless otherwise approved (through a revision and approval of this plan). Vehicles and equipment access of existing designated roads/access tracks and cleared areas will be preference over clearing new roads/access tracks. 	<p>Indicator: Ground disturbance outside of demarcated boundary.</p> <p>Method: Visual inspection of the ground disturbance outside of demarcated clearing area identified in the approved GDP boundary.</p> <p>Location: Development Envelope/Proposed Action Area.</p>	<ul style="list-style-type: none"> Clearing to be approved through GDP application prior to commencement of clearing during construction or operation. Visual inspections monthly during clearing activities. Confirm clearing within approval GDP boundary post completion of clearing activities under each GDP. 	<ul style="list-style-type: none"> Induction and training records. Design drawings. GDP records. Recording as per internal GDP procedure. Incident reporting system. Inspection records. Annual audit. Annual reporting on compliance.
10	Minimise degradation of significant fauna habitat as a result of dust emissions from the Proposal.	<ul style="list-style-type: none"> All site personnel and contractors to be inducted/trained on environmental responsibilities. Vehicle speed limits on haul roads, work areas and campsites will be imposed and enforced where necessary to minimise dust emissions including (but not necessarily limited to): <ul style="list-style-type: none"> An upper limit of 90 km/hr on all sealed roads within the Development Envelope (with the exception of the Northern Haul Road FHEZ restriction zone between 6pm and 6am); An upper limit of 60 km/hr on all unsealed roads within the Development Envelope; Between 6pm and 6am, an upper speed limit restriction of 60 km/hr will be in place along the Northern Haul Road FHEZ restriction zone (refer to Figure 2-1). Routine speed testing will be undertaken to ensure limits and restrictions are being adhered to. Road signs with speed limits and time restrictions posted will be installed on all sealed and unsealed roads. Undertake dust suppression on all active roads and unsealed operational areas to reduce dust emissions. 	<p>Indicator: Excessive dust emissions observed.</p> <p>Method:</p> <ul style="list-style-type: none"> Visual assessment of dust during environmental inspections. Opportunistic sightings. <p>Locations: Development Envelope/Proposed Action Area</p>	<ul style="list-style-type: none"> Daily inspection during construction and operation. 	<ul style="list-style-type: none"> Induction and training records. Incident reporting system. Inspection reports. Dust monitoring results. Watercart records. Drill records. Permit to work records. Annual audit. Annual reporting on compliance.
11	Minimise decline in condition of significant fauna habitat as a result of altered fire regimes from the Proposal.	<ul style="list-style-type: none"> An adequate number of personnel and contractors shall be trained in basic fire awareness, fire response and use of fire suppression equipment. Smoking permitted in designated smoking areas to have a Cease fire unit (or similar) for safe and contained cigarette butt disposal. Spark arrestors will be fitted to mobile equipment with internal combustion engines involved in clearing operations. Fire-control equipment will be available in fire-risk areas including but not limited to hazardous material storage areas, hot works job sites, service trucks. An emergency management plan shall be developed and implemented and shall include methods for managing major environmental incidents, including but not limited to fire. Compliance with internal Hot Works Procedures. 	<p>Indicator: Recorded fire observed.</p> <p>Method: Fire incident reports.</p> <p>Locations: Development Envelope/Proposed Action Area</p>	<ul style="list-style-type: none"> Inspect equipment every 6 months during construction and operation. 	<ul style="list-style-type: none"> Inspection records. Annual audit. Annual reporting on compliance.

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12	Minimise disturbance to native fauna from noise, vibration and lighting during Proposal implementation.	<ul style="list-style-type: none"> All site personnel and contractors to be inducted on environmental responsibilities regarding noise, vibration and lighting implementation. All activities will be conducted in accordance with the Environmental Protection (Noise) Regulations 1997, Australian Standard 2436-1981: Guide to noise control on construction, maintenance and demolition sites and relevant occupational health and safety standards. All activities will be conducted in accordance with DCCEEW (2023b) National Light Pollution Guidelines for Wildlife. Potential mitigation measures (e.g. sound absorption devices) will be considered when selecting noise and vibration equipment. Equipment shall be fitted with appropriate noise reduction devices (where necessary) to comply with Project HSE and regulatory requirements. Inspections and maintenance of equipment and machinery to reduce noise emissions. Directional lighting onto active construction/operational areas to minimise the potential for light overspill resulting in fauna disturbances. No lighting towers within 500m of the FHEZ will be positioned facing towards the FHEZ. Lighting will be strategically placed and designed to shine towards plant operations. Lighting will only be used where is necessary for safe operations. Lighting to use low intensity lux. 	<p>Indicator:</p> <ul style="list-style-type: none"> Excessive noise or lighting observed. Recorded disturbance in caves observed from blasting activities. <p>Method:</p> <ul style="list-style-type: none"> Visual inspections of lighting on active construction areas. Inspection of noise emissions. Measurements of blast vibration in caves closest to blasting activity. <p>Locations:</p> <p>Development Envelope/Proposed Action Area.</p>	<ul style="list-style-type: none"> Visual inspections monthly during clearing activities. As required by approval conditions during construction and operation. Visual inspection of equipment prior to construction activities. As per general inspection schedule. 	<ul style="list-style-type: none"> Induction and training records. Noise monitoring results. Inspection records. Annual audit. Annual reporting on compliance.

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13	Minimise decline in conservation significant fauna numbers due to predation from feral animals (including cane toads) as a result of the Proposal.	<ul style="list-style-type: none"> All site personnel and contractors to be inducted on environmental responsibilities. Environmental induction will include awareness of high risk of introduced fauna species relevant to the Proposal, including the threat of cane toad invasion. Targeted control of infestations (the presence of feral animals) including control measure within the FHEZ and FHEZ corridor. Implement domestic waste management procedures (e.g. fencing of landfills, covering putrescible waste, secure lids on bins, to avoid attraction of both feral and native species to the Proposed Action Area. Implement annual (during operations) pest animal control program on within and around the Proposed Action area / Development Envelope. Discuss with DBCA (Parks and Wildlife) areas in the Pilbara where cane toads could potentially become established and apply management of vehicles entering from these areas (as per Cane Toad Strategy for WA 2014-2019). No medium to be imported from areas of cane toad invasion. Participate in collaborative programs as stated in the Cane Toad Strategy for WA and the Commonwealth Threat Abatement Plan (Commonwealth of Australia 2011). Prohibit the feeding of declared pests (and fauna). Modify existing habitat to make it less suitable for cats e.g. reduce fragmentation by rehabilitating tracks and clearings and making it more structurally complex with shelter and escape sites. Implement and enforce a no cat and no dog policy for developments with accommodation facilities. Educate and train staff and public in any no cat and dog policy and ensure signage is displayed. 	<p>Indicator: Feral animal sightings. Pest animal control records.</p> <p>Method:</p> <ul style="list-style-type: none"> Visual inspections. Opportunistic sightings. <p>Locations: Development Envelope/Proposed Action Area.</p>	<ul style="list-style-type: none"> Annual pest animal control program. Visual inspections monthly during clearing activities. Annual inspection of clearing areas. Annual inspection of rehabilitated areas. Monthly inspection of work areas to ensure free from litter etc. 	<ul style="list-style-type: none"> Induction and training records. Inspection records. Incident reporting system. Material specification certificates. Monthly inspection. Pest animal control records. Annual audit. Annual reporting on compliance.
14	Minimise impacts to conservation significant fauna due to the introduction of weeds as a result of the Proposal.	<ul style="list-style-type: none"> All site personnel and contractors to be inducted on environmental responsibilities. Environmental induction will include awareness of high risk/priority weed relevant to the Proposal and weed hygiene management. Undertake progressive rehabilitation in accordance with a Mine Closure Plan to reduce the opportunity for weeds to become established. All machinery and vehicles shall be cleaned down of all soil and vegetation material prior to arriving or entering on site. Any soil and vegetation removed from machinery or vehicles during clean down shall be collected and disposed of offsite. Vehicle and Mobile Equipment Weed Hygiene Inspection Form (HNR-0000-EN-TEM-0014) must be completed, prior to entry to site and records maintained. Vehicles and equipment access of existing designated roads/access tracks and cleared areas will be preference over clearing new roads/access tracks. Imported fill, ballast or other potential weed mediums to be certified by the supplier as being free from weed free sources prior to arrival on site. Certification and completed Imported Materials Weed Hygiene Inspection Form (HNR-0000-EN-EN-TEM-0004) is to be provided to HanRoy. Implement an annual weed monitoring and management program. Efforts to manage all identified weeds. Undertake progressive land clearing minimising the amount of active disturbance present at any one time to reduce the opportunity for weeds to become established. 	<p>Indicator: New weed species identified.</p> <p>Method:</p> <ul style="list-style-type: none"> Visual inspections. Opportunistic sightings. Weed control reports. <p>Locations: Development Envelope/Proposed Action Area.</p>	<ul style="list-style-type: none"> Visual inspections monthly during clearing activities. Prior to mobilisation to Proposal. Prior to delivery of each load. Annual inspection will be after a rainfall event and at the beginning of the growing season (February to May)). Annual inspection of clearing areas. Annual inspection of rehabilitated areas. 	<ul style="list-style-type: none"> Induction and training records. Inspection records. Incident reporting system. Material specification certificates. Weed inspection records. Monthly inspection. Pest animal control records. Annual audit. Annual reporting on compliance.

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15	Saline water (> 50,000 mg/L TDS) shall not be used for dust suppression unless approved by the Environmental Manager.	<ul style="list-style-type: none"> TDS testing of water used for dust suppression to ensure TDS does not exceed >50,000 mg/L. Construction and installation of appropriate surface water diversion structures to minimise contact between natural drainage systems and dust control surfaces. Dribble bars shall be used to control overspray onto adjacent vegetation. TDS testing to ensure TDS does not exceed >50,000 mg/L. 	<p>Indicator: Decline in vegetation health of significant habitat along roads and tracks utilising dust suppression activities.</p> <p>Method: TDS testing to ensure TDS does not exceed >50,000 mg/L.</p> <p>Locations: Significant habitat within the Development Envelope/Proposed Action Area.</p>	<ul style="list-style-type: none"> Monthly inspection of vegetation health during clearing activities and every 6 months during operation. 	<ul style="list-style-type: none"> Induction and training records. Incident reporting system. Inspection records. Annual audit. Annual reporting on compliance.
16	Minimise incidental mortality or injury of conservation significant terrestrial fauna from clearing activities, vehicle strike or mining related activities resulting from the Proposal.	<ul style="list-style-type: none"> Ensure staff and contractors are provided with appropriate training to ensure significant fauna and associated habitat are protected. Record any injury or death to fauna as an incident. Record any unintentional direct loss of significant fauna habitat as an incident through the incident reporting process. Report all conservation significant fauna mortalities to the appropriate regulating authority within the required timeframes. Promote driver awareness and implement appropriate mitigation measures for vehicle strike including speed limit restrictions, right of way for fauna, and the prohibition of off-road driving. Vehicle speed limits on haul roads, work areas and campsites will be imposed and enforced where necessary including (but not necessarily limited to): <ul style="list-style-type: none"> An upper limit of 90 km/hr on all sealed roads within the Development Envelope (with the exception of the Northern Haul Road FHEZ restriction zone between 6pm and 6am); An upper limit of 60 km/hr on all unsealed roads within the Development Envelope; Between 6pm and 6am, an upper speed limit restriction of 60 km/hr will be in place along the Northern Haul Road FHEZ restriction zone (refer to Figure 2 1). Routine speed testing will be undertaken to ensure limits and restrictions are being adhered to. Road signs with speed limits and time restrictions posted will be installed on all sealed and unsealed roads. 	<p>Indicator: Conservation significant fauna mortality or injury from mining, clearing or vehicle strike.</p> <p>Method: Visual observation and incident reports of deceased or injured conservation significant fauna.</p> <p>Locations: Development Envelope/Proposed Action Area.</p>	<ul style="list-style-type: none"> Training to be provided during inductions of staff or contractors prior to entry on site. Monthly visual inspection of clearing extent during clearing activities. Records of fauna death or injury on incident during construction and operation. 	<ul style="list-style-type: none"> Induction and training records. Incident reporting system. Incident report. GDP records. Notify regulator Authority in accordance with Section 3.2. Annual audit. Annual reporting on compliance.
17	Minimise conservation significant terrestrial fauna population decline due to entrapment within mine infrastructure and equipment, as a result of the Proposal.	<ul style="list-style-type: none"> Ensure egress points and/or fauna ladders are installed as appropriate in excavations and dams to avoid accidental death and/or entrapment of fauna. Undertake inspections of water infrastructure to ensure integrity of fauna egress points and fencing. Ensure all open holes, including drill holes, are covered or capped during construction and operation; or are rehabilitated when they are no longer required. Ensure all domestic waste facilities are fenced and putrescible wastes are covered. Ensure all containers doors closed are securely when not in use. Avoid the use of barbed wire fencing. Where barbed wire fencing cannot be avoided, HPPL will install reflectors so the fence is conspicuous to bats. 	<p>Indicator: Sightings of a conservation significant fauna presence within mine infrastructure or equipment.</p> <p>Method:</p> <ul style="list-style-type: none"> Visual inspections of equipment/infrastructure. Opportunistic sightings. <p>Locations: Development Envelope/Proposed Action Area.</p>	<ul style="list-style-type: none"> Daily inspections during excavation works. Inspection undertaken of rehabilitation following closure of open holes no longer required. Monthly inspection egress points and/or fauna ladders during construction and operation. Daily checks of waste facilities and container doors during construction and operation. 	<ul style="list-style-type: none"> Inspection reports. Reporting of any non-compliance as required. Annual audit. Annual reporting on compliance.

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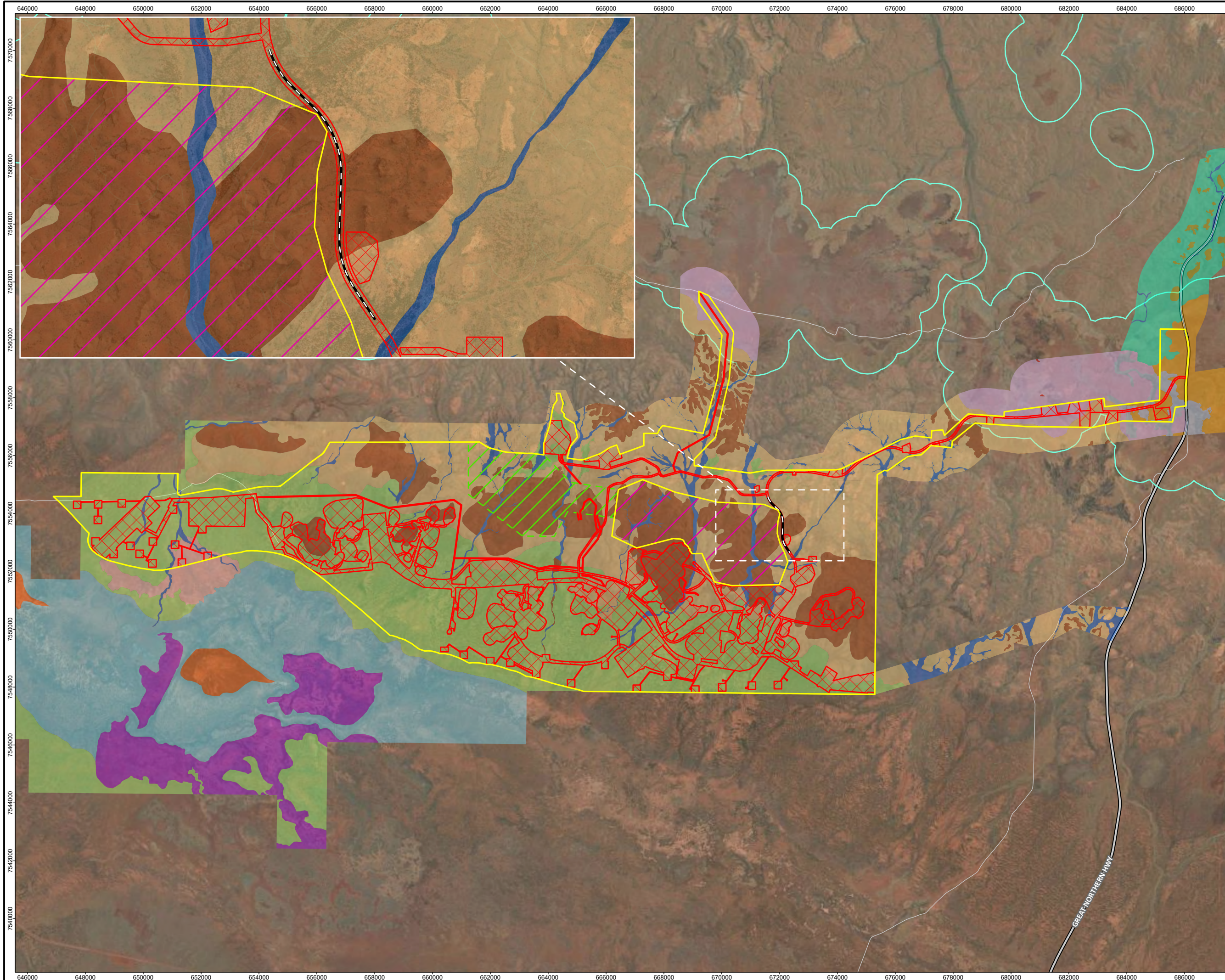
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	Management target	Management action	Monitoring Indicators, Methods and Locations	Timing/frequency of monitoring	Reporting
18	All interactions with conservation significant fauna / MNES are managed appropriately to minimise fauna disturbance, injury or stress.	<ul style="list-style-type: none"> All site personnel and contractors to be inducted on protected or threatened species and appropriate fauna management practices. Any protected or threatened species encountered on site are to be recorded and records maintained for the Proposal. This will include locations, and animal status (alive/dead). In the event that of protected or threatened species are observed within active clearing area, clearing will cease in the area of the sighting for 15 minutes to allow the fauna to move away from the area or until the individual/s have been relocated. If any of protected or threatened species are required to be moved, fauna are to be handled (by appropriately trained personnel or contractor) and transported in accordance with the requirements of the BC Act. Any injury or fatality of conservation listed fauna species to be documented as an incident. 	<p>Indicator Interactions with conservation significant fauna</p> <p>Method: Visual; opportunistic</p> <p>Locations: Development Envelope/Proposed Action Area.</p>	<ul style="list-style-type: none"> As required, during construction and operation. 	<ul style="list-style-type: none"> Records. Incident report. Annual reporting on compliance.
19	Identification of protected or threatened species	<ul style="list-style-type: none"> All site personnel should be trained to identify protected or threatened species. Immediately report any sightings of protected or threatened species. Interactions are to be avoided (i.e. do not approach, feed, or attempt to handle the animal). If any of protected or threatened species are required to be moved, fauna are to be handled (by appropriately trained personnel or contractor) and transported in accordance with the requirements of the BC Act. 	<p>Indicator Interactions with conservation significant fauna</p> <p>Method: Visual; opportunistic</p> <p>Locations: Development Envelope/Proposed Action Area.</p>	<ul style="list-style-type: none"> As required, during construction and operation. 	<ul style="list-style-type: none"> Maintain detailed records of all fauna encounters, including species identification, location, date, and actions taken. Incident report. Annual reporting on compliance.

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- Legend**
- Proposed Action Area
 - Disturbance Footprint
 - Fauna Habitat Exclusion Zone (FHEZ)
 - FHEZ Corridor
 - Priority Ecological Communities (DBCA)
 - Four plant assemblages of the Wona Landsystem (Priority 1)
- Fauna habitat**
- Boulder Piles
 - Calcrete Stony Plain
 - Chenopod/ Cracking Clay Floodplain
 - Claypan
 - Cracking Clay
 - Drainage Lines/Floodplains
 - Gibber Cracking Clay
 - Hilltops, Mesas & Outcrops
 - Mixed Eucalypt/ Mulga Floodplain
 - Mulga Woodland
 - Rocky Hills
 - Rocky Plains & Footslopes
 - Snakewood
 - Stony Spinifex Plains and Hillslopes
 - Cleared/Disturbed
- Roads (LGATE-195)**
- Vehicle speed limit between 6pm and 6am
 - Highway
 - Minor Road



Job No: 68676
 Client: Hancock Prospecting Pty Ltd
 Version: A Date: 24-Mar-2025
 Drawn By: dmills Checked By: VC

Scale 1:120,000 at A3

 0 2 4
 Kilometers

Coord. Sys. GDA2020 MGA Zone 50

**Mulga Downs Iron Ore Mine
 Central Pilbara, Western Australia**

**VEHICLE SPEED LIMITS ALONG
 THE NORTHERN HAUL ROAD
 FHEZ RESTRICTION ZONE**

FIGURE 2.1

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 Image Reference: World Imagery: Earthstar Geographics
 World Imagery: Maxar

Conservation Significant Fauna Management Plan

Mulga Downs Iron Ore Mine – Western Australia

2.5 Monitoring

Due to Cultural sensitivities, access to baseline monitoring locations or proposed construction/operational monitoring sites may be restricted. The Proponent will work with the Banjima people to implement the monitoring program outlined in this section. The specific locations and number of sites proposed may change as a result of those discussions. The CSFMP will be updated accordingly.

2.5.1 Northern Quoll Monitoring Program

Management actions have been designed to avoid, mitigate, manage or minimise potential impacts on Northern Quoll individuals and their preferred habitats. It is necessary to monitor the implementation of these actions to ensure they are effective. To achieve this, a monitoring program for Northern Quoll will be conducted to monitor the population of Northern Quolls in the FHEZ.

2.5.1.1 Baseline Northern Quoll Data

Baseline surveys for Northern Quoll were completed between 2019 and 2024 (*ecologia* 2021, Biologic 2022, Spectrum 2023, and Spectrum 2024). The results of these surveys provide baseline data on Northern Quoll population in the FHEZ prior to development of the Proposal; however, it is noted that Northern Quoll populations often fluctuate and can undergo boom and bust periods, depending on the food resources and conditions. This is demonstrated through the results in 2019 where only two individuals were recorded following lower than average rainfall records prior to this survey from 2017 to 2019 compared with the 2024 results, which followed higher than average rainfall, where the species was recorded on 15 occasions. Individuals are very short lived and each females reproduces six young each year. A couple of years of drought or good conditions can alter the size of a population significantly. The results of baseline surveys (together with other environmental data e.g. temperature, rainfall) will be used to inform monitoring results analysis where possible.

2.5.1.2 Monitoring Program Objectives

The broad objectives for the monitoring program are to monitor and measure the success of management actions in protecting Northern Quoll. Specific objectives include:

- Measure impacts of the Proposal over time; and
- Measure the success of management measures (based on Northern Quoll monitoring results) against performance indicators to inform an adaptive management approach that will be implemented during the life of the Proposal.

2.5.1.3 Monitoring Site Selection

To ensure that the monitoring program is consistent with, and builds on data previously collected during baseline surveys, monitoring will continue to utilise Northern Quoll monitoring sites established during baseline surveys. Indicative monitoring locations are provided in Figure 2-2.

Previous Northern Quoll monitoring undertaken for the Proposal incorporated site specific control sites. It is proposed that the monitoring program aligns with DBCA Pilbara Northern Quoll Project (DBCA 2014). This project currently incorporates 14 monitoring sites across the Pilbara. The methods used to monitor the Northern

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Quolls within Proposal impact sites are comparable to those DBCA have applied at their regional Pilbara Northern Quoll monitoring sites. As such, the information from the DBCA control sites can be used as reference sites in addition to the original baseline survey control sites. This approach allows for a comparison of Northern Quoll population trends within the Proposal to regional control sites.

2.5.1.4 Monitoring Program Design

The Northern Quoll monitoring program design for the Proposal will align with the current DBCA Pilbara Northern Quoll Project (DBCA 2014). The survey outcomes can be compared with the ongoing Pilbara regional monitoring program. In addition, the Survey Guidelines for Australia Threatened Mammals (DSEWPac, 2011) and Referral guidelines for the endangered Northern Quoll (DSEWPAC, 2016) have also been considered.

The monitoring program is outlined below. A summary of all proposed monitoring is provided in **Table 2-3**.

2.5.1.5 Trapping Methodology – Motion Cameras

Recent advances in motion camera monitoring have demonstrated that Northern Quoll can be identified by downward facing cameras. This method is less invasive than cage trapping and poses less risks to harming Northern Quoll.

Each monitoring site shall consist of:

- Trap type: infra-red motion sensitive cameras;
- Bait type: non-food reward bait consisting of cotton rope soaked in fish oil;
- Layout: up to four (4) cameras at least 100 m apart;
- Duration: at least 38 nights;
- Marking: individual trap locations are fixed and marked (GPS) for the duration of the monitoring program;
- Searches: five (5) targeted searches shall be undertaken to record secondary signs of Northern Quoll;
- A sample of scats shall be collected where possible for dietary analysis. The results of the analysis will be provided to DBCA.; and
- Habitat data sheets shall be completed for each monitoring site (if DBCA require).

2.5.1.6 Supplementary Camera Trapping (Feral Predators, Fauna Friendly Culverts, Mine Pits and Artificial Lighting)

Feral Predators

Cameras will be set up in areas where quolls and predators are most likely to interact, such as putrescible waste storage areas and permanent water sources, or locations where predators are likely to use preferentially, such as roads, access tracks and culverts. The location of motion cameras may change for each monitoring event and therefore, their locations have not been included.

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Fauna Friendly Culverts

Motion cameras shall be deployed near fauna friendly culverts to confirm the culverts are in use and they are effective as habitat linkages. Assessment on whether feral predators are frequenting fauna friendly culverts shall be incorporated into the feral predator control programs.

Operational areas

Cameras will be set up inside mining areas to assess whether Northern Quolls are also using these areas.

Artificial Lighting

Motion cameras shall be deployed in monitoring sites identified in the baseline artificial light survey (see **Section 2.5.3**). Fauna activity shall be assessed and comment will be made to assert whether the following impacts are identified:

- Fauna appear more vulnerable to predator species;
- Fauna access to food and habitat resources is impacted;
- Change in fauna circadian rhythms and activity periods; and
- Stopping, reducing or change in fauna reproduction timing.

2.5.1.7 Survey Timing

Monitoring will be undertaken annually, with a review of the program after the first two years of monitoring. Camera deployment and collection will not occur between 1 April to 30 September to avoid the periods of the year when females have large pouch young or denned young (Dunlop, et al., 2014). The results will be compared to baseline results (including the DBCA monitoring locations) along with environment factors to determine whether the results are likely to be attributed to environmental conditions, or Proposal activities. Should the monitoring results indicate impacts as a result of the Proposal, the frequency of future monitoring will be re-assessed as well as the methodology and effort on annual monitoring and any other appropriate contingency actions that should be implemented in consultation with DBCA.

2.5.1.8 Environmental Data

Standardised data sheets for Northern Quoll will be completed for each monitoring site during each monitoring event. Weather data will be obtained on site by permanent weather stations and will be incorporated into analysis of Northern Quoll monitoring results.

2.5.2 Pilbara Leaf-nosed Bat Monitoring Program

2.5.2.1 Baseline Pilbara Leaf-nosed Bat Data

Baseline surveys for Pilbara Leaf-nosed Bat were completed in 2024 (Spectrum 2024). The results of these surveys provide baseline data on Pilbara Leaf-nosed Bat population in the FHEZ prior to development of the Proposal. These results will be incorporated into monitoring results analysis.

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2.5.2.2 Monitoring Program Objectives

The broad objective for the monitoring program is to monitor and measure the success of management actions in protecting Pilbara Leaf-nosed Bat.

2.5.2.3 Monitoring Site Selection

To ensure that the monitoring program is consistent with, and builds on data previously collected during baseline surveys, monitoring will continue to utilise Pilbara Leaf-nosed Bat monitoring sites established during baseline surveys. These monitoring locations are available for viewing in Figure 2-2.

2.5.2.4 Monitoring Program Design

The survey shall be conducted in alignment with relevant State, Commonwealth guidelines and policy including:

- Environmental Factor Guidelines – Terrestrial Fauna (EPA, 2016a).
- Environmental Protection Authority (EPA) Technical Guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (EPA 2020).
- Survey guidelines for Australia’s threatened mammals (DSEWPaC 2011a).
- Survey guidelines for Australia’s threatened bats (DSEWPaC 2010).
- EPBC Act Significant impact guidelines 1.1 - Matters of National Environmental Significance (DotE 2013).

The monitoring program is outlined below. A summary of all proposed monitoring is provided in **Table 2-3**.

2.5.2.5 Bat Recorders

Wildlife Acoustics Song Meter SM4BAT full spectrum ultrasonic recorders (SM4BAT) shall be deployed to evaluate the presence of Pilbara Leaf-nosed Bat within the FHEZ. These recorders are specifically designed to detect and record ultrasonic echolocation calls emitted by bats during flight. Selected filters, triggers and audio settings shall follow the manufacturer’s recommendations for bat detection of call frequencies up to 130 kHz (Wildlife Acoustics, 2021).

The recording period shall be set at night, from 30 minutes pre-sunset to 30 minutes post-sunrise. Recorders shall be placed in locations where bat species are likely to forage (as per the baseline monitoring sites). Recording shall take place for at least 38 nights as per monitoring program.

The bat call recordings will be analysed by an appropriately qualified zoologist.

2.5.2.6 Other Monitoring (Caves and Lighting)

The results of the artificial light survey and cave monitoring will be assessed in conjunction with bat recording data.

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2.5.2.7 Survey Timing

Bat recording should be conducted typically during breeding and post breeding seasons (November to March), when the bats are more active and concentrated around roosting sites. However, they can be recorded year round with the right equipment and appropriately qualified zoologist.

2.5.3 Artificial Light Survey

2.5.3.1 Baseline Artificial Light Survey

A baseline artificial light survey shall be conducted following construction of long-term structures and infrastructure using techniques outlined in the following guidance and studies:

- Methods for assessment and monitoring of light pollution around ecologically sensitive sites (Barentine 2019); and
- National Light Pollution Guidelines for Wildlife (DCCEEW 2023b).

The baseline survey will identify fauna monitoring locations where artificial lighting has the potential to affect local populations. The light survey shall include assessment of artificial light on caves.

A summary of all proposed monitoring is provided in **Table 2-3**.

2.5.4 Cave Monitoring

2.5.4.1 Baseline Cave Monitoring / Geotechnical Assessment

The baseline cave monitoring and geotechnical stability assessment has been performed by PSM (2024). The baseline geotechnical assessment and literature review recommends that vibration limits are established to reduce the likelihood of significant damage above the natural background level of degradation that may contribute in changes to climatic conditions within the caves.

19 Caves to be retained within the FHEZ that are located closest to pits were selected for the assessment as they are considered most susceptible to vibration impacts, and subsequently most susceptible to climate condition changes related to any structural changes.

Medium susceptibility caves were identified as MEC007; MEC012; MEC013; MEC016; MEC025; MEC033; MEC049; MEC060; MEC062; MEC074.

High susceptibility caves were identified as MEC003; MEC061; MEC063; MEC065

Humidity

Prior to the commencement of mining, a baseline humidity assessment shall be performed in caves identified as viable for significant bat species usage and highly or moderately susceptible to the potential impact of construction and operational activities. Additionally, caves located within the FHEZ Corridor will also be measured.

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2.5.4.2 Vibration Monitoring (during blasting activities)

Vibration monitors shall be deployed in the vicinity of a selection of those caves identified as viable for significant bat species usage that will be retained and that have been geotechnically .Monitoring of caves within 200m of proposed mining activities will be prioritised. The following preliminary vibration limits are proposed:

- High susceptibility caves = 25 mm/s; and
- Low to medium susceptibility caves = 75 mm/s.

Noting that some other Pilbara projects have proposed higher vibration limits (ie 100mm/s for Atlas' McPhee Project), the proposed limits for the MDIOM proposal may be revised based on the results of relevant monitoring programs.

A summary of all proposed monitoring is provided in **Table 2-3**.

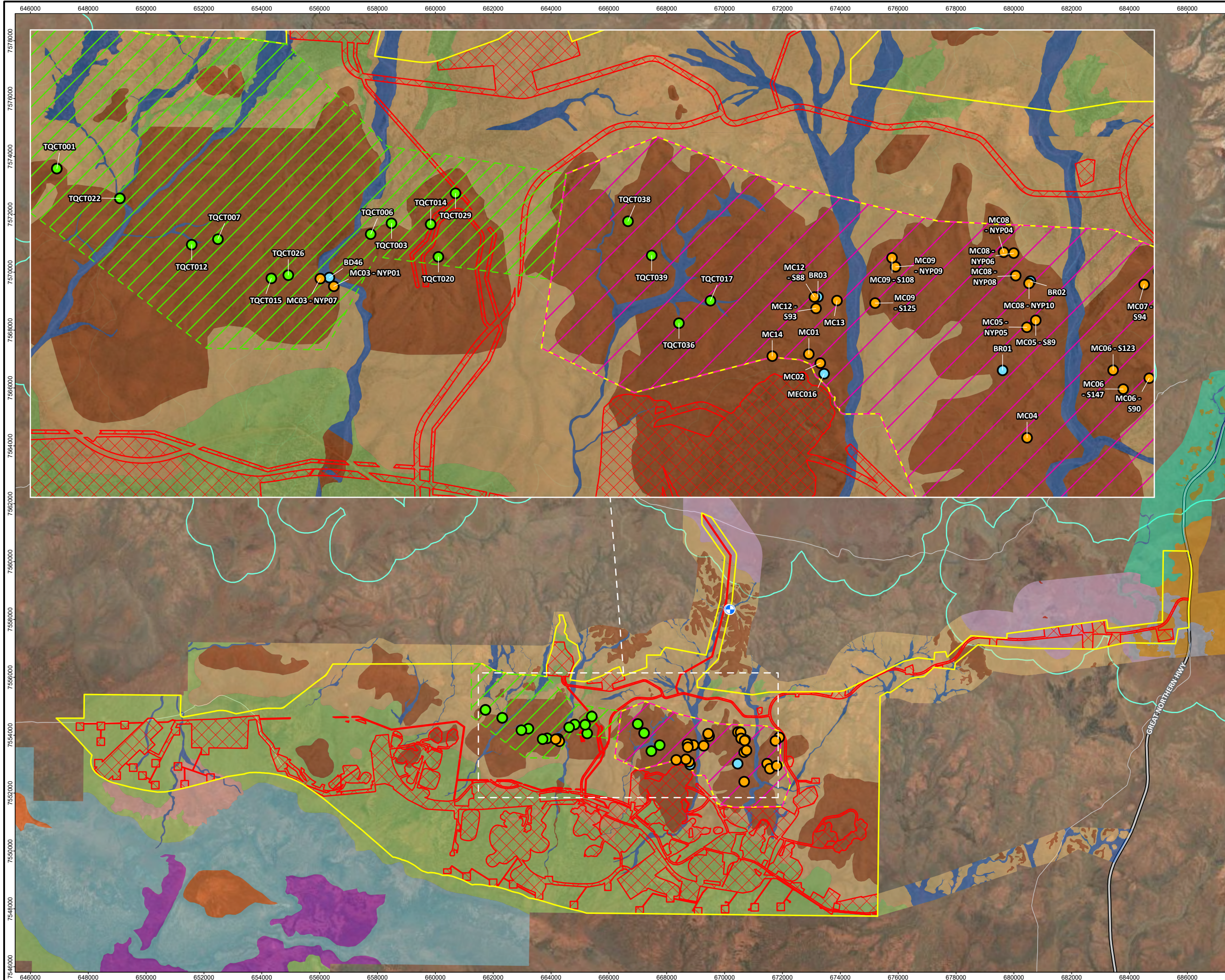
2.5.4.3 Temperature and Humidity Monitoring (during blasting activities)

During blasting activities there is the potential for vibrations to disturb a caves structural integrity, potentially leading to the development of new cracks or fractures. This could result in airflow changes which could change humidity levels. The Pilbara Leaf-nosed Bat requires a high humidity to ensure their skin remains hydrated and for optimum digestion and respiratory function. Monitoring the temperature and humidity levels would provide additional insight as to whether cracks or fractures are developing.

A summary of all proposed monitoring is provided in **Table 2-3**.

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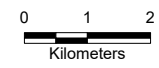


- Legend**
- Development Envelope
 - Indicative Footprint
 - Fauna Habitat Exclusion Zone (FHEZ)
 - FHEZ Corridor
 - Priority Ecological Communities (DBCAs)
 - Four plant assemblages of the Wona Landsystem (Priority 1)
 - Fauna habitat
 - Boulder Piles
 - Calcrete Stony Plain
 - Chenopod/ Cracking Clay
 - Floodplain
 - Claypan
 - Cracking Clay
 - Drainage Lines/Floodplains
 - Gibber Cracking Clay
 - Hilltops, Mesas & Outcrops
 - Mixed Eucalypt/ Mulga Floodplain
 - Mulga Woodland
 - Rocky Hills
 - Rocky Plains & Footslopes
 - Snakewood
 - Stony Spinifex Plains and Hillslopes
 - Cleared/Disturbed
 - Water feature
 - Water feature
 - Ongoing monitoring locations
 - Bat recorder; Bat ultrasonic acoustic recording unit
 - Camera Trap
 - Motion camera
 - Roads (LGATE-195)
 - Highway
 - Minor Road



Job No: 67751
 Client: Hancock Prospecting Pty Ltd
 Version: A Date: 10-Apr-2025
 Drawn By: droberts Checked By: VC

Scale 1:120,000 at A3



Coord. Sys. GDA2020 MGA Zone 50

**Mulga Downs Iron Ore Mine
 Central Pilbara, Western Australia**

**MONITORING LOCATIONS FOR
 NORTHERN QUOLL AND PILBARA
 LEAF-NOSED BAT**

FIGURE 2.2

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 Image Reference: World Imagery; Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community
 World Imagery: Earthstar Geographics

Conservation Significant Fauna Management Plan

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Table 2-3: Summary of Monitoring

Targeted Species / Element	Methodology	Minimum Monitoring Effort	Timing and Frequency
Northern Quoll	Trapping – motion cameras	Motion cameras: up to 4 cameras per sampling site, for a minimum of 38 nights	Annually between 1 April and 30 September
	Active searches for scats and other signs	At least 1km search effort per monitoring site	
	Remote cameras	Up to 4 cameras per sample location (e.g. putrescible waste bin locations, fauna friendly culverts, artificial light monitoring locations, mine pits)	
Pilbara Leaf-nosed Bat	Bat recorders	The recording period shall be set at night, from 30 minutes pre-sunset to 30 minutes post-sunrise. Recorders shall be placed in locations where bat species are likely to forage (as per the baseline monitoring sites). Recording shall take place for at least 38 nights.	Annually (preferably between November and March - however, they can be recorded year round with the right equipment and appropriately qualified zoologist)
Artificial light	Artificial Light Survey	The baseline survey will identify fauna monitoring locations where artificial lighting has the potential to affect local populations.	Baseline survey conducted following construction of long-term structures and infrastructure
	Cave light assessment	The baseline survey will assess impacts of lighting on caves. This data shall inform ongoing bat monitoring studies.	
Caves	Vibration monitoring	Vibration monitoring in caves identified as to be retained within the Development Envelope / Proposed Action Area and/or within 200 m from the disturbance boundary (within the FHEZ) and are viable for significant bat species usage. Vibration monitoring of all medium (MEC012; MEC016; MEC025; MEC033) and highly (MEC003 and MEC061) susceptible caves for each blast within 200 metres of each cave.	For each blast within 200m, pre, during and post blasting
	Temperature and humidity monitoring	A baseline study on the temperature and humidity levels in caves shall be performed at least 6 months prior to the commencement of blasting. Continuous monitoring from commencement of blasting within 200 m of medium susceptibility caves MEC012; MEC016; MEC025; MEC033 and for 6 months from the cessation of blasting. Continuous monitoring from commencement of blasting within 200 m of High susceptibility caves MEC003 and MEC061 and for 6 months from the cessation of blasting.	Continuous monitoring pre, during and post blasting activities within 200m of retained caves.

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3 Review and Reporting

3.1 Adaptive Management and Review

Review of learnings from the implementation of mitigation measures will be utilised for the development of adaptive management practices to meet environmental objectives more effectively. The need for adaptive management may be recognised in the following ways:

- Evaluation of assumptions and uncertainties of the conservation significant fauna management and monitoring program;
- Re-evaluation of the risk assessment and revision of risk-based priorities as a result of monitoring outcomes;
- Review of data and information gathered over the review period that has increased understanding of site environment in the context of the regional ecosystem;
- Review of management actions as the Proposal matures and new management measures and technologies become available that may be more effective for conservation significant fauna management;
- Assessment of changes which are outside the control of the Proposal and the management measures identified (i.e. a new project within the area or region; regional change affecting conservation significant fauna management); and
- Reaching a trigger or breaching a threshold.

Each adaptive management review will include:

- Review of the outcomes and objectives that this CSFMP addresses;
- Review of the implementation of the response and management actions and associated monitoring, recording and reporting requirements;
- Review of the response and management actions based on evaluation of:
 - Monitoring data and records;
 - Review of assumptions, uncertainties and understanding (e.g., of the ecological system);
 - Risk assessment; and
 - External changes (e.g., technical advances or innovation).

This CSFMP is to be reviewed by HPPL at the following intervals:

- Grant or modification to relevant approvals (including any proposed clearing within the FHEZ Corridor);
- When the need for adaptive management not covered in this CSFMP is recognised;
- When monitoring indicates a potential new or increased impact on conservation significant fauna;
- Findings or actions identified through monitoring, audits and incident reports;
- Confirmation of proposed monitoring sites with Traditional Owner representatives;
- Every second year from the commencement of construction until the achievement of rehabilitation completion criteria for construction disturbance, followed by five-yearly during operations; and

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- As and when directed by Chief Executive Officer, Department of Water and Environmental Regulation (DWER) and DCCEEW.

3.2 Reporting

3.2.1 Internal Reporting

Environmental incidents are to be reported within HanRoy's Incident Management System. In accordance with internal procedures the incident will be assessed by severity and relevant personnel will be notified and consulted if required to notify regulatory agencies. **Table 3-1** below outlines proposed internal and external reporting actions.

Table 3-1: Fauna Reporting Actions

Notification Event	Action	Responsibility	Timing
Trigger exceedance (and failure of management target)	Internal incident report and investigation	Environmental Advisor	Within 24 hours
Threshold exceedance	Internal incident report and investigation. External incident report to regulator	Environment Manager	Within 7 days of event
Injury or death of conservation significant fauna	Internal incident report and investigation	Environmental Advisor	Within 24 hours
Damage to conservation significant fauna habitat outside the approved footprint	Internal incident report and investigation	Environmental Advisor	Within 24 hours

3.2.2 Regulator Reporting

Incidents reportable to the DWER and DCCEEW will be in accordance with condition requirements.

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4 Abbreviations, Definitions & Acronyms

Abbreviation	Definition
BC Act	<i>Biodiversity Conservation Act 2016</i>
BNTAC	Banjima Native Title Aboriginal Corporation
CAMBA	China-Australia Migratory Bird Agreement
CD	Conservation Dependent
CE	Critically Endangered
CSFMP	Conservation Significant Fauna Management Plan
DBCA	Department of Biodiversity, Conservation and Attractions
DJTSI	Department of Jobs, Trade, Science and Innovation
DMIRS	Department of Mines, Industry Regulation and Safety
DPLH	Department of Planning, Lands and Heritage
DWER	Department of Water and Environmental Regulation
EN	Endangered
EMP	Environmental Management Plan
EPA	Environmental Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EP Act	<i>Environmental Protection Act 1986</i>
EX	Extinct
FHEZ	Fauna Habitat Exclusion Zone
GDP	Ground Disturbance Permit
ha	Hectare
HPPL	Hancock Prospecting Pty Ltd
IRP	Impact Reconciliation Procedure
km	Kilometre
MI	Migratory
MRWA	Main Roads Western Australia
Mtpa	Million tonnes per annum
OS	Other Special (protected fauna)
PEC	Priority Ecological Community
RiWI Act	<i>Rights in Water and Irrigation Act 1914</i>
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement
TBC	To be confirmed
VU	Vulnerable

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5 References

In-text Citation	Reference
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Biologic 2022	Biologic (2022) Mulga Downs Iron Ore Project: Transport Corridor to Great Northern Hwy Terrestrial Fauna Survey, Biologic Environmental Survey, Report to Strategen JBS&G, May 2022.
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Castalanelli et al. 2020	Castalanelli, M. A., Framenau, V. W., Huey, J. A., Hillyer, M. J., & Harvey, M. S. (2020) New species of the open-holed trapdoor spider genus <i>Aname</i> (Araneae: Mygalomorphae: Anamidae) from arid Western Australia. <i>The Journal of Arachnology</i> , 48(2): 169-213.
Coffey 2008	Coffey (2008) Level 2 terrestrial vertebrate fauna assessment for the Solomon Project.
Coffey 2010	Coffey (2010) Level 1 vertebrate fauna assessment - Solomon Rail Project.
Coffey 2011	Coffey (2011) Targeted surveys - Northern Quolls, mulgara and Pilbara Olive Pythons. Solomon Rail Project.
Commonwealth of Australia 2017	Commonwealth of Australia (2017) Pilbara Conservation Strategy
Crews 2013	Crews, S. C. (2013) Thirteen new species of the spider genus <i>Karaops</i> (Aranae: Selenopidae) from Western Australia. <i>Zootaxa</i> , 3647(3): 443-469.
DBCA 2011	DBCA (2011) Survey Guidelines for Australia's Threatened Reptiles
DBCA 2014	DBCA (2014) Pilbara Northern Quoll Project – surveying and monitoring <i>Dasyurus hallucatus</i> in the Pilbara, Western Australia
DBCA 2017a	DBCA (2017) Guidelines for surveys to detect the presence of bilbies and assess the importance of habitat in Western Australia.
DBCA 2017b	DBCA (2017) Interim guideline for preliminary surveys of night parrot (<i>Pezoporus occidentalis</i>) in Western Australia. DBCA.
DBCA 2018a	DBCA (2018a) Guidelines for pre-clearing searches to locate resident bilbies
DBCA 2018b	DBCA (2018b) Guidelines for relocation of bilbies prior to vegetation clearing
DCCEEW 2023a	DCCEEW (2023a) Recovery Plan Greater Bilby. Department of Climate Change Energy the Environment and Water.
DCCEEW 2023b	DCCEEW (2023b) National Light Pollution Guidelines for Wildlife
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DoEE (TSSC) 2008	DoEE (TSSC) (2008) Threatened Species Scientific Committee: Conservation Advice for <i>Liasis olivaceus barroni</i> (Olive Python- Pilbara subspecies) Canberra: Department of the Environment, Water, Heritage and the Arts.
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DoEE (TSSC) 2016b	DoEE (TSSC) (2016) Threatened Species Scientific Committee: Conservation Advice <i>Macroderma gigas</i> Ghost Bat. Canberra: Department of the Environment.
DoEE (TTSC) 2016c	DoEE (TTSC) (2016) Threatened Species Scientific Committee: Conservation Advice <i>Rhinonicteris aurantia</i> (Pilbara form) (Pilbara Leaf-nosed Bat). Canberra: Department of the Environment.
DoEE (TSSC) 2016d	DoEE (TSSC) (2016) Threatened Species Scientific Committee: Conservation Advice <i>Macrotis lagotis</i> Greater Bilby. Canberra: Department of the Environment.
DSEWPaC 2010	DSEWPaC (2010) Survey Guidelines for Australia's Threatened Bats
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ecologia 2009a	ecologia (2009a) Murray's Hill level 1 fauna survey.
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ecologia 2023	ecologia (2023) Desktop Risk Assessment for the Pilbara Leaf-Nosed Bat and Ghost Bat. Report prepared by ecologia Environment for JBS&G Australia Pty Ltd/Hancock Prospecting Pty Ltd. March 2023.
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Ecoscope 2010b	Ecoscope (2010b) Solomon Project - Rail realignment fauna assessment.
Ecoscope 2010c	Ecoscope (2010c) Vertebrate fauna and fauna habitat assessment for the Firetail Project.
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EPA 2020	EPA (2020) Technical Guidance: Terrestrial vertebrate fauna surveys for environmental impact assessment
EPA 2021	Environmental Protection Authority (2021) How to prepare Environmental Protection Act 1986 Part IV Environmental Management Plans, Instructions
Hill and Ward 2010	Hill and Ward (2010) National Recovery Plan for the Northern Quoll <i>Dasyurus hallucatus</i> . Department of Natural Resources, Environment, The Arts and Sport, Darwin
Raven 1994	Raven R. J. (1994). Mygalomorph spiders of the Barychelidae in Australia and the western Pacific. <i>Memoirs of the Queensland Museum</i> , 35: 291-706.
Spectrum 2023a	Spectrum (2023) Memo MDIOP Solar Farm, Haul Road & Pipeline Vertebrate & Short-Range Endemic Terrestrial Fauna Assessment.
Spectrum 2023b	Spectrum (2023b) Memo: Mulga Downs Iron Ore Mine, Targeted Grey Falcon Survey.
Spectrum 2024	Spectrum (2024) Mulga Downs Iron Ore Mine – Supplementary Targeted Fauna Survey
Terrestrial Ecosystems 2013	Terrestrial Ecosystems (2013) Level 2 fauna assessment for the Mulga Downs Project Area.

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Trainor <i>et al.</i> 2016	Trainor <i>et al.</i> (2016). New bird records from the Fortescue Marsh and nearby claypans, Pilbara bioregion, Western Australia.
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6 Appendices

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1. EPBC Terrestrial Fauna Risk Assessment

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Environment Consequence Severity Table

Environmental Factor	Level	Environment
Terrestrial Fauna	5-Severe	Permanent or irreversible widespread impact to land or water providing habitat for threatened flora or fauna species or mangrove community
	4-Major	Permanent or irreversible widespread impact to land or water that provide habitat or scheduled, listed, or declared rare and/or threatened species of flora or fauna (>5 individuals) OR >5 years recovery time) to land or water providing habitat for threatened flora or fauna species
	3-Moderate	>5 years recovery time to land or water that provides habitat for flora and fauna OR <3 months recovery time to land or water providing habitat for threatened flora or fauna species
	2-Minor	Localised impact, <24 hours recovery time to land or water providing habitat for threatened flora or fauna species
	1-Slight	Direct impact to fauna (excluding conservation significant, priority or threatened fauna species)

Risk Consequence and Likelihood Definitions

Consequence Ranking			Likelihood Ranking		
1	Slight	Limited damage to minimal area of low significance.	A	Almost Certain	The event is expected to occur in most circumstances (May occur multiple times within 12 months)
2	Minor	Minor effect on biology or physical environment.	B	Likely	The event will probably occur in many circumstances (May occur once per year)
3	Moderate	Moderate short-term effects but not affecting ecosystem.	C	Possible	The event is expected to occur at some time (May occur once in 5 years)
4	Major	Serious medium-term environmental effects.	D	Unlikely	The event could credibly occur at some future time (May occur once in 10 years)
5	Severe	Very serious long-term environmental impairment of ecosystems.	E	Rare	The event may occur only in exceptional circumstances (May occur once during Life of Mine)

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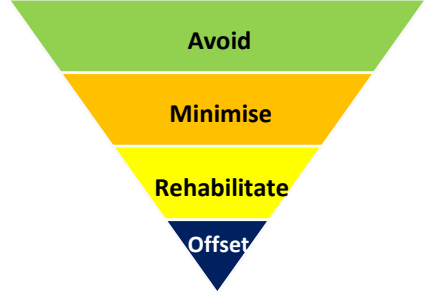
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Risk Assessment Categories

Risk Evaluation Matrix (5 x 5)			Likelihood Rating				
			RARE	UNLIKELY	POSSIBLE	LIKELY	ALMOST CERTAIN
Consequence / Impact		Factors	Residual Risk Rating (RRR)				
			5	7.5	15	20	30
Severity Level	5 – SEVERE	10	50*	75*	150	200	300
	4 – MAJOR	5	25*	37.5*	75	100	150
	3 – MODERATE	2	10	15	30	40	60
	2 – MINOR	1	5	7.5	15	20	30
	1 – SLIGHT	0.5	2.5	3.75	7.5	10	15

Hierarchy of Controls



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Management Plan Risk Assessment – Terrestrial Fauna

Management Objective	Inherent Risk	Management Actions	Residual Risk	Timeframe/Phase
Minimise incidental mortality or injury of conservation significant terrestrial fauna from clearing activities, vehicle strike or mining related activities resulting from the Proposal	Severe/Possible 150	<p>Implement induction and education programmes</p> <p>Promote driver awareness/training and implement appropriate speed limits</p> <p>Enforce strict traffic management rules (e.g. keeping to designated tracks, limiting driving at dusk and dawn, driving to road and weather conditions, reduced speed limits, signage of fauna along roads) to avoid accidental disturbance to fauna and habitat</p> <p>Record any injury or death of fauna to relevant agencies and as per internal processes</p>	Moderate/Unlikely 15	Construction, operation and closure
Minimise conservation significant terrestrial fauna population decline due to entrapment within mine infrastructure and equipment, as a result of the Proposal	Major/Likely 100	<p>Ensure egress points and/or fauna ladders are installed as appropriate in excavations and dams to avoid accidental death and/or entrapment of fauna</p> <p>Undertake inspections of water infrastructure to ensure integrity of fauna egress points and fencing</p> <p>Ensure all open holes, including drill holes, are covered or capped during construction and operation; or are rehabilitated when they are no longer required</p> <p>Ensure all domestic waste facilities are fenced and putrescible wastes are covered</p> <p>Ensure all containers doors closed are securely when not in use</p>	Moderate/Possible 30	Design, construction, operation and closure
Minimise clearing required for the Proposal, which results in conservation significant terrestrial fauna habitat loss and fragmentation	Moderate/Likely 40	<p>Implement induction and education programmes</p> <p>Design measures to avoid the clearing of terrestrial fauna habitat, including locating infrastructure in existing disturbed areas</p> <p>Require site layout designed to reduce habitat fragmentation and provide corridors allowing fauna to move through the landscape on all sides of development</p> <p>Avoid or minimise disturbance to terrestrial fauna habitat, in particular critical and important habitat such as Pilbara Leaf-nosed bat roosts, claypan habitat features, rocky hills areas</p> <p>Establishment of the fauna habitat exclusion zone</p> <p>Implementation of internal clearing permit procedure to avoid unauthorised clearing (procedure to include flagging of clearing areas by surveyors, supervision of clearing by a suitably qualified environmental professional, reporting of over-clearing)</p> <p>Vehicles and machinery limited to designated access tracks</p>	Minor/Unlikely 7.5	Design, construction, operation and closure

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Management Objective	Inherent Risk	Management Actions	Residual Risk	Timeframe/Phase
		<p>Progressive land clearing to be undertaken to minimise the amount of active disturbance at any one time</p> <p>Progressive rehabilitation to be undertaken in accordance with the Mine Closure Plan</p> <p>Undertake direct placement of topsoil and vegetation respreading over rehabilitated areas</p>		
Minimise decline in significant fauna habitat condition or composition due to altered fire regimes and dust emissions from the Proposal	Moderate/Likely 40	<p>Implement induction and education programmes</p> <p>All activities to be conducted in accordance with relevant legislation and regulations</p> <p>Vehicle speed limits to be enforced to reduce dust emissions</p> <p>Undertake dust suppression on all active roads to reduce dust emissions</p> <p>Ensure all processing equipment is appropriately sealed or has appropriate dust emission reduction facilities</p> <p>Implement a dust monitoring program in areas containing conservation significant fauna habitat</p> <p>Undertake maintenance of fire breaks and implement fire management procedures (e.g. Hot Work Permit system, firefighting training, Emergency Response Plan) to avoid increases in fire frequency</p> <p>Enforce strict traffic management rules (e.g. keeping to designated tracks) to reduce the dust/light/vibration emissions</p> <p>Fire control equipment to be present and available on site and in all vehicles</p> <p>HPPL will work with DFES and DBCA to undertake prescribed burns if deemed necessary</p>	Slight/Possible 7.5	Design, construction, operation and closure
Minimise disturbance to native fauna from noise, vibration and lighting during Proposal implementation	Moderate/Likely 40	<p>Implement induction and education programmes</p> <p>All activities to be conducted in accordance with relevant legislation and regulations</p> <p>Ensure all lights are strategically placed and designed to shine towards plant operations and minimise light spill to the surrounding environment.</p> <p>Potential mitigation measures (e.g. sound absorption devises) will be considered when selecting noise and vibration equipment</p> <p>Inspections and maintenance of equipment and machinery to reduce noise emissions</p>	Minor/Unlikely 7.5	Design, construction, operation and closure

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Management Objective	Inherent Risk	Management Actions	Residual Risk	Timeframe/Phase
Minimise decline in conservation significant fauna populations and habitat due to predation from introduced fauna and the introduction of pest species (including weeds) resulting from the Proposal	Moderate/Possible 30	<p>Implement induction and education programmes</p> <p>Ensure appropriate fencing is constructed where required</p> <p>Implement domestic waste management procedures (e.g. fencing of landfills, covering putrescible waste, secure lids on bins, designed to avoid ponding water) to avoid attraction of both feral and native species to the Project area</p> <p>Undertake pest animal control on site in cooperation with regional control programs where appropriate</p> <p>Implement vehicle hygiene management procedures and requirements for all new vehicles and equipment to be certified clean and weed-free prior to mobilisation to site</p> <p>Enforce strict traffic management rules (e.g. keeping to designated tracks) to reduce the introduction and spread of weeds. Vehicles are not permitted to leave access tracks or cleared areas to reduce the spread of weeds.</p> <p>Weed monitoring</p> <p>Undertake progressive land clearing minimising the amount of active disturbance present at any one time to reduce the opportunity for weeds to become established.</p> <p>Undertake progressive rehabilitation in accordance with a Mine Closure Plan to reduce the opportunity for weeds to become established</p>	Slight/Possible 7.5	Design, construction, operation and closure
Minimise decline in conservation significant fauna populations due to water use and/or altered surface water flows	Major/Possible 7	<p>Implement induction and education programmes</p> <p>Re-establishment of existing drainage lines upstream and downstream of development</p> <p>Construction and installation of appropriate surface water diversion structures</p> <p>TDS testing to ensure saline water use does not exceed >5000 mg/L</p>	Minor/Unlikely 7.5	Design, construction, operation and closure

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2. Category 4 Caves Location

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Site Name	Cave_ID	Location	Long (DD)	Lat (DD)	Long (DMS)	Lat (DMS)	Cave to be retained
MEC001	MEC001	Inside Fauna Exclusion Zone	118.655343967999997	-22.11204001	118° 39' 19.24" E	22° 6' 43.34" S	Yes
MEC002	MEC002	Inside Fauna Exclusion Zone	118.641419029000005	-22.11353098	118° 38' 29.11" E	22° 6' 48.71" S	Yes
MEC004	MEC004	Inside Fauna Exclusion Zone	118.654911964999997	-22.11134196	118° 39' 17.68" E	22° 6' 40.83" S	Yes
MEC006	MEC006	Inside Fauna Exclusion Zone	118.654707028000004	-22.11628603	118° 39' 16.95" E	22° 6' 58.63" S	Yes
MEC007	MEC007	Inside Fauna Exclusion Zone	118.635806004000003	-22.11460403	118° 38' 8.90" E	22° 6' 52.57" S	Yes
MEC008	MEC008	Inside Fauna Exclusion Zone	118.637537034000005	-22.12123697	118° 38' 15.13" E	22° 7' 16.45" S	Yes
MEC009	MEC009	Inside Fauna Exclusion Zone	118.634336990999998	-22.11837002	118° 38' 3.61" E	22° 7' 6.13" S	Yes
MEC010	MEC010	Inside Fauna Exclusion Zone	118.634897992000006	-22.11833096	118° 38' 5.63" E	22° 7' 5.99" S	Yes
MEC012	MEC012	Inside Fauna Exclusion Zone	118.636256028000005	-22.119934	118° 38' 10.52" E	22° 7' 11.76" S	Yes
MEC015	MEC015	Inside Proposed FEZ Corridor	118.591246967999993	-22.10816002	118° 35' 28.49" E	22° 6' 29.38" S	Yes
MEC016	MEC016	Inside Fauna Exclusion Zone	118.636564985000007	-22.11979	118° 38' 11.63" E	22° 7' 11.24" S	Yes
MEC017	MEC017	Inside Proposed FEZ Corridor	118.590823010999998	-22.11147398	118° 35' 26.96" E	22° 6' 41.31" S	Yes
MEC018	MEC018	Inside Proposed FEZ Corridor	118.587107983999999	-22.11254401	118° 35' 13.59" E	22° 6' 45.16" S	Yes
MEC022	MEC022	Inside Proposed FEZ Corridor	118.592631994000001	-22.11324901	118° 35' 33.48" E	22° 6' 47.70" S	Yes
MEC025	MEC025	Inside Fauna Exclusion Zone	118.635278028000002	-22.11867697	118° 38' 7.00" E	22° 7' 7.24" S	Yes
MEC027	MEC027	Inside Fauna Exclusion Zone	118.633321021000000	-22.11804103	118° 37' 59.96" E	22° 7' 4.95" S	Yes
MEC030	MEC030	Inside Fauna Exclusion Zone	118.632688019000000	-22.11827698	118° 37' 57.68" E	22° 7' 5.80" S	Yes
MEC031	MEC031	Inside Fauna Exclusion Zone	118.635058002999997	-22.11635903	118° 38' 6.21" E	22° 6' 58.89" S	Yes
MEC033	MEC033	Inside Fauna Exclusion Zone	118.635883032999999	-22.11442298	118° 38' 9.18" E	22° 6' 51.92" S	Yes
MEC034	MEC034	Inside Fauna Exclusion Zone	118.626406033999999	-22.11453002	118° 37' 35.06" E	22° 6' 52.31" S	Yes
MEC035	MEC035	Inside Fauna Exclusion Zone	118.626392037000002	-22.11392099	118° 37' 35.01" E	22° 6' 50.12" S	Yes
MEC036	MEC036	Inside Proposed Action Area & inside disturbance footprint	118.635942041999996	-22.12532901	118° 38' 9.39" E	22° 7' 31.18" S	no
MEC037	MEC037	Inside Proposed Action Area & inside disturbance footprint	118.635540968000001	-22.12463097	118° 38' 7.95" E	22° 7' 28.67" S	no
MEC038	MEC038	Inside Proposed Action Area & outside disturbance footprint	118.636852986999997	-22.12495199	118° 38' 12.67" E	22° 7' 29.83" S	no
MEC039	MEC039	Inside Fauna Exclusion Zone	118.638052017999996	-22.12241798	118° 38' 16.99" E	22° 7' 20.70" S	Yes
MEC041	MEC041	Inside Proposed Action Area & inside disturbance footprint	118.636211016999994	-22.12543102	118° 38' 10.36" E	22° 7' 31.55" S	no

Site Name	Cave_ID	Location	Long (DD)	Lat (DD)	Long (DMS)	Lat (DMS)	Cave to be retained
MEC042	MEC042	Inside Proposed Action Area & inside disturbance footprint	118.636057964000003	-22.12536396	118° 38' 9.81" E	22° 7' 31.31" S	no
MEC044	MEC044	Inside Fauna Exclusion Zone	118.655516970999997	-22.11199902	118° 39' 19.86" E	22° 6' 43.20" S	Yes
MEC045	MEC045	Inside Fauna Exclusion Zone	118.657135013000001	-22.11867202	118° 39' 25.69" E	22° 7' 7.22" S	Yes
MEC046	MEC046	Inside Fauna Exclusion Zone	118.642255961999993	-22.11434403	118° 38' 32.12" E	22° 6' 51.64" S	Yes
MEC048	MEC048	Inside Proposed Action Area & outside disturbance footprint	118.635145007000006	-22.12726297	118° 38' 6.52" E	22° 7' 38.15" S	no
MEC049	MEC049	Inside Fauna Exclusion Zone	118.642179016000000	-22.11044703	118° 38' 31.84" E	22° 6' 37.61" S	Yes
MEC052	MEC052	Inside Fauna Exclusion Zone	118.651262986999996	-22.11639399	118° 39' 4.55" E	22° 6' 59.02" S	Yes
MEC054	MEC054	Inside Fauna Exclusion Zone	118.655394930000000	-22.11193842	118° 39' 19.42" E	22° 6' 42.98" S	Yes
MEC055	MEC055	Inside Fauna Exclusion Zone	118.655562149000005	-22.11192694	118° 39' 20.02" E	22° 6' 42.94" S	Yes
MEC056	MEC056	Inside Fauna Exclusion Zone	118.655936401000005	-22.11182719	118° 39' 21.37" E	22° 6' 42.58" S	Yes
MEC062	MEC062	Inside Fauna Exclusion Zone	118.636691384000002	-22.11129544	118° 38' 12.09" E	22° 6' 40.66" S	Yes
MEC063	MEC063	Inside Fauna Exclusion Zone	118.636712758000002	-22.11072765	118° 38' 12.17" E	22° 6' 38.62" S	Yes
MEC065	MEC065	Inside Fauna Exclusion Zone	118.634948451000000	-22.11451208	118° 38' 5.81" E	22° 6' 52.24" S	Yes
MEC066	MEC066	Inside Fauna Exclusion Zone	118.635008717000005	-22.1168684	118° 38' 6.03" E	22° 7' 0.73" S	Yes
MEC068	MEC068	Inside Fauna Exclusion Zone	118.634137167000006	-22.11751917	118° 38' 2.89" E	22° 7' 3.07" S	Yes
MEC069	MEC069	Inside Fauna Exclusion Zone	118.634463893000003	-22.11753367	118° 38' 4.07" E	22° 7' 3.12" S	Yes
MEC070	MEC070	Inside Fauna Exclusion Zone	118.634743345999993	-22.1184162	118° 38' 5.08" E	22° 7' 6.30" S	Yes
MEC073	MEC073	Inside Fauna Exclusion Zone	118.637894019000001	-22.12187399	118° 38' 16.42" E	22° 7' 18.75" S	Yes
MEC074	MEC074	Inside Fauna Exclusion Zone	118.638453428000005	-22.12287747	118° 38' 18.43" E	22° 7' 22.36" S	Yes
MEC075	MEC075	Inside Proposed Action Area & outside disturbance footprint	118.597452489999995	-22.11372802	118° 35' 50.83" E	22° 6' 49.42" S	no
MEC076	MEC076	Inside Proposed FEZ Corridor	118.601986784000005	-22.11062514	118° 36' 7.15" E	22° 6' 38.25" S	Yes
MEC079	MEC079	Inside Proposed Action Area & inside disturbance footprint	118.635238548999993	-22.12419502	118° 38' 6.86" E	22° 7' 27.10" S	no
MEC080	MEC080	Inside Proposed Action Area & outside disturbance footprint	118.636072967000004	-22.12629503	118° 38' 9.86" E	22° 7' 34.66" S	no
MEC082	MEC082	Inside Fauna Exclusion Zone	118.642912013000000	-22.11495004	118° 38' 34.48" E	22° 6' 53.82" S	Yes
MEC024	MEC024	Inside Proposed FEZ Corridor	118.591030966000005	-22.11074802	118° 35' 27.71" E	22° 6' 38.69" S	Yes