APPENDIX C Significant Species Management Plan

Telfer - Havieron Gold Mine Project

Significant Species Management Plan

REVISION HISTORY TRACKING RECORD

Item	Page	Section	Comments

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 _____/_____/_____

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ABBREVIATIONS

Abbreviation	Full Description
BC Act	*Biodiversity Conservation Act 2016*
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DBCA	Department of Biodiversity, Conservation and Attractions
DMIRS	Department of Mines, Industry Regulations and Safety
EPA	Environmental Protection Authority
EP Act	*Environmental Protection Act 1986*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
Greatland	Greatland Pty Ltd
IUCN	International Union for Conservation of Nature
Newcrest	Newcrest Operations Limited
SSMP	Significant Species Management Plan
SOP	Standard Operating Procedure

EXECUTIVE SUMMARY

This Significant Species Management Plan (SSMP) is prepared for the Telfer - Havieron Gold Mine Project to develop and operate the Telfer and Havieron Mine and associated infrastructure, including an infrastructure corridor linking the Telfer and Havieron mines. Table ES1 presents the environmental objectives to be met through implementation of this SSMP.

TABLE ES1: PURPOSE OF THE SSMP

Proposal name	Telfer – Havieron Gold Mine Project
Proponent name	Newcrest Operations Limited (Newcrest)
Ministerial Statement / Approval	[New Ministerial Statement No.] EPBC assessment 2021/9085
Purpose of the EMP	Provide monitoring and management actions for potential impacts on conservation significant species within the Development Envelope and surrounds
Key environmental factor/s, outcome/s and objective/s	Terrestrial Fauna "To protect terrestrial fauna so that biological diversity and ecological integrity are maintained" To avoid or minimise the potential environmental effect of the Projects to significant fauna, including: • Greater Bilby (*Macrotis lagotis*) • Night Parrot (*Pezoporus occidentalis*); • Brush-tailed Mulgara (*Dasycercus blythi*); • Northern Marsupial Mole (*Notoryctes caurinus*); • Great Desert Skink (*Liopholis kintorei*); and • Migratory birds – Red Knot (*Calidris canutus*), Wood Sandpiper (*Tringa glareola*), Common Sandpiper (*Actitis hypoleucos*), Sharp-tailed Sandpiper (*Calidris acuminata*), Gull-billed Tern (*Gelochelidon nilotica*). The following outcomes and objectives for fauna have been established: • Clearing of no more than 1,266 ha of fauna habitat within the Development Envelope • No removal of active Bilby burrows within the Development Envelope • No impacts to Night Parrot nesting sites within the Development Envelope • Avoid, or otherwise minimize clearing and indirect impacts to Primary Greater Bilby and Night Parrot habitat within the Development Envelope • No significant impact to significant fauna or habitat within the Development Envelope Flora and Vegetation "To protect flora and vegetation so that biological diversity and ecological integrity are maintained" To avoid potential environmental effect of the Projects to significant flora and vegetation types. The following outcomes and objectives for flora and vegetation have been established:

	• Clearing of no more than 1,266 ha of vegetation within the Development Envelope • Clearing of no more than 21.56% of *Goodenia hartiana* local records • No significant adverse indirect impacts to significant flora and vegetation within the Development Envelope
Condition Clauses (if applicable)	Not currently applicable
Key components in the EMP (if applicable)	Not applicable – refer to Appendix A
Proposed construction and operation dates	Havieron Construction expected to commence in 2023. Underground mine development is expected to commence early 2024.
EMP required pre-construction?	Yes

This SSMP is designed to be adaptive and will be updated over the life of the Projects (approximately 17 years) as required to be consistent with any new findings on the species in the local, regional and state-wide context, and in consultation with the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW), State Environmental Protection Authority (EPA), State Department of Water and Environmental Regulation (DWER), State Department of Biodiversity, Conservation and Attractions (DBCA) and the State Department of Mines, Industry Regulation and Safety (DMIRS).

1. CONTEXT, SCOPE AND RATIONALE

1.1 Background

1.1.1 Telfer Project

The Telfer Gold Mine (Telfer Project) is an open pit and underground gold-copper mine with ore processing facilities. The Telfer Project is owned and operated by Newcrest Mining Limited, a subsidiary of Newcrest Operations Limited (Newcrest) in the East Pilbara Shire and is located 400 km south-east of Port Hedland (Figure 1-1).

The Telfer Project was constructed in 1975 and placed on care and maintenance in 2000, then operations recommenced in 2002. The Minister for the Environment published Ministerial Statements No. 605 and 606 (MS605 and MS606) in October 2002, with No. 650 (MS650) published in 2004, as an additional condition to MS605. The Telfer Project was referred under the EPBC Act in 2002 and assessed as Not a Controlled Action.

Telfer's MS606 covers the expansion of mining at the Telfer Gold Mine to include the mining and processing of 400 million tonnes of gold ore at a rate of up to 23 million tonnes per annum, and the transport of copper concentrate to Port Hedland by road. Key components of the expansion included (EPA, 2002):

- Expansion of existing underground mining areas and deepening of the existing open pits;
- Extensions to the existing southern WRL and several other dumps;
- Construction of a new TSF;
- Construction of a new ore processing plant and associated infrastructure;
- Expansion of the capacity of water supply borefields;
- Upgrading of the existing accommodation village to accommodate 650 people; and
- Transport of copper concentrate to Port Hedland via road.

Telfer's energy requirements are generated on-site from two power stations. Natural gas is transferred via a 440 km gas pipeline within the Port Hedland–Telfer Infrastructure Corridor for use in the Primary Power Station (approved under MS605).

1.1.2 Havieron Project

The Havieron Underground Mine Project (Havieron Project) is a greenfield gold-copper deposit operated by Newcrest under a farm-in agreement with Greatland Pty Ltd (Greatland). The Havieron Project is located in the East Pilbara Shire and the Paterson Province of Western Australia, and is approximately 45 km east of the Telfer Project and 450 km east south-east from the town of Port Hedland within the Martu People and Ngurrara Native Title Determination area (Figure 1-1).

Newcrest is submitting the proposed underground mine for environmental assessment under Part IV of the Western Australian *Environmental Protection Act 1986* (EP Act) and the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Newcrest seeks approval of Stage 2 of the Havieron Project, which includes the development of the underground mine and associated infrastructure:

- Development of an underground mine below 420 mbgl below the Permian Cover;
- Operation of an underground mine and associated infrastructure;
- Construction and operation of a 50 km infrastructure corridor from Havieron Project to Telfer Project for the transport of ore, water, electricity, borrow material, tailings for paste fill and site access;
- Continued abstraction of up to 2 GL per year of groundwater; and
- Expansion of associated infrastructure.

The infrastructure corridor may comprise:

- An unsealed road with stopping bays;
- Crossing controls at the intersection with the Punmu Road;
- A 66 kV transmission line from the Telfer power station to Havieron;
- A HDPE pipeline carrying water from Telfer to Havieron; and
- Borrow pits, topsoil stockpiles and drainage works.
- Water bores and refilling stations

Havieron underground mining will be undertaken at a rate of 2-4 Mt of ore per annum with an anticipated Life of Mine (LoM) of 12 years. The mining methodology to be used is Sub-Level Open Stoping (SLOS). Ore will be transported to the Telfer Project via road trains along the infrastructure corridor. Transport will occur 24 hours a day with approximate 40 return trips on a daily basis.

Mined areas in the underground operations will require backfill to provide structural support. The preferred backfill method for mined areas is paste fill utilising mine tailings from Telfer Project Tailings Storage Facilities (TSFs).

Water supply for the Havieron mine site to either be supplied from the Telfer Project or a portion to be obtained at the site via production bores. Abstraction is expected to occur from the Staggers Borefield, to minimise impacts from TSF7 groundwater mounding.

Processing of Havieron ore and discharge of tailings is expected to occur at a rate of 2-4 Mt per annum over 12 years at the Telfer Project.

1.2 The Proposal

The Proposal referred to the EPA consists of the development and operation of the Telfer – Havieron Project (the Projects) and associated infrastructure, including an infrastructure corridor between the Havieron Project and the Telfer Project. Havieron Project ore processing and tailings disposal will occur at the Telfer Project, which will also supply electricity, tailings for paste fill, water and waste rock material for construction.

The Telfer Project has already been assessed and is approved under MS 605 and MS606. Stage 2 of the Havieron Project was referred under s38 of the EPA on 13 October 2021, however advice was received from EPA Services that the Havieron Project should be instead referred as a significant amendment to the Telfer Project.

The Proposal referred to the DCCEEW consists of the development and operation of the Havieron Project and associated infrastructure, including the infrastructure corridor. The Telfer Project is excluded from the DCCEEW assessment.

A summary of the combined Project is provided in Table 1-1 and the key characteristics are provided in Table 1-2. Figure 1-1 (Havieron mine site), Figure 1-2 (infrastructure corridor) and Figure 1-3 (Telfer) show an indicative layout and the location of the proposed Development Envelope.

Table 1-1: Summary of the Proposal

Summary of Proposal	
Proposal Title	Telfer - Havieron Gold Mine Proposal
Proponent Name	Newcrest Operations Limited
Short Description	The Proposal includes: • The mining and processing of ore at the Telfer Gold Mine located 400 km south-east of Port Hedland in the Shire of East Pilbara region of Western Australia, with associated facilities including a 160 MW natural gas-fired power station. • A 440 km-long natural gas pipeline corridor from Port Hedland to the Telfer Gold Mine. • The underground mining of ore at the Havieron Gold Mine located 55 km east of Telfer, and the transport of ore and other materials between Havieron and Telfer, including waste rock materials for the progressive backfilling of the Havieron Gold Mine. The realignment and upgrading of the Infrastructure Corridor between Telfer and Havieron.

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122°37'0"E 122°38'0"E 122°39'0"E 122°40'0"E 122°41'0"E

21°42'0"S 21°43'0"S 21°44'0"S

Landfill (Initial)
Irrigation Area
Camp
Core Shed
Topsoil Stockpile
Emulsion Storage
Explosives Magazine
Paste Plant
Topsoil Stockpile
Evaporation Pond
Raw Water Pond
Evaporation Pond
ROM Pad
Boxcut
Batch Plant
Administration Area
Laydown
Raw Water Pond
Topsoil Stockpile
Waste Rock Landform (Stage 1)
Waste Rock Landform (Stage 2, Incorporating Primary Landfill)

Data source: Imagery - ESRI, 2021.

LEGEND

- Development Envelope
- Indicative Footprint (Stage 1)
- Indicative Footprint (Stage 2)

Current Roads

- Regional Roads and Tracks
- Major Centres

Mines

Classification

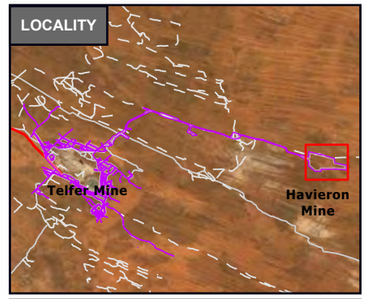
- Mine & Fuel Sites
- Conservation
- Rock_Landforms

Water Courses

Type

- Major River
- Minor River
- Estuarine
- Inundation Area
- Paleo-Drainage Line
- Infrastructure

LOCALITY



0 10 20 30 40 50 Kilometers

DEVELOPMENT ENVELOPE and INDICATIVE FOOTPRINT

Havieron Project

Significant Species Management Plan

N

0 200 400 600 800 1,000 Metres

Coordinate System: GCS GDA 1994, Datum: GDA 1994
Scale @ A3: 1:25,000

Prepared:	N Johnston	Date:	13/07/2022
Reviewed:	G Barrett	Revision:	B
Project:	TE21074		

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Figure 1.1

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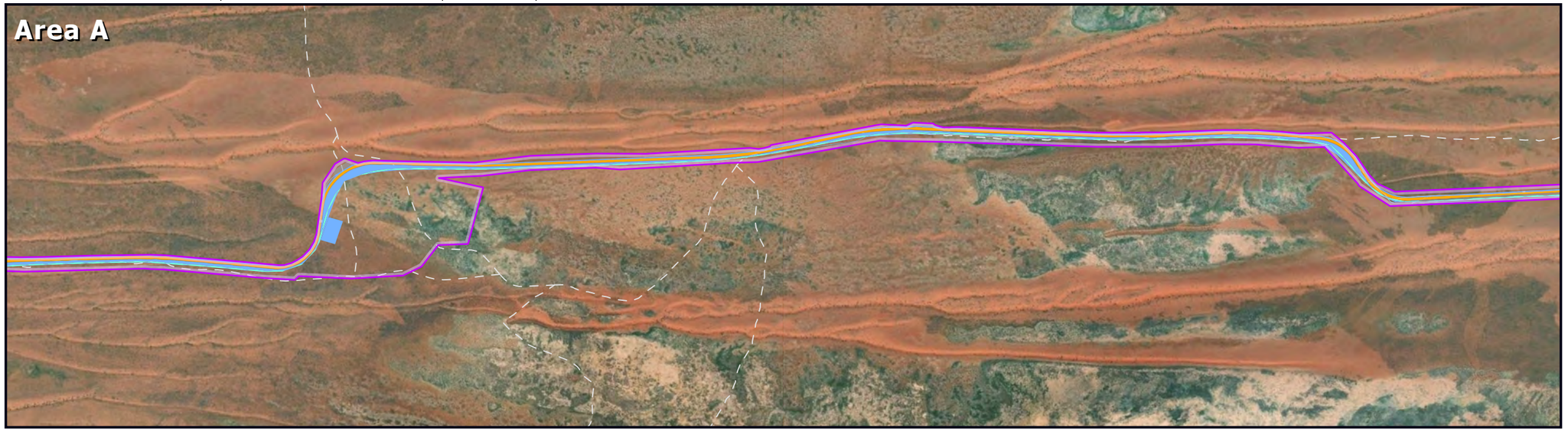
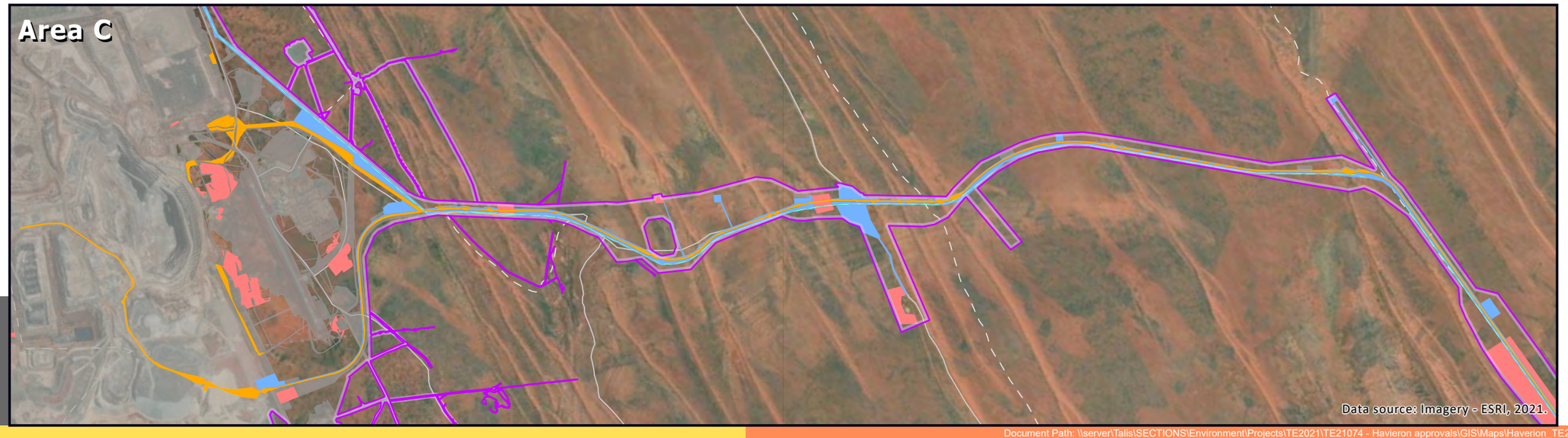


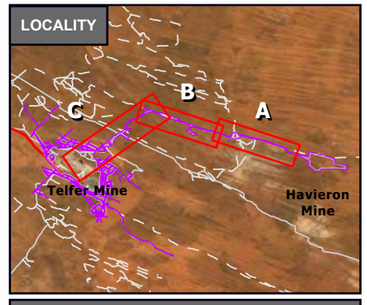


LEGEND

- Development Envelope
- Indicative Footprint (Stage 1)

Indicative Footprint (Stage 2)

- Borrow Pits
- Construction Area
- Haul Road
- Powerline
- Other Disturbance / Telfer



DEVELOPMENT ENVELOPE and INDICATIVE FOOTPRINT

Havieron Infrastructure Corridor
Havieron Project

Significant Species Management Plan

N
Meters
0 500 1,000 1,500 2,000

Coordinate System: GCS GDA 1994, Datum: GDA 1994
Scale @ A3: 1:1,200,000

Prepared:	N Johnston	Date:	13/07/2022
Reviewed:	G Barrett	Revision:	B
Project:	TE21074		

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Figure 1.2

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21°41'0"S 21°42'0"S 21°43'0"S 21°44'0"S 21°45'0"S 21°46'0"S 21°47'0"S 21°48'0"S 21°49'0"S

Data source: Imagery - ESRI, 2021.

LEGEND

- Development Envelope
- Indicative Footprint (Stage 1)
- Indicative Footprint (Stage 2)
- Telfer Previous Disturbance

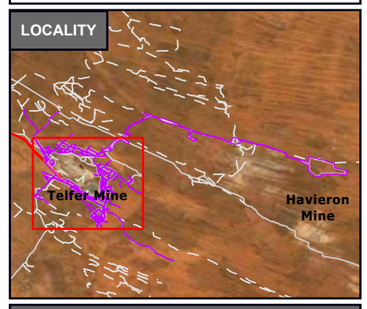
Pipelines

- Gas

Current Roads

- Minor Road
- Regional Roads and Tracks

LOCALITY



Kilometers
0 10 20 30 40 50

DEVELOPMENT ENVELOPE and INDICATIVE FOOTPRINT

Telfer Project

Significant Species Management Plan

N

Metres
0 500 1,000 1,500 2,000

Coordinate System: GCS GDA 1994, Datum: GDA 1994
Scale @ A3: 1:65,000

Prepared:	N Johnston	Date:	13/07/2022
Reviewed:	G Barrett	Revision:	B
Project:	TE21074		

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Figure 1.3

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Table 1-2: Location and Proposed Extent of Physical and Operational Elements

Element	Location	Existing Approval (Telfer under Ministerial Statement 606)	Proposed Change (this Proposal)	Proposed Extent
Physical Elements				
Havieron Mine including: • Box cut and decline; • Waste rock landforms; • Topsoil stockpiles; • Haul and access roads; and • Supporting infrastructure.	Figure 1-1	Not applicable (N/A)	N/A	Clearing of no more than 1,266 ha of native vegetation and use of up to 5,033 ha of existing disturbance and previously approved areas, resulting in a 6,299 ha Indicative Footprint within a 9,176 ha Development Envelope (DE).
Havieron Infrastructure corridor including: • Haul road; • Power and water corridor; and • Borrow pits.	Figure 1-2			
Telfer Mine including: • Open pits; • Underground mines; • Waste rock landforms; • Haul and access roads; and • Supporting infrastructure.	Figure 1-3	Total land disturbance area of 4,921 ha, which includes the original Telfer Gold Mine land disturbance of 2,278.23 ha.	Addition of 12 ha of clearing of native vegetation and 421 ha of existing disturbance. Inclusion of a 9,176 ha Development Envelope	
Telfer Processing Plant including: • Processing Plant; • Heap Leach Facilities; • Tailings Storage Facilities; • Concentrate transport and storage; and • Supporting infrastructure.	Figure 1-3			
Operational Elements				
Mining	Figure 1-1 Figure 1-3	Conventional truck and shovel open pit mining techniques in the Main Dome and West Dome pits. Sublevel caving operations in the Telfer Deeps Ore Zone below the Main Dome pit. Options for materials handling from the underground to the	Inclusion of 29 million tonnes of Telfer ore per year. Addition of 3 million tonnes of Havieron Project ore per year.	Up to 32 million tonnes of ore per year

Element	Location	Existing Approval (Telfer under Ministerial Statement 606)	Proposed Change (this Proposal)	Proposed Extent
		surface include a conveyor incline or haulage shaft.		
Groundwater abstraction for water supply and mine dewatering	Figure 1-1 Figure 1-3	Water supply limit of 29,700 ML/year	Additional abstraction of no more than 3,000 ML per year (Havieron Project)	Abstraction up to 32,700 ML/year
Waste rock landform volume	Figure 1-1 Figure 1-3	Up to approximately 90 million tonnes per annum. Two waste dump extensions will be developed to contain approximately 1,562 Mt of waste material.	Addition of up to 500,000 tonnes of Havieron Project waste rock per annum	Up to 92 million tonnes per annum
Processing of ore	Figure 1-3	Up to 29 million tonnes per annum of ore (including dump leach ore) Processing throughput up to 26 million tonnes per annum. Existing dump leach facilities will be used to treat low grade oxide ore. Waste dump leach facilities will be expanded to include Dump Leach 10 for processing of low grade ores.	Clarification of dump leach ore processed – addition of 9 million tonnes per annum.	Up to 38 million tonnes per annum of ore (including dump leach ore)
Discharge of tailings	Figure 1-3	Tailings storage facilities constructed to contain 550 Mt of tailings (Figure 6).	No change	Tailings storage facilities constructed to contain 550 Mt of tailings
Greenhouse Gas Emissions				
Operations				
Scope 1	Not applicable	800,000 tonnes CO2-e/annum	Decrease of 335,215 tonnes CO2-e/annum	Up to 464,785 tonnes CO2-e/annum
Rehabilitation				
Areas temporarily cleared for Infrastructure Corridor construction (borrow pits, laydown areas and powerline construction corridors) will be rehabilitated following construction. Final closure and rehabilitation within ten years of cessation of operations				
Commissioning				
There are no environmental impacts specific to commissioning.				

Element	Location	Existing Approval (Telfer under Ministerial Statement 606)	Proposed Change (this Proposal)	Proposed Extent
Decommissioning				
Removal of all above surface infrastructure within five years of cessation of operations.				
Timing elements				
Proposal time	Maximum Project Life	Up to 25 years	Addition of 18 years	Up to 2045
	Operations Phase	Not applicable	Addition of eight years	Up to 2035
	Decommissioning and Closure Phase	Not applicable	Addition of ten years	Up to 2045

1.3 Scope

The scope of this SSMP is for the life of the Projects and is applicable to the Havieron and Telfer Projects. Exploration activities, the Port Hedland concentrate shed, the Telfer Access Road and Telfer gas pipeline (MS605 and MS650) are excluded from this SSMP.

As a result of baseline surveys, significant species have been recorded or are considered likely to occur at the Projects. Significant flora, fauna and vegetation types considered are listed under the *Biodiversity Conservation Act 2016* (BC Act), EPBC Act or on the Department of Biodiversity, Conservation and Attractions (DBCA) Priority list. The purpose of this SSMP is to minimise impacts to significant fauna, flora and vegetation as a result of the Projects.

The entirety of this SSMP is relevant to MS606, as flora and vegetation and all identified species of terrestrial fauna are considered key environmental factors. However, only Matters of National Environmental Significance (MNES) associated with Havieron Project activities are considered relevant to the EPBC approval and DCCEEW assessment. The Matters of National Significance are:

- Greater Bilby (*Macrotis lagotis*) listed as Vulnerable under the EPBC Act
- Night Parrot (*Pezoporus occidentalis*) listed as Endangered under the EPBC Act
- Great Desert Skink (*Liopholis kintorei*) listed as Vulnerable under the EPBC Act
- Migratory birds – Red Knot (*Calidris canutus*), Wood Sandpiper (*Tringa glareola*), Common Sandpiper (*Actitis hypoleucos*), Sharp-tailed Sandpiper (*Calidris acuminata*), Gull-billed Tern (*Gelochelidon nilotica*) listed as Migratory under the EPBC Act
- Fringed Fire Bush (*Seringia exastia*) listed as Critically Endangered under the EPBC Act

1.4 Key Environmental Factors

1.4.1 Terrestrial fauna

Fauna is a Key Environmental Factor for the Projects due to:

- Clearing of native vegetation will result in the loss of terrestrial fauna habitat;
- Vehicle movements have the potential to result in mortality (death) or injury to fauna from vehicle strikes, and a potential for displacement from vehicle noise, light or vibration; and
- Potential for indirect impacts to fauna and their habitats.

The EPA's objective for protection of terrestrial fauna is to:

> *"protect terrestrial fauna so that biological diversity and ecological integrity are maintained"* (EPA 2016).

In the context of the EPA objective, ecological integrity is considered to be the composition, structure, function and processes of ecosystems, and the natural range of variation of these elements.

The key environmental factor, risk activities, botanical values and potential impacts are summarised in Table 1.3.

Table 1.3: Activities, values and associated impacts relating to Key Environmental Factor: Terrestrial Fauna

Key environmental factor	Activities	Significant fauna values	Impacts
Terrestrial Fauna	Clearing of native vegetation Vehicle movement (construction and operations) Indirect impacts to individuals or habitats from Project operations	The following significant species are potentially present in the Development Envelope: • Greater Bilby (*Macrotis lagotis*) listed as Vulnerable under the EPBC Act and BC Act • Night Parrot (*Pezoporus occidentalis*) listed as Endangered under the EPBC Act and Critically Endangered under the BC Act • Brush-tailed Mulgara (*Dasycercus blythi*) listed as Priority 4 by DBCA • Northern Marsupial Mole (*Notoryctes caurinus*) listed as Priority 4 by DBCA • Great Desert Skink (*Liopholis kintorei*) listed as Vulnerable under the EPBC Act and BC Act • Migratory birds – Red Knot (*Calidris canutus*), Wood Sandpiper (*Tringa glareola*), Common Sandpiper (*Actitis hypoleucos*), Sharp-tailed Sandpiper (*Calidris acuminata*), Gull-billed Tern (*Gelochelidon nilotica*) listed as Migratory under the EPBC Act and BC Act	• direct loss of habitat from vegetation clearing • direct loss (injury or mortality) of fauna from clearing, operations and vehicle interactions • Indirect impacts on significant fauna from which includes: ○ increased predation and competition due to introduced fauna species ○ individual displacement due to dust, light, noise and vibration ○ impacts to fauna habitat due to altered fire regimes, increased introduced weeds and fragmentation

1.4.2 Flora and Vegetation

Flora and vegetation is a Key Environmental Factor for the Projects due to:

- Clearing of native vegetation will result in the loss of significant species, native vegetation and loss or fragmentation of habitat; and
- Potential for indirect impacts to flora and vegetation communities resulting from emissions of dust, application of dust suppressants, introduction and spread of weeds, spills from hydrocarbons and water and altered hydrology and fire regimes.

The EPA's objective for protection of terrestrial fauna is to:

> *"protect terrestrial flora and vegetation so that biological diversity and ecological integrity are maintained"* (EPA 2016).

In the context of the EPA objective, ecological integrity is considered to be the composition, structure, function and processes of ecosystems, and the natural range of variation of these elements.

The key environmental factor, risk activities, botanical values and potential impacts are summarised in Table 1.4.

Table 1.4: Activities, values and associated impacts relating to Key Environmental Factor: Flora and Vegetation

Key environmental factor	Activities	Significant flora and vegetation values	Impacts
Flora and Vegetation	Clearing of native vegetation Indirect impacts to individuals or communities from Project operations	One significant flora species is known to be present in the Development Envelope: • *Goodenia hartiana* (Priority 2) as listed by the Department of Biodiversity, Conservation and Attractions (DBCA) • A number of Priority species, as listed by the DDBCA potentially occur within the project area Fringed Fire Bush (*Seringia exastia*) listed as Critically Endangered under the EPBC Act and Threatened under the BC Act is present within the Development Envelope. The individuals were originally recorded as *Seringia elliptica* and the species is expected to be delisted and removed as a Threatened species. Therefore, the individuals are not considered significant to the Amended Proposal. Two significant vegetation types are known to be present in the Development Envelope: • 11 ha of Banded Mulga vegetation type (VT2 and 3a within Approved Proposal) is considered locally restricted • 13 ha of Vegetation Type VT6 due to a restricted distribution, being representative of the range of a unit, and a novel combination of species	• direct loss and fragmentation of native vegetation and habitat; • direct loss of individual plants of conservation significance; • Indirect impacts on flora and vegetation: ○ Impacts of dust deposition; ○ Impacts from overspray of water used for dust suppression; ○ Altered surface drainage flow patterns, fire regimes and spread of weeds resulting in changes to vegetation structure and composition; and ○ Impacts from spills of hydrocarbons and water.

1.5 Rationale and Approach

The Projects have been designed to minimise impacts to significant species and vegetation types known to occur within the Development Envelope. Results of baseline surveys, assumptions and uncertainties informing the management approach are summarised in the sections below.

An objective and outcome-based management plan has been developed, as whilst some outcomes can be determined, the inclusion of objectives was considered of importance due to:

- The mobile nature of fauna populations within the Great Sandy Desert means the ability to adequately monitor fauna populations and establish triggers and thresholds is inhibited
- The variability of fauna habitat and vegetation condition due to rainfall and fire and amount of previous monitoring data means an acceptable level of impact (whereby significant impact would not occur) is not currently known
- The ability to differentiate Project-related impacts to those associated with environmental (rainfall, fire) based on current information collated is difficult
- The Proponent only has control over activities within the Development Envelope, but acknowledges the interconnectivity of the environment and that Project impacts could go beyond the Development Envelope. Therefore, the inclusion of management targets and actions is of importance to minimise local impacts for fauna species and habitat and flora and vegetation.
- As further information on Project impacts occurs, it is expected that future revisions of the SSMP would create outcome-based provisions

This SSMP is intended to satisfy the requirements of the Newcrest Biodiversity Policy and Standard and as such the International Council on Mining and Metals (ICMM) commitments.

1.5.1 Environmental Outcome/Management Objective

Overlap between terrestrial fauna and flora and vegetation outcomes and objectives exists, hence a combined SSMP has been developed. Table 1.5 and Table 1.6 summarise the outcomes and objectives of this SSMP, which have removed duplication where possible.

Table 1.5: SSMP Outcomes

Relevant Factor		Outcome
Flora	Fauna	Clearing of no more than 1,266 ha of fauna habitat and native vegetation within the Development Envelope
-		No removal of active Bilby burrows within the Development Envelope
-		No impacts to Night Parrot nesting sites within the Development Envelope
Flora	-	Clearing of no more than 21.56% of *Goodenia hartiana* local records

Table 1.6: SSMP Objectives and Targets

Relevant Factor		Objectives	Targets
-	Fauna	No significant impact to Primary Greater Bilby and Night Parrot habitat within the local region	No significant impacts to Primary Bilby and Night Parrot habitat
Flora	Fauna	No significant impact to significant fauna species or habitat within the local region No significant adverse indirect impacts to significant flora species and vegetation within the local region	No significant impact to significant fauna due to mortalities from clearing activities
			No significant impact to significant fauna due to mortalities from entrapment
			No significant impact to significant fauna due to mortality from vehicle interactions
			No significant increase of predation
			Minimise risk of Project related fires impacting fauna habitat
			No significant impact to flora and vegetation from dust deposition

Relevant Factor		Objectives	Targets
			No significant impact to flora and vegetation from saline water, hydrocarbons and chemicals
			No significant impact to flora and vegetation (particularly significant vegetation types) from altered surface water patterns
			No significant impact to flora and vegetation from Amended Proposal introduced weed species

1.5.2 Fauna Survey Findings

Terrestrial fauna studies

The results from fauna surveys have been used to assess the potential impacts of the Projects on terrestrial fauna. These fauna survey reports are summarised in Table 1-7.

The surveys were undertaken in accordance with the *Technical Guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment* (EPA 2020f), *Technical Guidance – Sampling of Short Range Endemic Invertebrate Fauna* (EPA 2016g) and the *Environmental Factor Guideline: Terrestrial Fauna* (EPA 2016b).

Table 1-7: Terrestrial Fauna Surveys

Report Author	Date	Survey Description	Area	Details
Biologic (2020a)	16 – 27 March 2020 31 May – 14 June 2020	Detailed survey over a 5,153 ha area and included a 180,460 ha Regional Mapping Area.	Stage 1 Mining Lease and Service Corridor	166 habitat assessments 6 systematic trapping sites each consisting of ten pit traps, 2 funnel traps, 20 Elliot traps and two cage traps, twenty-minute avifauna census, one-hour active foraging and nocturnal searches 20 ultrasonic bat recorders for a total of 43 nights 18 motion cameras at 15 locations for a total of 99 nights 22 targeted Bilby and Great Desert Skink 2 ha plot searches for a total of 66.5 hours 13 acoustic recorder locations for a total of 79 nights Eight Northern Marsupial Mole trenches 58 SRE habitat assessments Ten SRE sampling sites for active foraging
Spectrum Ecology (2021a)	6 – 13 November 2020	Targeted conservation significant fauna surveys over Telfer tenements with a Regional mapping area of 129,916 ha	Telfer Operations	34 active search sites for 22.67 hours 31 motion cameras 16-17 nights Six acoustic recorders for 12 consecutive nights Regional habitat mapping

Report Author	Date	Survey Description	Area	Details
Biologic (2021a)	23 October – 7 November 2020 December 2020 – January 2021 26 April – 7 May 2021	Detailed survey over a 3,193 ha area Targeted Night Parrot acoustic recorders	Stage 2 Infrastructure Corridor (Detailed Study Area)	161 habitat assessments 6 systematic trapping sites each consisting of ten pit traps, 2 funnel traps, 20 Elliot traps and two cage traps, twenty-minute avifauna census, two-hour active foraging and nocturnal searches 15 ultrasonic bat recorders for a total of 59 nights 87 targeted Bilby and Great Desert Skink 2 ha plot searches for a total of 70.5 hours 37 acoustic recorder locations for a total of 336 nights Eight Northern Marsupial Mole trenches 56 SRE habitat assessments Ten SRE sampling sites for active foraging Regional habitat mapping
Biologic (2022a)	25 October – 1 November 2021	Population monitoring	Havieron mine area (M45/1287)	17 sites established (12 within mining area and five regional). Habitat assessment completed, photo monitoring, targeted searches (2 ha) for a minimum of 30 minutes and camera traps. Genetic analysis of 45 scats was submitted from baseline survey (Biologic 2020a).

Terrestrial fauna- habitats

A total of six fauna habitats were mapped regionally (see Figure 2.1) with Sand Plain the most widespread.

At a species level, habitats mapped within the Study Area were assessed for the provision of critical habitat for conservation significant species (areas necessary "for activities such as foraging, breeding, roosting, or dispersal"). Within these categories, habitat types were recognised as providing primary habitat (i.e. critical habitat as per the definition above), or secondary habitat (i.e. habitats not critical for foraging, breeding, roosting or dispersal, but may support such activities and/ or habitats of marginal suitability for such activities).

Of the six broad fauna habitats occurring within the Study Area, the Sand Plain, Sand Dune and Saltpan habitats provide suitable habitat, for the highest number of species of conservation significance (Table 1.8). This includes primary breeding, nesting/roosting and/or foraging habitats for night parrot, greater bilby, great desert skink, mulgara and northern marsupial mole, particularly in areas not affected by recent widespread fires within and in the broader vicinity of the Study Area, where vegetation structure and composition provide optimal habitat for the species. Potential foraging habitat is also provided for grey falcon and peregrine falcon. Although a large extent of these habitat's occurrence within the Study Area is in various stages of post-fire regrowth, and therefore providing suboptimal primary habitat, they are still likely to provide secondary foraging and/or dispersal habitat for these species. All the species have the potential to occur in these habitats within the Study Area as residents, with suitable habitat, in the form of both primary and secondary habitats, present to support all life stages of each species. The occurrence of these species and extent of their occurrence within these habitats is likely to be dependent on vegetation cover and seasonality, with higher likelihood of occurrence likely to occur in unburnt areas which are more likely to provide primary breeding or nesting/roosting habitat and following rainfall events when seasonal foraging habitat is likely to be more abundant.

Saltpan habitat provides suitable habitat for night parrot, particularly in areas where larger mature spinifex (*Triodia* species) occurs near chenopods (*Atriplex* and *Tecticornia* species), which together provide suitable primary nesting/roosting and primary (annual) foraging habitat for the species. In contrast, foraging habitat provided by Sand Plain and Stony Plain habitats are likely to only provide secondary (seasonal) foraging habitat. Saltpan habitats may also provide suitable habitat for migratory shorebirds; however, the value and extent of species' occurrence would be seasonal, particularly following high rainfall events when it is most likely to be inundated and utilised by migratory shorebirds and waterbirds.

Stony Plain and Stony Hill, Breakaway or Other Outcropping habitats provide suitable habitat for western pebble-mound mouse and brush-tailed mulgara, particularly where suitable burrowing substrates, and resources (pebbles) permitting burrow and mound constriction are present. Stony Plain habitat may also provide suitable foraging habitat for night parrot, grey falcon, peregrine falcon.

Claypan's value as a habitat would be seasonal and dependent on high rainfall events, when it is most likely to be utilised by migratory shorebirds and waterbirds. During this time, when claypan habitats are inundated, shorebird and waterbird occurrence is still likely to be intermittent as larger areas of more suitable habitat (i.e. saltlakes) in the vicinity of the Study Area (e.g. Lake Dora, ~30 km south east of the Study Area) are more likely to be utilised, with occurrence within the Study Area likely to be representative of opportunistic visitation while transiting. The small extent and relatively isolated nature of claypan habitat within the Study Area is also likely to influence infrequent occurrence by these species, particularly as they remain dry for a large portion of the year.

All broad fauna habitats occurring within the Study Area are well represented more broadly outside the Study Area, with the extent of habitats within the Study Area often forming part of larger continuations of these habitats beyond the Study Area. Sand Plain and Sand Dune habitats are relatively widespread in areas adjacent to the Study Area and occur more broadly across the Great Sandy Desert bioregion where they are representative of the dominant broad fauna habitats occurring in the region. Due to the common and widespread occurrence of these habitats beyond the Study Area and more broadly throughout the Great Sandy Desert bioregion, it is unlikely that such species would be solely dependent on the extent of these habitats occurring within Study Area itself.

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Telfer Mine

Havieron Mine

Data source: Imagery - ESRI, 2021.

LEGEND

Development Envelope

Fauna Survey Area

- Biologic 2020a
- Biologic 2021a
- Spectrum 2021

Fauna Habitats

- Claypan
- Cleared/Disturbed
- Saltpan
- Sand Dune
- Sand Plain
- Stony Hill, Breakaway
- Stony Plain

Pipelines

- Gas

Rail Network

- Railway Stations
- Railway Lines

Current Roads

- Minor Road
- Regional Roads and Tracks

LOCALITY

0 1,000 2,000 3,000 4,000 5,000 Km

FAUNA HABITATS

Telfer and Havieron Projects

Significant Species Management Plan

N 0 2 4 6 8 10 Km

Coordinate System: GCS GDA 1994
Scale @ A3: 1:220,000

Prepared:	N Johnston	Date:	13/07/2022
Reviewed:	G Barrett	Revision:	B
Project:	TE21074		

talis consultants

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Figure 1.4

Document Path: \\server\Talis\SECTIONS\Environment\Projects\TE2021\TE21074 - Havieron approvals\GIS\Maps\Haverion_TE21074_EPA_Assesment\Haverion_TE21074_EPA_Assesment.aprx

Table 1.8: Havieron Fauna Habitats

Habitat	Distinguishing habitat characteristics	Extent of the habitat	Habitat for significant species	Photo
Sand Plain	Sand Plain habitat comprises flat to low undulating areas, often between parallel Sand Dune habitat with vegetation dominated by *Triodia* hummock grasses of various life stages and scattered patches of various small to medium shrub species (including *Acacia* and *Melaleuca* species) on sandy to clay loam substrates. Occasionally intermixed with small, isolated patches of Stony Plain, with similar vegetation on heavy clay substrates. A large extent of the Study Area comprises recently burnt areas with little to no vegetation remaining or only limited recent natural post-fire regrowth. Scattered small and relatively isolated unburnt areas (~15–20+ years unburnt) with large mature *Triodia* hummock grassland and open *Acacia* shrubland present in parts of the Study Area.	Sand Plain habitat occurs throughout a large portion of the Study Area, primarily occurring in the eastern half of the Study Area and often occurring as the intervening area between sand dunes. The Sand Plain habitat is one of the most common and widespread habitat types within the Great Sandy Desert region. The vegetation and substrate which make up this habitat type are characteristic features of the region.	• **night parrot** – primary nesting (where suitable mature *Triodia* occurs) and secondary foraging (seasonal) • **greater bilby** – primary breeding, foraging and dispersal (unburnt areas only), secondary foraging and dispersal (burnt areas) • **northern marsupial mole** – secondary breeding, foraging and a dispersal • **great desert skink** – primary breeding and foraging • **brush-tailed mulgara** – primary breeding, foraging and dispersal • **peregrine falcon** – primary foraging • **grey falcon** – primary foraging	

Habitat	Distinguishing habitat characteristics	Extent of the habitat	Habitat for significant species	Photo
Stony Plain	Stony Plain habitat comprises flat to low undulating areas with vegetation dominated by *Triodia* hummock grasses of various life stages and scattered patches of various small to medium *Acacia* and *Hakea* shrub species on gravelly loam or clay loam substrates. Some small, isolated patches of Stony Plain intermixed with Sand Plain habitat, particularly low-lying areas between dunes subject to movement of substrates over time. Large patches of recently burnt areas with little to no vegetation remaining or limited post-fire natural regrowth.	The occurrence of Stony Plain habitat is limited to the western portion of the Study Area, with sparse isolated patches occurring elsewhere. Although not a common habitat within the Great Sandy Desert region, Stony Plain habitat is more common and widespread to the west of the Study Area, where it is characteristic of the Pilbara region.	• **western pebble-mound mouse** – secondary breeding, foraging and dispersal • **brush-tailed mulgara** – secondary breeding, foraging and dispersal • **peregrine falcon** – primary foraging • **grey falcon** – primary foraging	
Sand Dune **Significance: High**	Sand Dune comprised low to high red parallel sand dunes, often separated by Sand Plain habitat with vegetation largely dominated by *Triodia* hummock grasses and various scattered small to medium shrubs (usually *Acacia*) with scattered tree and mallee eucalypts occurring on upper dune slopes and crests, on sandy or sandy loam substrates. Large areas of recently burnt areas with little to no vegetation remaining	Parallel Sand Dune habitat bisects the Study Area in multiple locations, often separated by intervening Sand Plain habitat. Sand Dune habitat is one of the most common and widespread habitat types within the Great Sandy Desert region. The vegetation and substrate which make up this habitat	• **night parrot** – primary nesting (where suitable mature *Triodia* occurs) and secondary foraging (seasonal) • **greater bilby** – primary breeding, foraging and dispersal (unburnt areas only), secondary foraging and dispersal (burnt areas) • **great desert skink** – primary breeding and foraging • **brush-tailed mulgara** – primary breeding, foraging and dispersal	

Habitat	Distinguishing habitat characteristics	Extent of the habitat	Habitat for significant species	Photo
	or only limited recent natural post-fire regrowth.	type are characteristic features of the region.	• **northern marsupial mole** – primary breeding, foraging and a dispersal	
Stony Hill/ Breakaway	This habitat comprises low to moderate hills and undulating plains with a, often sparse vegetation cover dominated by a *Triodia* hummock grassland with scattered *Acacia* and *Grevillea* shrubs on a gravelly clay loam substrate. Rocky outcropping is often sparse within this habitat and confined to the larger hills.	This habitats occurrence within the Study Area is limited to a small area in the north and western portions of the Study Area, where it is often associated with Stony Plain habitat. Primarily occurs as small steep hills and/or low rolling. Low Stony Hills habitat is not common within the Study Area or more broadly across the Great Sandy Desert region; however, it is more common and widespread to the west of the Study Area, where it is characteristic of the Pilbara region further west.	• **western pebble-mound mouse** – primary breeding and foraging	

Habitat	Distinguishing habitat characteristics	Extent of the habitat	Habitat for significant species	Photo
Claypan	Claypan habitat within the Study Area comprised low lying areas, often amongst Sandy Plain habitat often sparsely vegetation or with deceased vegetation from periods water was present (i.e. rushes and various tussock grasses) on a hard clay to clay loam substrate. The structure and condition of vegetation within Claypan habitat is likely to vary seasonally, particularly following heavy rainfall events when inundation is likely to occur. No water was recorded at any areas of Claypan habitat during the Phase 1 survey; however, water was present at most occurrences of the habitat during the Phase 2 survey.	Claypan habitat occurs in small isolate patches across the Study Area, often occurring within Sand Plain habitat. Scattered throughout the central and eastern portions of the Regional Mapping Area, usually occurring within broader occurrences of Sand Plain and Saltpan habitats. Although not a common habitat within the Study Area, Claypan habitat is more common, though patchily distributed, across the Great Sandy Desert, often occurring in association with saltlakes and other paleo-drainage channels occurring across the region.	• **Migratory shorebirds and waterbirds** – secondary roosting, foraging and dispersal	 
Saltpan	Saltpan habitat within the Study Area is characterised by low lying areas subject to infrequent flooding. Often vegetated with *Triodia* hummock grasses and mixed small to medium shrubs, including *Acacia*, *Melaleuca* and chenopod species (*Atriplex* and *Tecticornia* spp.) forming a patchy density cover with scattered patches of exposed substrate, often with a saline crust on the surface.	Saltpan habitat occurs only in a few small areas within the Study Area; however, it forms part of a much larger area of the habitat that extends south. Although limited in extent within the Study Area, occurrences often forming part of large extents of paleo-drainage lines to larges lake systems	• **night parrot** – primary nesting (where suitable mature *Triodia* occurs) and foraging (annual) • **greater bilby** – secondary breeding, foraging and dispersal • **grey falcon** – secondary foraging • **peregrine falcon** – secondary foraging • **migratory shorebirds and waterbirds** – seasonal secondary foraging habitat	

Habitat	Distinguishing habitat characteristics	Extent of the habitat	Habitat for significant species	Photo
	Substrate often comprised of fine clay or loamy sands with scattered calcrete outcropping.	such as Lake Dora, located south of the Study Area. This habitat is relatively common and widespread more broadly outside of the Study Area and throughout the Great Sandy Desert, often associated with saltlakes and other paleo-drainage channels occurring throughout the region.		
Cleared / Disturbed	Cleared and/or previously disturbed areas, largely associated with Telfer Gold Mine.	Within the Study Area, Cleared/ Disturbed habitats is restricted the southernmost extent, in the vicinity of Telfer, where historic clearing and disturbance has occurred as a result of construction and operation of Telfer mine and associated infrastructure. Although minor access tracks occur through other parts of the Study Area, these are not delineated due to their relatively minimal disruption to the broader habitats in which they occur.	Not Applicable	

Significant fauna

A desktop assessment was conducted prior to the field survey to identify all vertebrate and Short-Range Endemic (SRE) invertebrate fauna species which have the potential to occur in the Development Envelope (Table 1.9).

A total of 106 vertebrate fauna species, comprising 19 mammal species (16 native and three introduced), 45 bird species, 37 reptile species and five amphibian species were recorded from the study area during the field survey. All species recorded were typical of assemblages for the broad fauna habitats present and the Great Sandy Desert region generally.

Five significant vertebrate fauna species were recorded within the study area, as shown in Figure 1.5, with records detailed in Table 1.9. Species that have been recorded or that are considered likely to occur are discussed in further detail in the sections below. The majority of other species are associated with migratory species which are not likely to be resident with the Project area.

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21°30'0"S 21°40'0"S 21°50'0"S

Havieron Mine

Telfer Mine

Data source: Imagery - ESRI, 2021.

LEGEND

- Development Envelope
- Indicative Footprint (Stage 1)
- Indicative Footprint (Stage 2)

Significant Fauna Records

- Brush-tailed Mulgara, Scat
- Brush-tailed Mulgara, Track
- Greater Bilby, Burrow (active)
- Greater Bilby, Burrow (inactive)
- Greater Bilby, Digging
- Greater Bilby, Individual
- Greater Bilby, Scat
- Greater Bilby, Track
- Gull-billed Tern, Recording
- Northern Marsupial Mole,Burrow (inactive)

Fauna habitats

- Claypan
- Cleared/Disturbed
- Saltpan
- Sand Dune
- Sand Plain
- Stony Hill, Breakaway
- Stony Plain

Pipelines

- Gas

Rail Network

- Railway Stations
- Railway Lines

Current Roads

- Minor Road
- Regional Roads and Tracks

LOCALITY

0 1,000 2,000 3,000 4,000 5,000 Km

CONSERVATION SIGNIFICANT FAUNA RECORDS

Telfer and Havieron Projects

Significant Species Management Plan

N 0 2 4 6 8 Km

Coordinate System: GCS GDA 1994
Scale @ A3: 1:200,000

Prepared:	N Johnston	Date:	13/07/2022
Reviewed:	G Barrett	Revision:	B
Project:	TE21074		

talis consultants

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Figure 1.5

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Table 1.9: Significant vertebrate fauna considered possible or likely to occur in Development Envelope

Species	Conservation Status			Potential Critical Habitat Within the Study Area						Comments	Likelihood of Occurrence
	EPBC Act	BC Act	DBCA	Sand Plain	Sand Dune	Saltpan	Stony Hill, Breakaway	Claypan	Stony Plain		
Brush-tailed mulgara *Dasycercus blythi*			P 4	●	●	●			●	Recorded on two occasions from secondary evidence (tracks and scat) in Sand Plain and Sand Dune habitats. Four scats, one digging and one burrow was recorded within the Telfer Project area (Spectrum 2021a). Species likely to occur throughout the area, particularly within Sand Plain and Stony Plain habitats, and to a lesser extent Saltpan and Stony Plain habitats where suitable burrowing substrates are present. Occurrence and abundance may fluctuate seasonally when desirable conditions occur, and resources are abundant.	Recorded
Western pebble-mound mouse *Pseudomys chapmani*			P 4				●		●	May occur as a resident in Stony Plain and Stony Hill, Breakaway or Other Outcropping habitats where suitable stony substrates present. Records of the species in the broader vicinity of the Fauna Study Area scarce and often associated secondary evidence of former occurrence (i.e. old inactive pebble-mounds) (DBCA, 2021). An old mound was recorded within the Telfer Project area (Spectrum 2021a), due to the degraded nature of the mound this species is considered unlikely to occur in the Development Envelope area.	Recorded
Northern marsupial mole *Notoryctes caurinus*			P 4	●	●					Recorded a total of 25 times from secondary evidence (inactive burrows/tunnels) at mole trenching sites with a total of 60 inactive burrows (tunnels) recorded in Sand Dune habitat. Likely to occur as a resident within Sand Dune and Sand Plain habitats throughout the Fauna Study Area.	Recorded

Species	Conservation Status			Potential Critical Habitat Within the Study Area						Comments	Likelihood of Occurrence
	EPBC Act	BC Act	DBCA	Sand Plain	Sand Dune	Saltpan	Stony Hill, Breakaway	Claypan	Stony Plain		
Greater bilby *Macrotis lagotis*	VU	V U		•	•	•				Recorded 288 times (Biologic 2020a; 2021a) including: • Seven active burrows • Ten inactive burrows • Two possible burrows (one active and one inactive) • 32 tracks • 199 diggings • 40 scats • Four direct observations via motion camera • One burrow, 11 scats and 14 diggings surrounding Telfer (Spectrum 2021a) Population monitoring in 2021 (Biologic 2022a) did not identify any evidence. Likely to occur within Sand Plain and Sand Dune habitats where suitable burrowing substrates are present, particularly where vegetation provides suitable cover (i.e. not recently burnt and void of vegetation). Likely to forage and disperse throughout Sand Plain and Sand Dune habitats within the Fauna Study Area.	Recorded

Species	Conservation Status			Potential Critical Habitat Within the Study Area						Comments	Likelihood of Occurrence
	EPBC Act	BC Act	DBCA	Sand Plain	Sand Dune	Saltpan	Stony Hill, Breakaway	Claypan	Stony Plain		
Night parrot *Pezoporus occidentalis*	EN	CR		●	●	●			●	Recorded on three occasions, comprising two confirmed and one unconfirmed, in Sand Plain habitat from call recording within and adjacent to the Fauna Study Area. Timing and characteristics of calls were indicative of foraging and/or dispersing individuals. The species may occur as a resident if nesting/roosting occurs within the Fauna Study Area, or as an occasional visitor to forage if nesting occurs in the broader vicinity of the Fauna Study Area. Nesting and/or roosting may occur in areas where suitably sized old growth Triodia is present, particularly in Sand Plain and Saltpan habitat where large mature Triodia hummocks and chenopods occur together in areas; however, foraging may occur more broadly within and outside the Fauna Study Area. Foraging habitat is widespread, with primary (annual) foraging habitat occurring within Saltpan habitat and secondary (seasonal) foraging habitat occurring more broadly within Sand Plain and Stony Plain habitats dominated by Triodia hummock grasses. The suitability and likelihood of utilisation by the species in Sand Plain and Stony plain habitats are likely to be dependent on seasonal seeding of grasses, particularly after large rainfall events.	Recorded
Wood Sandpiper *(Tringa glareola)*	MI	MI								Commonly found in low numbers on the edges of inland water bodies such as artificial dams. Typically occupies freshwater river and pool habitats though rarely associated with brackish, salt lake and estuary environments (Spectrum 2021a).	Recorded
Common sandpiper *Tringa hypoleucos*	MI	MI				●		●		May infrequently occur in Saltpan habitat following heavy rainfall and inundation. Occurrence is likely to be the resultant of cyclonic activity from the northwest and may only represent transient or migrating individuals. Spectrum (2021a) recorded three photos within proximity to Telfer Project.	Recorded

Species	Conservation Status			Potential Critical Habitat Within the Study Area						Comments	Likelihood of Occurrence
	EPBC Act	BC Act	DBCA	Sand Plain	Sand Dune	Saltpan	Stony Hill, Breakaway	Claypan	Stony Plain		
Red knot *Calidris canutus*	EN/ MI	EN				•		•		May infrequently occur in Saltpan habitat following heavy rainfall and inundation. Occurrence is likely to be the resultant of cyclonic activity from the northwest and may only represent transient or migrating individuals. Spectrum (2021a) recorded two photos within proximity to Telfer Project.	Recorded
Sharp-tailed Sandpiper *Calidris acuminata*	MI	MI				•		•		May infrequently occur in Saltpan habitat following heavy rainfall and inundation. Occurrence is likely to be the resultant of cyclonic activity from the northwest and may only represent transient or migrating individuals. Spectrum (2021a) recorded one photo within proximity to Telfer Project.	Recorded
Gull-billed tern *Gelochelidon nilotica*	MI	MI				•		•		Recorded on one occasion from acoustic recorded deployed in Sand Plain habitat in far east of Fauna Study Area. Record likely to represent a migrating individual flying over the area and unlikely to be residing or visiting the site due to the absence of suitable habitat to support the species. May infrequently occur in Saltpan habitat following heavy rainfall and inundation. Occurrence likely to be resultant of cyclonic activity from northwest and may only represent transient or migrating individuals. Spectrum (2021a) recorded one photo within proximity to Telfer Project.	Recorded
Red goshawk *Erythro-triorchis radiatus*	VU	V U								Previously recorded in vicinity of Telfer from a radiotracked individual in January 2021. The species may infrequently occur with the Study Area during foraging and/or dispersal activities. The species' occurrence within the Fauna Study Area is likely to be limited to infrequent visitation only and nesting unlikely to occur within the Fauna Study Area due to the lack of suitable nesting habitat.	Possible

Species	Conservation Status			Potential Critical Habitat Within the Study Area						Comments	Likelihood of Occurrence
	EPBC Act	BC Act	DBCA	Sand Plain	Sand Dune	Saltpan	Stony Hill, Breakaway	Claypan	Stony Plain		
Fork-tailed swift *Apus pacificus*	MI	MI		●	●	●	●	●	●	May occasionally occur within the airspace above the Fauna Study Area to forage, unlikely to land or nest within Fauna Study Area.	Possible
Oriental plover *Charadrius veredus*	MI	MI				●		●		May infrequently occur in Saltpan habitat following heavy rainfall and inundation. Occurrence likely to be resultant of cyclonic activity from northwest and may only represent transient or migrating individuals.	Possible
Grey falcon *Falco hypoleucos*		V U		●	●	●	●	●	●	May occur within the Fauna Study Area occasionally to forage within all habitats present, nesting unlikely due to absence of suitable nesting sites.	Possible
Peregrine falcon *Falco peregrinus*		OS		●	●	●	●	●	●	May occur within the Fauna Study Area occasionally to forage within all habitats present, nesting unlikely due to absence of suitable typical nesting sites.	Possible
Caspian tern *Hydroprogne caspia*	MI	MI				●		●		May infrequently occur in Saltpan habitat following heavy rainfall and inundation. Occurrence likely to be resultant of cyclonic activity from northwest and may only represent transient or migrating individuals.	Possible
White-winged black tern *Chlidonias leucopterus*	MI	MI				●		●		May infrequently occur in Saltpan habitat following heavy rainfall and inundation. Occurrence likely to be resultant of cyclonic activity from northwest and may only represent transient or migrating individuals.	Possible
Princess parrot *Polytelis alexandrae*	VU		P 4	●	●				●	May occur within the Fauna Study Area, particularly within suitably vegetated Sand Plain and Stony Plain habitats. The species occurrence and abundance within the Fauna Study Area is likely to be influenced by rainfall, following which resources are more abundant.	Possible

Species	Conservation Status			Potential Critical Habitat Within the Study Area						Comments	Likelihood of Occurrence
	EPBC Act	BC Act	DBCA	Sand Plain	Sand Dune	Saltpan	Stony Hill, Breakaway	Claypan	Stony Plain		
Curlew sandpiper *Calidris ferruginea*	CR/ MI	CR / MI				●		●		May infrequently occur in Saltpan habitat following heavy rainfall and inundation. Occurrence is likely to be the resultant of cyclonic activity from the northwest and may only represent transient or migrating individuals.	Possible
Pectoral sandpiper *Calidris melanotos*	MI	MI				●		●		May infrequently occur in Saltpan habitat following heavy rainfall and inundation. Occurrence is likely to be the resultant of cyclonic activity from the northwest and may only represent transient or migrating individuals.	Possible
Red-necked stint *Calidris ruficollis*	MI	MI				●		●		May infrequently occur in Saltpan habitat following heavy rainfall and inundation. Occurrence is likely to be the resultant of cyclonic activity from the northwest and may only represent transient or migrating individuals.	Possible
Common greenshank *Tringa nebularia*	MI	MI				●		●		May infrequently occur in Saltpan habitat following heavy rainfall and inundation. Occurrence is likely to be the resultant of cyclonic activity from the northwest and may only represent transient or migrating individuals.	Possible
Glossy ibis *Plegadis falcinellus*	MI	MI				●		●		May infrequently occur in Saltpan habitat following heavy rainfall and inundation. Occurrence is likely to be the resultant of cyclonic activity from the northwest and may only represent transient or migrating individuals.	Possible
Great desert skink *Liopholis kintorei*	VU	V U		●	●					Not recorded in surveys but likely to occur in Sand Plain and Sand Dune habitats throughout the Fauna Study Area where suitable burrowing substrates are present. Likely to utilise both burnt and unburnt areas of these habitats within the Fauna Study Area.	Likely

[1] EX – Extinct, CR – Critically Endangered, EN – Endangered, VU – Vulnerable, OS – Specially protected, CD – Conservation Dependent, MI – Migratory, P1–P4 – Priority 1–4

Greater Bilby (*Macrotis lagotis*) – Vulnerable (EPBC/BC Act)

The Greater Bilby is a medium-sized marsupial that formerly inhabited the arid and semi-arid zones of 70% of Australia (Department of Environment and Conservation, 2012). The distribution has declined to about 20% of their former range. Outside of Western Australia, they remain in parts of the Tanami Desert (Northern Territory) and small isolated areas of south-west Queensland (Department of Environment and Conservation, 2012). In Western Australia, they occur across much of the Eastern Pilbara extending in to the Great Sandy, Little Sandy and Gibson Deserts, and the southern Kimberley region (Dziminski, Carpenter and Morris, 2020).

Throughout most of its range, the distribution of greater bilby is patchy and often occurs in low abundance (Southgate *et al.*, 2007). The species is generally solitary, often occurring at a density of 1–2 individuals per km^2 and up to 12–16 individuals per km^2 in areas of optimal habitat (Southgate, 1987). Extant populations of the greater bilby occur in a variety of habitats; however, it is most often associated with landforms comprising level to low slope topography and light to medium soils, such as sand plains and sand dune habitats (Cramer *et al.*, 2017; Southgate, 1990).

Typically the species will excavate several burrows within its home range and frequently move between them (Moseby & O'Donnell, 2003). Despite this, the species is not sedentary, and a previously occupied area may be vacated for alternative areas, which is most likely attributed to resource depletion within the occupied area (Southgate, 1987). As such, the occurrence of inactive burrows may only represent temporary or seasonal inactivity in an area and does not necessarily mean species absence from an area.

Males have been recorded moving distances of 2–3 km and up to 5 km between burrows over consecutive nights, while females tend to move up to 1.5 km (Southgate *et al.*, 2007). Home range of the species ranges between 1–3 km^2, averaging 3.16 km^2 for males and 0.18 km^2 for females (Moseby & O'Donnell, 2003). Variation in the species range is likely to be influenced by the presence and suitability of habitat and availability of resources (Southgate, 1987).

Greater Bilby can forage broadly across habitats and can be highly mobile in response to resource availability, particularly in response to fire and post-fire regeneration (Southgate *et al.*, 2007). Fire has been identified as an important process in the species ecology and occurrence, particularly due to many plant species that make up the species' diet or host prey species are fire-germinated species (Southgate, 1990; Southgate & Carthew, 2007; Southgate & Carthew, 2006; Southgate *et al.*, 2007). As such, the species is known to utilise mosaic habitats comprising unburnt areas and areas at various stages of post-fire regeneration, often primarily utilising unburnt areas but venturing into burnt areas during foraging and dispersal movements (Southgate & Carthew, 2007; Southgate & Carthew, 2006; Southgate *et al.*, 2007). The utilisation of burnt areas is often associated with post-fire regeneration of vegetation, which is heavily dependent on rainfall events to occur successfully (Southgate & Carthew, 2007). This is potentially evidenced by the population identified to the north-east of the proposed mine site, where active burrows and numerous secondary records were identified in unburnt Primary habitat.

Although it is difficult to determine the age of vegetation within the unburnt areas where the majority of records of the species occurred, the size of the large *Triodia* hummocks present suggests the area has remained unburnt for a long period, at least 15–20 plus years following approximate age criteria defined in Burrows *et al.* (2014) and AFAC (2015). The true age of vegetation in desert regions, including *Triodia* grasslands, is difficult to ascertain as growth rates are highly variable and can be heavily influenced by environmental factors including rainfall, moisture, soil fertility and temperature (Bogusiak *et al.*, 1990; Casson & Fox, 1987; Gibson *et al.*, 2016; Wright *et al.*, 2014). Therefore, the age of unburnt vegetation within the Study Area, and timeframe in which burnt areas will regenerate to comparable structure is unknown. Due to the extent of fire within the Fauna Study Area, the unburnt areas remain relatively protected from fire due to the lack of connectivity to other areas where fires may occur.

Following Southgate (2005), assessment of age classes of tracks recorded within the Fauna Study Area suggests multiple individuals of various age classes occur in 2020, with evidence of all three age classes (i.e. large male, female/small male and immature) present. Genetic analysis was completed (Biologic 2022a) on 45 scats collected in 2020, however only eight were successfully genotyped, indicating two individuals - one male and one female. The species was recorded in Sand Plain and Sand Dune habitats; however, notably, the majority of records of recent occurrence occurred within areas of primary habitat, comprising unburnt areas primarily located in the eastern portion of the Fauna Study Area (Figure 6-4), in relatively small areas comprising open Triodia grassland with even cover of large mature Triodia hummocks and scattered Acacia shrubs at least 15–20 plus years unburnt. Records from other parts of the Fauna Study Area within secondary habitat largely comprised old and/or weathered diggings, often occurring singly.

Population monitoring within proximity to the Havieron mine area occurred in 2021 (Biologic 2022a), however no evidence of Greater Bilby was identified. Previously active burrows were determined to be inactive with evidence of other species (feral cat (*Felis catus*) and sand goanna (*Varanus gouldii*)) utilising burrows. Several of the monitoring sites consisted of areas that were recently burnt; however, these areas still provide secondary foraging and dispersal habitat. Since the Biologic (2020a) baseline fauna survey, exploration and mining activity has increased exponentially. Although likely that individuals will move from an area undergoing development, there have been foraging/ dispersing records of Greater Bilby within the disturbed areas of the Study Area previously. Therefore, although mining disturbance may impact the species occurrence, Greater Bilby may still utilise the disturbed areas to forage/disperse.

The increase in feral predators recorded (particularly feral cat) is the most likely factor influencing Greater Bilby occurrence. The number of dog/ dingo records has substantially decreased between the baseline fauna survey (Biologic 2020a) and the current monitoring survey (Biologic 2022a), most likely as a result from the dog/ dingo cull that occurred. Only two dingoes were culled in August 2021. In contrast, feral cat was recorded for the first time as part of the survey and an increase in records has been observed.

Based on the results of the current survey and knowledge of the species in the broader area and regionally, the species occurrence within the Fauna Study Area is unlikely to represent an important population, as defined by DoE (2013).

Biologic (2020a; 2021b) undertook mapping of the Greater Bilby habitat suitability within the Detailed Study Area (Figure 1-6). A total of 292 ha (4% of the Study area) provides primary breeding, foraging and dispersal habitat for the species, which is characterised by relatively mature and unburnt areas of Triodia hummock grassland and/or open Acacia shrubland. A total of 6,389 ha (93%) of the Detailed Study Area provides secondary foraging and dispersal habitat.

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21°30'0"S 21°40'0"S 21°50'0"S

Telfer Mine

Havieron Mine

Data source: Imagery - ESRI, 2021.

LEGEND

- Development Envelope
- Indicative Footprint (Stage 1)
- Indicative Footprint (Stage 2)

Bilby Habitat Mapping
- Primary
- Secondary
- Unsuitable

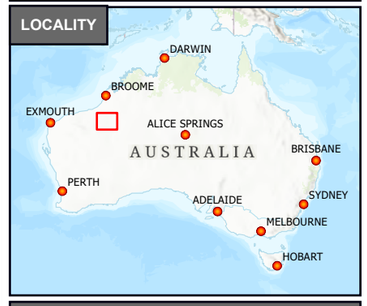
Significant Fauna Records
- Greater Bilby, Burrow (active)
- Greater Bilby, Burrow (inactive)
- Greater Bilby, Digging
- Greater Bilby, Individual
- Greater Bilby, Scat
- Greater Bilby, Track

Fauna habitats
- Claypan
- Cleared/Disturbed
- Saltpan
- Sand Dune
- Sand Plain
- Stony Hill, Breakaway
- Stony Plain

Pipelines
- Gas

Current Roads
- Minor Road
- Regional Roads and Tracks

LOCALITY



0 1,000 2,000 3,000 4,000 5,000 Km

GREATER BILBY RECORDS and HABITAT

Telfer and Havieron Projects

Significant Species Management Plan

N

0 2 4 6 8 Km

Coordinate System: GCS GDA 1994
Scale @ A3: 1:200,000

Prepared:	N Johnston	Date:	13/07/2022
Reviewed:	G Barrett	Revision:	B
Project:	TE21074		

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Figure 1.6

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Brush-tailed Mulgara (*Dasycercus blythi*) – Priority 4 (DBCA)

The brush-tailed mulgara is a small carnivorous marsupial that occurs in the semi-arid and arid regions of Western Australia. The species is often recorded from a range of sandy and stony plain habitats, often dominated by spinifex *Triodia* spp. grasslands on sandy or stony plains where suitable burrowing substrate is present (Pavey *et al.*, 2012; Woolley, 2006). Within these habitats, the species' average home range can be up to 25.5 ha for males, with a much smaller average range (10.8 ha) occupied by females (Körtner *et al.*, 2007). The species may utilise multiple burrows within their home range, some of which may be shared with more than one individual, including simultaneous use of the same burrow by multiple individuals (Körtner *et al.*, 2007).

The species is likely to occur as a resident within the study area, primarily within Sand Plain, Sand Dune, Saltpan and, to a lesser extent, Stony Plain habitats, particularly where suitable vegetation cover and sandy or loamy substrates permitting burrowing are present. Due to the current condition of many of these habitats within the study area providing less optimal habitat for the species following recent fires, the species occurrence is likely to increase following recovery of vegetation. Despite the extent of recently burnt areas throughout the study area, the species is still likely to utilise these areas to forage and disperse, particularly were occurring adjacent to or near unburnt areas with sufficient vegetation cover. The occurrence of all habitats likely to support brush-tailed mulgara within the study area are all part of larger expanses of these habitats beyond the study area and within the broader vicinity of the study area. The occurrence or extent of these habitats within the study area is unlikely to provide habitat critical to the species persistence on a local or regional scale.

Northern Marsupial Mole (*Notoryctes caurinus*) – Priority 4 (DBCA)

Little is known about the ecology of the Northern Marsupial Mole. They occur in sandy dune habitats of north-western Australia, particularly in the Great Sandy and Little Sandy Deserts. The northern marsupial mole is a highly adapted fossorial species, spending most of its life underground. The species is primarily associated with sand dune habitats, and to a lesser extend sand plains, where loose sandy substrates permitting underground tunnelling (Benshemesh, 2005; Woinarski et al. 2014). Due to the species' cryptic nature, the ecology of the northern marsupial mole is poorly known, and its distribution is not well defined. The species is presumed to occur throughout the sandy deserts of Western Australia; however, records of the species are scarce. Although the species is rarely recorded from direct observation, it is regularly detected from secondary evidence, particularly backfilled tunnels from burrowing (via targeted mole trenches), and to a lesser extent tracks (Benshemesh 2005).

The species is likely to occur throughout Sand Dune and, to a lesser extent, Sand Plain habitats within the study area as a resident. The occurrence of both Sand Plain and Sand Dune habitats within the Fauna Study Area forms part of a much larger extents of both habitats that extends beyond the study area and are well represented within and in the broader vicinity. Therefore, it is unlikely habitat present within the Fauna Study Area provides critical habitat which the species is reliant upon within the Fauna Study Area or more broadly in the Great Sandy Desert region.

Western Pebble-mound Mouse (*Pseudomys chapmani*) – Priority 4 (DBCA)

This species occurs on the gentler slopes of rocky ranges where the ground is covered with a stony mantle and vegetated by hard spinifex, often with a sparse overstorey of eucalypts and scattered shrubs (Anstee, 1996; Start et al., 2000). Based on habitat mapping, this species is unlikely to be affected by the Amended Proposal.

Night Parrot (*Pezoporus occidentalis*) – Endangered/Critically Endangered (EPBC/BC Act)

Description, range, ecology and habitat preference

The Night Parrot is a rarely encountered, elusive, nocturnal parrot that is primarily ground-feeding (Bamford Consulting Ecologists 2005). Records are very rare and therefore the information about this species is limited (Department of Parks and Wildlife, 2017). Historically, the species occurred over much of the semi-arid and arid zone of Australia (Garnett, Szabo and Dutson 2011). Recently Night Parrots have been recorded from Pullen Pullen reserve in Queensland and from the central desert regions of Western Australia (Jackett et al. 2017).

The ecology and habitat preferences of the Night Parrot are poorly known; however, based on accepted records, the habitat of the species often comprises long-unburnt mature Triodia grasslands in stony or sandy environments (McGilp, 1931; North, 1898; Whitlock, 1924; Wilson, 1937), and of samphire and chenopod shrublands, including genera such as Atriplex, Bassia and Maireana, on floodplains and claypans, and on the margins of salt lakes, creeks or other sources of water (McGilp, 1931; Wilson, 1937). The current interim guidelines for preliminary surveys of night parrot in Western Australia suggest this species requires old-growth (often more than 50 years unburnt) spinifex (Triodia species) for roosting and habitats comprising of various grasses and herbs (including Triodia, chenopods and other ephemeral grasses and herbs) for foraging (DPaW, 2017; Murphy et al., 2017). Based on known records, foraging habitat utilised often occurs within or adjacent to suitable roosting/nesting habitat and foraging habitat is considered to be of greater value when it occurs within 10 km of suitable roosting/nesting habitat (DPaW, 2017; Murphy et al., 2017).

Night Parrot records throughout the species' presumed distribution are scarce; however, the species has previously been recorded from multiple undisclosed locations in the vicinity of Lake Disappointment, approximately 160–200 km south of the Study area, between 2017–2018 (Harewood, 2018). A further record from 1970 is located approximately 200 km southwest of the Study Area (DBCA, 2020a) and the species has purportedly been recorded from another locality in the Great Sandy Desert relatively recently (2017); however, the location or further details of habitats are not available (Mills, 2017).

Survey Effort Results

The Night Parrot was recorded on three occasions (including two from the same location) during the fauna surveys from call recording via acoustic recorder, comprising two confirmed records and one unconfirmed. All three records of the species were associated with Sand Plain habitat. Of the three calls recorded, two occurred during the Biologic Phase 1 survey and one during the Phase 2 survey (Biologic 2021a).

During the Biologic (2021a) Phase 1 survey, the two calls were structurally consistent with known calls of the species (a two-note hollow whistle, as described by Leseberg et al. (2019)). Due to the quality of calls recorded, confirmation of both calls as Night Parrot was possible. The timing and characteristics of the calls (i.e. decreasing in volume with each call) recorded on 26 October 2020, suggest the individual was flying over the site. Although the direction of the call cannot be determined, based on habitats present at the site and in the broader vicinity, the species' occurrence is likely to be attributed to dispersal or resource-searching behaviour (i.e. in transit to or searching for food or water resources) by an individual. The timing of the single call recorded on 25 October 2020 (approximately one hour after sunrise), suggests the species may have roosted within relatively close proximity to the recorder's location.

The probable distance and direction of the potential roost site could not be determined; however, a small area of suitable primary breeding/roosting habitat occurs approximately 1.5 km east of the recorder's location. It should be noted though that an acoustic recorder was also deployed within this area of habitat concurrently with the recorder that detected the species; however, no evidence of Night Parrot occurrence was detected during this sampling period.

The third, unconfirmed call of the species recorded during the 2021 fauna survey comprised a single call detected at 18.30 on 1 May 2021. The recorded call was structurally similar to a known call type (an abbreviated form of the one-note warble described by Leseberg et al. (2019)); however, as the

detected call was faint, confirmation of the identification was not possible. As only a single call was detected over six recording nights at the site, it is unlikely that roosting or foraging was occurring within 200 m of the site. With consideration of the call time (approximately one hour after sunset), the species detection is likely to be attributed to dispersal or resource-searching behaviour (i.e. in transit to or searching for food or water resources) (N. Jackett pers. comm. 25 May 2021).

Targeted sampling for Night Parrot within the Fauna Study Area via acoustic recorders focused primarily on areas of primary breeding/roosting habitat and, to a lesser extent, suitable foraging habitats (primary and secondary). The results of the 37 acoustic recorder deployments, and subsequent 336 recording nights, undertaken throughout the Fauna Study Area and adjacent areas did not record any evidence of nesting and/or roosting. Despite no Night Parrot calls being detected from recorders deployed in the area, suitable primary breeding/roosting habitat for the species occurs within parts of the Fauna Study Area, primarily within isolated areas of Saltpan and some instances of Sandy Plain habitat where suitable sized mature Triodia hommock grassland occurs with limited to no other wooded shrub or tree vegetation. Although the occurrence and extent of a Night Parrot population within or in the vicinity of the Fauna Study Area could not be ascertained, due to the cryptic and scarce occurrence of the species across its range (as indicated by previous records), any occurrence or population of the species is likely to represent an important population, as defined DoE (2013).

Likelihood of occurrence

Within the Fauna Study Area nesting and/or roosting by the species may occur in areas where suitably sized old growth Triodia is present, particularly in Sand Plain and Saltpan habitat where large mature Triodia hummocks and chenopods occur together in areas. Despite widespread recent fires across a large portion of the Fauna Study Area, there are a few occurrences of suitable nesting/roosting habitat occur, primarily within the eastern portion of the Fauna Study Area where it intersects a paleo drainage channel which is dominated by this habitat. Foraging by the species is likely to occur more broadly within and outside the Fauna Study Area. Within the Fauna Study Area primary (annual) foraging habitat occurs within Saltpan habitat and secondary (seasonal) foraging habitat occurs more broadly within Sand Plain and Stony Plain habitats dominated by Triodia hummock grasses.

The provision of suitable foraging habitat within Sand Plain and Stony Plain habitats, and therefore likelihood of utilisation by the species, is likely to be dependent on seasonal rainfall and the seeding of foraging grasses. In contrast, Saltpan habitat provides year-round foraging habitat, particularly where chenopod species (Atriplex and Tecticornia species) occur. Within the Fauna Study Area, primary nesting and roosting for the night parrot, comprising areas of large mature Triodia hummock grasses, occurs over approximately 103 ha (2% of the total Fauna Study Area). Foraging habitat within the Fauna Study Area is dominated by secondary (seasonal) foraging habitat, which occurs over approximately 6,448 ha (98%) of the Fauna Study Area with the extent of primary (annual) foraging habitat limited to approximately 30 ha (0.5%) (Table 6-7; Figure 6-5). The occurrence of food resource availability in secondary foraging habitat within the Fauna Study Area is likely to be dependent on rainfall events, which promote seeding by foraging grass species likely to be utilised by night parrot.

It should be noted, the widespread occurrence of recent fire in parts of the Fauna Study Area is likely to have resulted in a reduced suitability for the species in some areas, particularly those now currently void of vegetation or only supporting limited post-fire regrowth. The species' occurrence within the Fauna Study Area may represent resident occurrence, should areas of primary nesting/roosting habitat be utilised, or as an occasional visitor to forage should nesting occur outside the Fauna Study Area. Individuals have been recorded moving distances of approximately 9.4 km between roosting/nesting sites and foraging sites over a single night, (Murphy et al., 2017). The species is predicted to travel distances of up to 100 km per night, and greater than 100 km when resources are more sparsely distributed (i.e. during periods of drought) (Night Parrot Recovery Team, 2017). This suggests the species may utilise habitat within the Fauna Study Area at various rates depending on location of nesting/roosting and occurrence of suitable roosting/nesting and/or foraging habitat in the broader vicinity of the Fauna Study Area. As such, the species may utilise the Fauna Study Area in one

way and areas beyond the Fauna Study Area in others. For example, the Lake Dora salt lake (~35 km SE of Study Area) and associated paleo-drainage system which extends northwest from the lake into the easternmost portion of the Study area, may provide larger expanses of optimal habitat to that available within the Fauna Study Area; however, resource availability between Lake Dora and the Fauna Study Area may fluctuate, resulting in movement between the two areas.

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21°30'0"S 21°40'0"S 21°50'0"S

Indicative Night Parrot Recording Area

Telfer Mine

Havieron Mine

Development Envelope

Development Envelope

Data source: Imagery - ESRI, 2021.

LEGEND

- Development Envelope

Night Parrot Mapping

- Primary
- Primary (Continual)
- Secondary (Seasonal)

Fauna habitats

- Claypan
- Cleared/Disturbed
- Saltpan
- Sand Dune
- Sand Plain
- Stony Hill, Breakaway
- Stony Plain

Pipelines

- Gas

Rail Network

- Railway Stations
- Railway Lines

Current Roads

- Minor Road
- Regional Roads and Tracks

LOCALITY

0 1,000 2,000 3,000 4,000 5,000 Km

NIGHT PARROT RECORDS FROM SURVEY and HABITAT

Telfer and Havieron Projects

Significant Species Management Plan

N 0 2 4 6 8 Km

Coordinate System: GCS GDA 1994
Scale @ A3: 1:200,000

Prepared:	N Johnston	Date:	13/07/2022
Reviewed:	G Barrett	Revision:	B
Project:	TE21074		

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Figure 1.7

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Great Desert Skink (Liopholis kintorei) – Vulnerable (EPBC/BC Act)

The Great Desert Skink occurs in sandplain and sand dune habitats, often comprising a mosaic of different aged post-fire vegetation regeneration (DoEE 2018). Within its Western Australian distribution, vegetation is often dominated by hummock grassland (comprising *Triodia basedowii* and *T. schnizii*) and open or scattered shrubland (comprising *Eremophila leucophylla* and *Acacia* species) on red sandy substrates, or occasionally gravelly plain (Pearson et al., 2001). The species shows a preference to habitat comprising at least 50% bare ground, and inhabits areas of varying post-fire regeneration age, ranging from 3–15 years (DoEE 2018). Regenerating burnt areas are considered to potentially provide foraging habitat, while unburnt areas are more likely to be utilised for shelter (Pearson et al. 2001).

The Great Desert Skink was not recorded within the Fauna Study Area during the current survey; however, the species has previously been recorded approximately 23 km south southeast of the Fauna Study Area (DBCA 2020b). Based on the habitats present within the Fauna Study Area, the species is considered Likely to occur as a resident within Sand Plain and Sand Dune habitats. It is likely to utilise both unburnt areas and those recently burnt as regeneration occurs at various life stages for both shelter and foraging. The occurrence of Great Desert Skink within the Fauna Study Area would likely be representative of the western limit of the species' current known range. As such, a population occurring within the Fauna Study Area, if it occurred, is likely to represent an important population, as defined by DoE (2013).

1.5.3 Flora Survey Findings

Flora and Vegetation Studies

The results from floristic and vegetation surveys have been used to support the assessment of potential impacts of the Projects on flora and vegetation and are summarised in Table 5-2.

Table 1-10: Flora and Vegetation Surveys Undertaken for the Projects

Report Author	Date	Survey Description	Area	Details
Strategen JBS&G (2020b)	April 2020	Reconnaissance.	Stage 1 Access Road	19 relevés.
Strategen JBS&G (2020a)	4 - 12 March 2020 28 June - 5 July 2020	Detailed including an assessment for Groundwater Dependent Ecosystems (GDEs).	Stage 1 Mining Lease	41 quadrats with four supplementary plots with a minimum of three quadrats for all vegetation communities.
Strategen JBS&G (2021)	9 – 19 April 2021	Detailed with WDLAC Ecological Advisors.	Stage 2 - Infrastructure Corridor area	45 quadrats with a minimum of three quadrats for all vegetation communities.
Spectrum (2022)	Not applicable	Desktop Assessment.	Telfer Project – Powerline area	Desktop assessment of historical surveys.
Hart, Simpson and Associates Pty Ltd (Hart 2002)	May 1999 and May 2001	Detailed survey.	Telfer Study Ecological Area	Detailed flora survey with two single phased surveys. Extensive foot traverses, based on aerials were undertaken an unknown distance apart from one another. Opportunistic collections were made during

Report Author	Date	Survey Description	Area	Details
				vehicle and foot traverses with no quadrats installed. Survey conducted before EPA guidance was released. Does not meet EPA guidance (EPA 2016f).
Syrinx Environmental (2013)	June 2011 and October 2011	Flora, Vegetation and Fauna Desktop Review. Level 2 Flora & Vegetation Survey, field assessment of GDE.	Optimisation Study Area	Two phase flora and vegetation survey. The Survey Area was traversed by vehicle and on foot, 21 50 x 50 m quadrats were established in areas that were representative of a vegetations assemblages determined from aerial photography. Survey meets EPA guidance (EPA 2016f).

Local Vegetation Types

Telfer Project

The vegetation types remaining in the Telfer Project disturbance area (as of June 2021) are shown in Figure 1-8. All vegetation types are located outside of the Telfer Project with the majority widely represented and common. Two vegetation types of potential significance are approved for clearing (Banded Mulga (3a; VT2 - 20.83 ha) and VT6 (0.88ha)).

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21°42'0"S 21°44'0"S 21°46'0"S

Data source: Imagery - ESRI, 2021.

LEGEND

MS606 Approved Disturbance Areas

MS606 Conservation Significant Flora

Goodenia hartiana

MS606 Vegetation Communities

1d	Cleared
3c	1a
4b	1b
6b	3a
6c	4a
6e	5a
6f	7a
6g	Cl
6i	Cleared/Roads
6j	D
6k	Scattered Trees & Shrubs
VT1	Sp
VT2	Sp-A
VT3	Sp/Cl
VT4	SpGr
VT5	SpGr/WQS/Cl
VT6	St
VT7	

LOCALITY

0 1,000 2,000 3,000 4,000 5,000 Km

APPROVED PROPOSAL VEGETATION TYPES and CONSERVATION SIGNIFICANT FLORA

Telfer Project

Significant Species Management Plan

N 0 500 1,000 1,500 2,000 Meters

Coordinate System: GCS GDA 1994
Scale @ A3: 1:50,000

Prepared:	N Johnston	Date:	13/07/2022
Reviewed:	G Barrett	Revision:	B
Project:	TE21074		

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Figure 1.8

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Havieron Project

Within the Study Area, 18 vegetation types were recorded and mapped (Figure 1-9). The dominant vegetation type in the unburnt area was recorded as type 6b (7.767 ha) which was 49% of the entire Study Area. This vegetation type is typified by *Acacia stellaticeps* and *Triodia* grass lands dominated by *T. basedowii* with scattered Senna and Grevillea shrubs.

The species diversity and abundance recorded in the flora surveys was consistent with the ecology and diversity of the region and previous surveys of this level within the local area. Four vegetation types are associated with surface and groundwater; therefore this may require consideration to minimise impacts:

- Vegetation type 6i is restricted within the Development Envelope, containing scattered *Eucalyptus victrix*, a species associated with increased water availability. 6i consists of Scattered trees of *Eucalyptus victrix* over *Acacia cuthbertsonii* subsp. *cuthbertsonii* and *Senna artemisioides* subsp. *oligophylla* open shrubland over *T. schinzii* hummock grassland.
  This vegetation community is located within an area of localised water collection, potentially capturing surface water runoff during periods of heavy rainfall. Additionally, no other known groundwater dependant taxa are present within this vegetation type. Based on this, *Eucalyptus victrix* is likely to primarily reliant on surface water within this vegetation and as such, vegetation type 6i is unlikely to represent a GDE.

  Eucalyptus victrix is an opportunistic water user with 'intermediate' groundwater dependency (O'Grady et al. 2009). *Eucalyptus victrix* is recognised to be less reliant on groundwater access and is known to survive solely on vadose soil water sources.

  Whilst this vegetation type is restricted to within the Development Envelope, it is likely it occurs outside of the Development Envelope and Flora Survey Area. Therefore, it is not considered a significant vegetation type. The vegetation type is associated with a heritage site and will not be cleared, therefore direct impacts will not occur.

- Vegetation type 6j is associated with salt pans, however it is widely represented in the local region with an approximate extent of at least 5,340 ha, therefore isn't considered a significant vegetation type. 6j consists of Scattered Trees *of Melaleuca glomerata*, over *Tecticornia* and *Cyperus squarrosus*, *Eragrostis falcata*

- Vegetation type 6e is associated with claypans however does not include any species associated with groundwater dependency, nor does it include other characteristics normally associated with groundwater dependency e.g. plants remains green and physiologically active during extended dry periods, or feature a large leaf area index relative to other vegetation. For this reason, this vegetation type is considered to be reliant on occasional inundation of surface water and not on groundwater.

  6e consists of Fringing vegetation associated with Clay Pans. Typical community consists of *Acacia stellaticeps* over *Triodia epactia* and *Triodia basedowii.*

  Claypans have cultural significance to the Martu people and therefore, will be avoided wherever possible. Vegetation type 6e has a limited distribution within the Flora Survey Area, however is considered likely to occur elsewhere in association with claypans, therefore the vegetation type is not considered significant.

- Vegetation type 6b contains the species *Eucalyptus camaldulensis* which is associated with surface water and groundwater. This was the dominant vegetation type of the Study Area and is very widespread, therefore is not considered significant.

6b consists of *Grevillea wickhamii* Open Shrubland over *Acacia stellaticeps* and *Tribulus* spp. Low Open Shrubland over *Triodia epactia* Hummock Grassland

- Vegetation type VT2 (Vegetation type 3a within Telfer Project as per Syrinx (2013)) consists of a sheet flow dependent vegetation association (Banded Mulga). Mulga existing on slopes of between 0.2 – 2.0% are determined to be sheet flow dependent banded Mulga. VT2 consists of *Acacia pteraneura* tall shrubland, over *Acacia wanyu, Anthobolus leptomerioides* and *Psydrax latifolia* mid shrubland, over *Eremophila tietkensii* and *Eremophila latrobei* subsp. *latrobei* low open shrubland, and *Triodia basedowii* low open hummock grassland (Banded Mulga).

  Mulga vegetation types play an important role in water and nutrient capture, they are important for ecosystem function and may support or provide refuge to restricted flora and fauna species. Interruption to sheet flow can cause detrimental effects to Mulga due to water and nutrient run-off (Syrinx 2013).

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21°30'0"S 21°40'0"S 21°50'0"S

Telfer Mine

Havieron Mine

Data source: Imagery - ESRI, 2021.

LEGEND

Development Envelope

Flora and Vegetation Study Areas

Strategen JBS&G (2020-2021) Study Area

Spectrum Ecology (2022) Study Area

Pipelines

Gas

Current Roads

Minor Road

Regional Roads and Tracks

Vegetation Communities

1d	Cleared
3c	1a
4b	1b
6b	3a
6c	4a
6e	5a
6f	7a
6g	Cl
6i	Cleared/Roads
6j	D
6k	Scattered Trees & Shrubs
VT1	Sp
VT2	Sp-A
VT3	Sp/Cl
VT4	SpGr
VT5	SpGr/WQS/Cl
VT6	St
VT7	

LOCALITY

0 1,000 2,000 3,000 4,000 5,000 Km

FLORA and VEGETATION SURVEY AREA

Telfer and Havieron Projects

Significant Species Management Plan

N

0 1 2 3 4 5 6 7 Kilometers

Coordinate System: GCS GDA 1994
Scale @ A3: 1:200,000

Prepared:	N Johnston	Date:	13/07/2022
Reviewed:	G Barrett	Revision:	B
Project:	TE21074		

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Figure 1.9

Document Path: \\server\Talis\SECTIONS\Environment\Projects\TE2021\TE21074 - Havieron approvals\GIS\Maps\Haverion_TE21074_EPA_Assesment\Haverion_TE21074_EPA_Assesment.aprx

Significant vegetation communities

None of the vegetation associations mapped and described is listed as Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs).

Banded Mulga Vegetation type (VT2, Vegetation type 3a within Telfer Project as per Syrinx (2013)) consists of 66 ha of a sheet flow dependent vegetation association. Mulga existing on slopes of between 0.2 – 2.0% are determined to be sheet flow dependent banded Mulga. Mulga vegetation types play an important role in water and nutrient capture, they are important for ecosystem function and may support or provide refuge to restricted flora and fauna species. Interruption to sheet flow can cause detrimental effects to Mulga due to water and nutrient run-off (Syrinx 2013).

Aerial analysis of the local area confirmed that Banded Mulga is not widespread in the Telfer locality. However, 328 ha of banded Mulga may occur within a 10 km buffer of the Telfer Project. This sheet flow dependent vegetation is still locally restricted, but perhaps not as regionally restricted.

One additional vegetation type (VT6 – 13 ha) could be considered significant due to a restricted distribution, being representative of the range of a unit, and a novel combination of species. VT6 is described as *Acacia wanyu* tall open shrubland, over *Eremophila tietkensii, Senna sericea* and *Senna glutinosa* subsp. x *luerssenii* mid open shrubland, over *Triodia basedowii* and/or *Triodia epactia* low hummock grassland, with over *Acacia stellaticeps* low isolated shrubs. This vegetation type occurs on quartzite rocky slopes and may be regionally restricted, although 100.9 ha was recorded in the O'Callaghans area to the south east of the Telfer Project (Spectrum 2022).

Significant Flora

A summary of potential significant flora species recorded in the study area is detailed below and shown in Table 1-11 and Figure 1-10:

- *Seringia exastia* (Threatened – BC Act, Critically Endangered – EPBC Act; Fringed Fire-bush) was recorded on several occasions. The species was originally identified as *Seringia elliptica*, consistent with numerous other herbarium collections from the region. A recently completed taxonomic study that assessed genomic and morphological characters in several Seringia taxa (Binks & al. 2020) has concluded that *Seringia exastia* and *Seringia elliptica* are the same species. The taxonomy of the genus has been revised to synonymise *Seringia exastia* and *Seringia elliptica* under the oldest valid name of *Seringia exastia*. As *Seringia elliptica* is common and widespread throughout the Pilbara region, central WA and the Northern Territory and extends into South Australia, following the taxonomic revision *Seringia exastia* is now considered common and widespread. The Havieron locations are more than 400 km south of the Port of Broome collections of *Seringia exastia*, with numerous examples of the former *Seringia elliptica* occurring between.

  Seringia exastia is expected to be removed as a Threatened species under State legislation in the next review (Carolyn Wilkins (WAHERB), pers. comm.). A nomination to delist *Seringia exastia* following recent taxonomic review has been prepared, and future recommendations are expected after the WA Threatened Species Scientific Committee meeting (Binks, et al, 2020). Additionally, the vegetation type association with records of *Seringia exastia* are well represented outside of the Flora Study Area (Strategen 2021). However, until changes are officially made to the threatened species list, *Seringia exastia* is still legally listed as threatened flora, and authorisation to take under section 40 of the BC Act is still required.

  For the purposes of this SSMP, the species' current name (*Seringia exastia*) is used, however given it was originally identified as *Seringia elliptica* and the potential reclassification, it should not be considered a significant flora species.
- *Goodenia hartiana* (P2) has been observed in several local and regional surveys undertaken over the past two decades and has been recorded in rehabilitated areas on the mine site. (HSA 2002; Ecologia 2003; MBS 2005; Syrinx 2004, 2006, 2007, 2008, 2010, 2012a, 2012b).

The species has been recorded within sand, sand dune swales, and sand hills with associated vegetation widespread, particularly throughout the west of the Telfer Project (Syrinx Environmental, 2013b).

The previously recorded population of *Goodenia hartiana* within the Telfer Project area (Figure 1-8) is likely still present. Two other *Goodenia hartiana* populations may also occur within the south of the Approved Proposal (Syrinx 2013) and the local population is widely distributed (Figure 1-8).

Populations of *Goodenia hartiana* are highly dynamic, displaying dramatic changes in number of individuals recorded between surveys. While the ecology of this Priority flora species is not well understood it has been suggested that this stochasticity may be a response to fire and rainfall (Sage, 2006; Syrinx Environmental, 2010). Fire seems to play a major role in the resprouting and emergence of *Goodenia hartiana* seedlings and may be instrumental in predicting future population dynamics (Syrinx Environmental PL, 2010).

Goodenia hartiana was only found in large numbers when in association with low lying hills with silcrete sands 1-10cm thick, always overlaying rock, that have been burnt with the last 12 months. Unburnt areas of similar habitat type still supports *Goodenia hartiana* populations, but at much lower densities.

Syrinx Environmental (2010) reported that *Goodenia hartiana* population extents did not generally alter. This suggests that previously recorded populations may remain in the same location and that the populations previously recorded within the Telfer Project is likely still present. A large proportion of these individuals were displaying population decreases and signs of stress. There are approximately 11,000 individuals within the Telfer Project, and approximately 40,000 individuals outside. *Goodenia hartiana* was recorded within the Telfer Project and was considered in its assessment and subsequent approval, however further surveys have occurred since that time and populations may have changed.

In some instances, the identification of *Goodenia hartiana* may have been incorrect and that the species present may have been the superficially similar *Goodenia azurea* (Syrinx Environmental, 2013a).

- One collection, nominally called *Myrtaceae* (Tribe Chamelauciae) sp. may be a new variant, a large range extension or a new species. Consultation with the Western Australian Herbarium indicates it is likely to be a new species. Identification of this species would be dependent upon flowering specimens, with the flowering period unknown (although the April 2021 survey specimen included spent flowers, indicating the flowering period may be during the end of the wet season). The specimen was recorded along roadsides north east of Telfer within the 6f vegetation community, which is widely distributed through the local region. While this area was surveyed for the impact assessment, the area was subsequently removed from the Development Envelope and there will be no impact on this taxon.

Three range extensions were recorded (*Cyperus squarrosus*, *Heliotropium chrysocarpum* and *Panicum effusum*. However, these species are not of conservation significance and the range extension is likely associated with the absence of previous surveys in the area.

As a result of the desktop assessments, 13 additional Priority flora species were identified:

- *Goodenia nuda* (P4) is highly likely to be found with the Flora Study Area based on habitat preference. Given the species likelihood of occurrence, additional information is provided in Table 1-11;
- One (*Indigofera ammobia* (P3)) is likely to be found within the Study Area, as this species prefers deep red sands commonly associated with sand dunes. Other *Indigofera* species were recorded and were in flower (*Indigofera boviperda* subsp. Eremaea and, *Indigofera monophyla)* but *I. ammobia* was not recorded in surveys;

- Three (*Dampiera atriplicina* (P3)*, Eremophila maculata* subsp. *filifolia* (P1) and *Pterocaulon xenicum* (P3)) have a mediuim likelihood of occurrence
- Five (*Acacia auripila* (P2), *Eremophila* sp. Rudall River (P2), *Eremophila tenella* (P1), *Ptilotus wilsonii* (P1), and *Ptilotus mollis* (P4)) may occur within rocky ridgeline habitats, however detailed surveys did not identify the species despite ideal environmental conditions;
- Three are not likely to be found due to an absence of habitat.

One additional priority flora species (*Fuirena incrassata*; Priority 3) may occur in the Telfer Project area, as was included in the MS606 approval (Newcrest 2002). The species was found in small numbers in a low-lying site in the Freedom Road borefield. The species is widespread in the Kimberleys and Pilbara, and occurs in northern areas in other states. This collection appears to be a minor range extension into the desert. It is a relatively inconspicuous sedge and is probably poorly collected rather than rare.

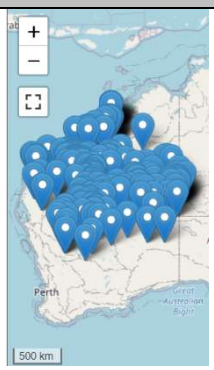
Introduced Species

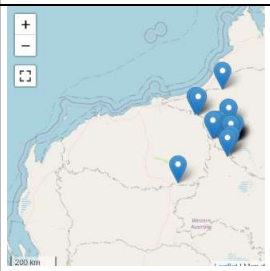
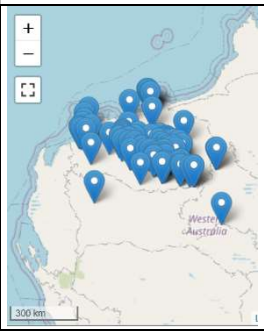
The surveys did not record any weeds of national significance (WoNS) or introduced/exotic taxa within the Havieron Study Area.

A weed survey undertaken in 2019 within the Telfer Project area recorded a total of 17 weed species, including two WoNS/Declared Pest species: *Tamarix aphylla* (Athel Tree) and *Cylindropuntia fulgida* var. mamillata (Boxing Glove Cactus). The Boxing Glove Cactus was recorded for the first time at the site. The majority of weed species recorded represent species that are commonly recorded throughout the region in areas subject to some form of land disturbance (Astron, 2019).

Table 1-11: Flora of Conservation Significance

All images from Florabase (https://florabase.dpaw.wa.gov.au/)

Species	Status	Description	Records – Flora Study Area	Distribution
Seringia exastia	Threatened (BC Act) and Critically Endangered (EPBC Act) with reclassification pending	Shrub with hairy stems. Flowering time April, May, June, July, August, September, October, November or December. Distribution Botanical Province Northern or Eremaean, IBRA Bioregion Great Sandy Desert or Dampierland (Florabase 2021).	4	
Myrtaceae (Tribe Chamelauciae) sp.	Variant, range extension or new species	At the time of collection (April 2021) the specimen has spent flowers resembling Calytrix species. As *Calytrix carinata* was at the end of its flowering period, it is probable that the optimum flowering season for this species is close to the end	1	Not applicable

Species	Status	Description	Records – Flora Study Area	Distribution
		of the wet season. The unknown Myrtaceae has morphology resembling Calytrix. Therefore, if this record has similar flower morphology, it may have similar seed dispersal mechanisms and potential similar post-fire recovery recruitment		
Goodenia hartiana	Priority 2	Erect to spreading, multi-stemmed perennial, herb or shrub (sub-shrub). Habitat includes sand and sand dune swales, sandhills.	Approx. 51,000	 (
Goodenia nuda	Priority 4	Erect to ascending herb, to 0.5 m high. Flowers yellow in April to August.	0	

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21°30'0"S 21°40'0"S 21°50'0"S

Telfer Mine

Havieron Mine

Data source: Imagery - ESRI, 2021.

LEGEND

- Development Envelope
- Indicative Footprint (Stage 1)
- Indicative Footprint (Stage 2)

Flora and Vegetation Study Areas

- Strategen JBS&G (2020-2021) Study Area
- Spectrum Ecology (2022) Study Area

Pipelines

- Gas

Current Roads

- Minor Road
- Regional Roads and Tracks

Vegetation Communities

- 1d
- 3c
- 4b
- 6b
- 6c
- 6e
- 6f
- 6g
- 6i
- 6j
- 6k
- VT1
- VT2
- VT3
- VT4
- VT5
- VT6
- VT7
- Cleared
- 1a
- 1b
- 3a
- 4a
- 5a
- 7a
- Cl
- Cleared/ Roads
- D
- Scattered Trees & Shrubs
- Sp
- Sp-A
- Sp/Cl
- SpGr
- SpGr/ WQS/Cl
- St

Significant Flora Records

- Cyperus squarrosus
- Heliotropium chrysocarpum
- Myrtaceae (Tribe Chamelauciae) sp.
- Panicum effusum
- Seringia exastia
- Goodenia hartiana

LOCALITY

0 1,000 2,000 3,000 4,000 5,000 Km

CONSERVATION SIGNIFICANT FLORA IN SURVEY AREA

Telfer and Havieron Projects

Significant Species Management Plan

N 0 1 2 3 4 5 6 7 Kilometers

Coordinate System: GCS GDA 1994
Scale @ A3: 1:200,000

Prepared:	N Johnston	Date:	13/07/2022
Reviewed:	G Barrett	Revision:	B
Project:	TE21074		

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Figure 1.10

1.5.4 Key Assumptions and Uncertainties

The SSMP has been based on survey and study findings and Project impacts. The key assumptions include:

- The field surveys, undertaken by suitably qualified individuals with experience in the fauna and flora taxa likely to be encountered, provide sufficient information to confirm the presence and abundance of significant taxa with the potential to occur within the area of the Amended Proposal and surrounds;
- The majority of 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 fauna 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 significant fauna species identified, the extent of potentially suitable breeding/foraging habitat is expected to extend beyond the fixed area of the field surveys;
- The flora and vegetation surveys were conducted in conditions that were typical of the weather experienced for the region at the time of the surveys.

The key uncertainties include the following:

- The rate at which Secondary habitat for Bilby and Night Parrot may transition to Primary habitat, more specifically the time, fire impacts and environmental conditions for spinifex to develop to provide Primary breeding or nesting habitat;
- The implications of fire and feral animal predation on fauna habitat quality and significant fauna populations;
- The implications of fire on flora species identification, due to portions of the survey area having been recently burnt, resulted in some collections not identifiable to species level and composition of flora present potentially being skewed towards species whose germination is stimulated by fire and fire tolerant species
- The size, extent and structure of Night Parrot populations and individual movements is uncertain;

1.5.5 Rationale for choice of provisions

The mitigation hierarchy is based on the objective of avoiding direct impacts to Bilby and Night Parrot actives sites, and minimising indirect impacts to Primary Bilby and Night Parrot habitat, significant flora, vegetation and fauna individuals.

Where possible, this SSMP utilizes outcomes-based trigger and threshold criteria. Objectives-based management actions are utilized as significant fauna (as an ecological factor) often have low densities and patch distributions, which can be difficult to objectively measure. Objectives-based management actions will be implemented to prevent indirect impacts and to manage direct impacts from vegetation clearing and vehicle movement. The management actions focus on all key project activities identified as potentially having a medium or higher risk on significant species (Appendix A).

The provisions within this SSMP have been informed by results of baseline surveys as detailed in Table 1-7 and Table 1-10, the characteristics of the Project and government guidelines. Flora and

vegetation and terrestrial fauna have been combined into one SSMP, given overlap in impact and associated objectives and management actions.

The management approaches discussed in this document are based and developed around the mitigation hierarchy of avoid, minimise, rehabilitate and offset to ensure impacts to significant species have been avoided or reduced to as low as reasonably practicable. Management measures have been designed to minimise the impacts of the Project.

The Havieron Project will have a life of approximately 17 years with priority use of existing disturbed areas. Management and mitigation measures have been designed for the Project life, and as such, may require adaptive solutions in subsequent revisions.

Due to conservation classification, confirmed occurrence of species and potential Project impacts, additional management measures have been proposed for fauna species, the Bilby and Night Parrot, *Goodenia hartiana* and significant vegetation types. The management approach of this SSMP is based on relevant Government policy, in particular any relevant Conservation Advice or National Recovery Plans.

Management targets and associated actions have been developed to be risk-based and application of the mitigation hierarchy ensures impacts to the key environmental factors have been avoided or reduced to as low as reasonably practicable. Management actions have been identified and prioritised based on a risk assessment (Appendix A), based on survey outcomes and Project impacts.

The potential effects of the Project on significant fauna will be managed through implementing the 'Mitigation Hierarchy' of:

- Avoid;
- Minimise;
- Rehabilitate (or Remediate); and
- Offset.

Focus on Avoidance

As described above, biological surveys have informed the design and layout to ensure direct impacts on current primary fauna habitats and flora populations have been avoided. Based on the current design and available survey information, no direct impact to current primary Bilby and Night Parrot habitat.

The preclearance survey requirements will ensure Bilby and Night Parrot active burrows or nesting sites are identified and avoided to ensure no direct impact to individuals.

Minimising impact

Significant fauna and flora species and vegetation types could be susceptible to direct impacts and indirect impacts during construction and operations. Direct impacts may result from vehicle use and unauthorised clearing of native vegetation. Indirect impacts include vegetation type and habitat degradation through altered fire regimes, increased predation or weed presence, dust emissions and deposition.

Applicable management actions and targets to minimise incidental mortality of fauna and direct loss of flora individuals, as well as indirect impacts to all significant species are proposed in Section 2.2.

Remediation actions where impacts cannot be avoided

If incident reports or annual monitoring indicate that incidental fauna mortality from vehicle strikes is an issue of significance, Newcrest will consult with DBCA with respect to adaptive management measures and controls that could be implemented to reduce impacts.

Offsets

As a result of the environmental impact assessment, the Havieron Project could result in Significant Residual Impacts to the Night Parrot. Therefore, an Offset Strategy has been proposed to ensure conservation benefit to the species.

No significant residual impacts were associated with the Bilby and therefore does not require an offset strategy.

2. MANAGEMENT PLAN COMPONENTS

This section identifies the outcome-based and objective-based components of the SMMP that Newcrest will implement to ensure protection of significant flora, vegetation types and fauna. Outcome, objectives, management actions, targets and monitoring have been developed based on a risk-based approach as shown in Appendix A.

2.1 Outcome-based SSMP

The outcomes-based criteria and response actions are outlined in Table 2.1. Criteria have been developed to prevent (trigger criteria) and mitigate (threshold criteria) any potential impacts. No early response triggers have been established for Outcome-based provisions in this version of the SSMP.

Table 2.1: Significant Species Outcome Based Management Plan

PURPOSE OF SSMP: Avoid impacts to Bilby and Night Parrot active sites and maintain clearing compliance.

RATIONALE: Removal of active Bilby and Night Parrot sites may result in a significant impact to the local species populations. Clearing of 1,266 ha of fauna habitat and native vegetation will be approved, with any additional clearing considered a non-compliance with potential impacts to fauna species and native vegetation.

EPA Factor and Objective: *Terrestrial Fauna – "To protect terrestrial fauna so that biological diversity and ecological integrity are maintained"*

Outcome:
To avoid the potential environmental effect of the Amended Proposal to significant fauna. The following outcomes have been established:

- Clearing of no more than 1,266 ha of fauna habitat or vegetation within the Development Envelope
- No removal of active Bilby burrows within the Development Envelope
- No impacts to Night Parrot nesting sites within the Development Envelope

Key Environmental Values:
The following significant fauna have been recorded within the area of the Project and surrounds:

- Greater Bilby (*Macrotis lagotis*);
- Brush-tailed Mulgara (*Dasycercus blythi*);
- Northern Marsupial Mole (*Notoryctes caurinus*);
- Western Pebble-mound Mouse (*Pseudomys caurinus*);
- Night Parrot (*Pezoporus occidentalis*);
- Great Desert Skink (*Liopholis kintorei*); and
- Migratory birds – Red Knot (*Calidris canutus*), Wood Sandpiper (*Tringa glareola*), Common Sandpiper (*Actitis hypoleucos*), Sharp-tailed Sandpiper (*Calidris acuminata*) and Gull-billed Tern (*Gelochelidon nilotica*).

Key impacts and risks

- direct loss of habitat from vegetation clearing.

Criteria	Response actions	Monitoring	Timing / frequency of monitoring	Reporting
Outcome 1: Clearing of no more than 1,266 ha of fauna habitat or vegetation within the Development Envelope				

Trigger Criteria: Clearing without an authorised internal permit within the Development Envelope	Trigger level actions:
	• Report and investigate internally as an incident in accordance with internal procedures.
	• Review impact of unauthorised clearing and report any non-compliance against Ministerial Statement to DWER within 7 days of identification.
	• Review Surface Disturbance Permit Procedure and implement changes to prevent future occurrences which may include the following:
	  ○ Surface Disturbance Permit competency training, including adequacy of inspections
	  ○ Improved practices associated with survey and demarcation of proposed clearing areas
	  ○ Improved traffic management procedures to avoid accidental disturbance of flora and vegetation (e.g. keeping to designated tracks)
	• Rehabilitation of vegetation disturbance to be considered to re-instate fauna habitat
		• Internal environmental compliance inspections
		• Surface Disturbance Permit pre-clearing and post construction inspections
		• Clearing Review
		• Monitoring of incident reports
			• Annually, as required, during operations	• Internal Incident Report
				• Annual Compliance Audit Report
				• Annual Clearing review
				• Survey data
				• Report any non-compliance against approvals to regulatory authority within 7 days of identification.

Threshold Criteria: Clearing outside of the Development Envelope or above 1,266 ha	Threshold contingency actions: • Cease clearing activities • Report and investigate internally as an incident in accordance with internal procedures • If disturbance is attributed to Proposal activities, undertake a review of layout to determine if impact can be minimised, develop actions to prevent a recurrence and communicate findings to relevant personnel • Suitably qualified fauna specialist to undertake an assessment of impact • Rehabilitation of vegetation disturbance to be considered to re-instate fauna habitat			• Report as a non-compliance against approval to regulatory authority within 7 days of identification • Incident investigation report provided within 21 days of identification to regulatory authority • Reporting on implementation of corrective and mitigation actions from incident investigation on an annual basis to regulatory authority
Outcome 2: No removal of active Bilby burrows within the Development Envelope				
Trigger Criteria: Active Bilby burrow identified within area of proposed clearing	• Review clearing justification to minimise clearing required • Implement 100 m exclusion buffer zones around active burrow and any associated Primary habitat for new disturbance areas, where possible • If avoidance is possible, undertake annual monitoring of burrow to gather information on local population and activity status. As part of Surface Disturbance Permit procedure: ○ Ensure exclusion buffer zone is surveyed and demarcated to avoid clearing active burrow	• Pre-clearance surveys • Internal environmental compliance inspections • Surface Disturbance Permit pre-clearing and	• Annually, as required, during operations	• Annual compliance reporting • Annual Clearing review • Survey data • Pre-clearance survey reports

	◦ Implement traffic management controls to avoid accidental disturbance ◦ No unauthorised access to burrow or the 100m exclusion buffer zone • If avoidance is not possible, active burrows will not be cleared until the burrow relocation process has been successfully implemented as per Section 2.5.1.1. As part of Surface Disturbance Permit procedure: ◦ Minimise impacts to Primary habitat, where possible ◦ Ensure pre-clearance surveys are completed in the area ◦ Ensure any proposed clearing in area is surveyed and demarcated ◦ Ensure a suitably qualified fauna handler is available for clearing activities ◦ Ensure clearing activities only occur during day light hours, where practicable ◦ Undertake clearing progressively to minimize active disturbance, where possible	post construction inspections		
Threshold Criteria: Active Bilby burrow directly impacted within Development Envelope	Threshold contingency actions: • Cease clearing activities • Report and investigate internally as an incident in accordance with internal procedures • If disturbance is attributed to Proposal activities, undertake a review of layout to determine if impact can be minimised, develop actions to prevent a recurrence and communicate findings to relevant personnel • Suitably qualified fauna specialist to undertake an assessment of impact • Rehabilitation of vegetation disturbance to be considered to re-instate fauna habitat			• Report as a non-compliance against approval to regulatory authority within 7 days of identification • Incident investigation report provided within 21 days of identification to regulatory authority • Reporting on implementation of corrective and mitigation actions from incident investigation on an annual basis to regulatory authority
Outcome 3: No impacts to Night Parrot nesting sites within the Development Envelope				
Trigger Criteria: Night Parrot nesting site identified within area of proposed clearing	• Review clearing justification to minimise clearing required • Implement 100 m exclusion buffer zones around nesting site and any associated Primary habitat for new disturbance areas, where possible • Ensure no impact or disturbance to nesting site through implementation of Surface Disturbance procedure: ◦ Minimise impacts to Primary habitat, where possible ◦ Ensure pre-clearance surveys are completed in the area ◦ Ensure any proposed clearing in area is surveyed and demarcated ◦ Ensure a suitably qualified fauna handler is available for clearing activities ◦ Ensure clearing activities only occur during day light hours, where practicable ◦ Undertake clearing progressively to minimize active disturbance, where possible	• Pre-clearance surveys • Internal environmental compliance inspections • Surface Disturbance Permit pre-clearing and post construction inspections	• Annually, as required, during operations	• Annual compliance reporting • Annual Clearing review • Survey data • Pre-clearance survey reports
Threshold Criteria: Night Parrot nesting site directly impacted within Development Envelope	Threshold contingency actions: • Cease clearing activities • Report and investigate internally as an incident in accordance with internal procedures • If disturbance is attributed to Proposal activities, undertake a review of layout to determine if impact can be minimised, develop actions to prevent a recurrence and communicate findings to relevant personnel • Suitably qualified fauna specialist to undertake an assessment of impact • Rehabilitation of vegetation disturbance to be considered to re-instate fauna habitat			• Report as a non-compliance against approval to regulatory authority within 7 days of identification • Incident investigation report provided within 21 days of identification to regulatory authority • Reporting on implementation of corrective and mitigation actions from incident investigation on an annual basis to regulatory authority
EPA Factor and Objective: *Terrestrial Flora and Vegetation – "To protect flora and vegetation so that biological diversity and ecological integrity are maintained"*				
Outcome: To avoid or minimize the potential environmental effect of the Amended Proposal to significant flora and vegetation. The following objectives have been established: • Clearing of no more than 1,266 ha of vegetation within the Development Envelope – Refer to Terrestrial Fauna (above) for this outcome • Clearing of no more than 21.56% of Goodenia hartiana local records				
Key Environmental Values: The following significant flora and vegetation have been recorded within the area of the Project and surrounds:				

- *Goodenia hartiana*
- Vegetation type Banded Mulga (VT2 (Spectrum 2022) and 3a (Hart, Simpson and Associates 2002)) and VT6 (Spectrum 2002)

Key impacts and risks

- Indirect impacts on conservation flora and vegetation, including:
  - Impacts of dust deposition;
  - Impacts from overspray of water used for dust suppression;
  - Altered surface drainage flow patterns and spread of weeds resulting in changes to vegetation structure and composition; and
- Impacts from spills of hydrocarbons and saline water.

Criteria	Response actions	Monitoring	Timing / frequency of monitoring	Reporting
Outcome 1: Clearing of no more than 21.56% of *Goodenia hartiana* local records				

Trigger Criteria: *Goodenia hartiana* confirmed within clearing area	• Undertake targeted survey within areas of potential habitat to confirm number of individuals
	• Complete a population impact assessment to ensure that impacts to local records are less than 21.56% prior to clearing.
	• If impacts are greater than 21.56% of local records, the following may occur to decrease impacts to an acceptable level:
	  ○ Re-design clearing to avoid individuals
	  ○ Undertake additional targeted surveys in local area to increase known population size
	  ○ Consider rehabilitation trials to increase population size
	• As part of Surface Disturbance Permit procedure:
	  ○ Ensure any proposed clearing in area is surveyed and demarcated to avoid clearing individuals
	  ○ Ensure clearing activities only occur during day light hours, where practicable
		• Targeted surveys
		• Internal environmental compliance inspections
		• Surface Disturbance Permit pre-clearing and post construction inspections
			• Annually, as required, during operations	• Annual compliance reporting
				• Annual Clearing review
				• Survey data
				• Targeted survey reports

Threshold Criteria: More than 21.56% of *Goodenia hartiana* local records cleared	Threshold contingency actions: • Cease clearing activities • Report and investigate internally as an incident in accordance with internal procedures • If disturbance is attributed to Proposal activities, undertake a review of layout to determine if impact can be minimised, develop actions to prevent a recurrence and communicate findings to relevant personnel • Suitably qualified flora specialist to undertake an assessment of impact • Rehabilitation of vegetation disturbance to be considered to re-instate *Goodenia hartiana* individuals			• Report as a non-compliance to DWER within 7 days of identification • Incident investigation report provided within 21 days of identification to DWER • Reporting on implementation of corrective and mitigation actions from incident investigation on an annual basis to DWER

2.2 Objective-based SSMP

The objectives-based management actions and targets are outlined in Table 2.1. Management actions specified in the provisions tables for each species are commensurate with their conservation significance and the potential impact(s) of the Projects.

Table 2.2: Significant Species Management Actions and Targets

PURPOSE OF SSMP: Provide management actions for potential impacts on significant species and associated habitat within the Development Envelope

RATIONALE: The Management actions proposed will minimise impacts to critical habitat, potential indirect impacts and potential fauna fatalities. Management actions are considered industry standard with amendments to reflect the Proposal environmental setting.

EPA Factor and Objective:
Terrestrial Fauna – "To protect terrestrial fauna so that biological diversity and ecological integrity are maintained"

Management Objective:
To avoid or minimise the potential environmental effect of the Project to significant fauna species. The following objectives have been established:

- No significant impact to Primary Greater Bilby and Night Parrot habitat within the Development Envelope
- No significant impact to significant fauna species or habitat within the Development Envelope

Key Environmental Values:
The following conservation significant fauna have been recorded within the area of the Project and surrounds:

- Greater Bilby (*Macrotis lagotis*);
- Brush-tailed Mulgara (*Dasycercus blythi*);
- Northern Marsupial Mole (*Notoryctes caurinus*);
- Western Pebble-mound Mouse (*Pseudomys caurinus*);
- Night Parrot (*Pezoporus occidentalis*);
- Great Desert Skink (*Liopholis kintorei*); and
- Migratory birds – Red Knot (*Calidris canutus*), Wood Sandpiper (*Tringa glareola*), Common Sandpiper (*Actitis hypoleucos*), Sharp-tailed Sandpiper (*Calidris acuminata*) and Gull-billed Tern (*Gelochelidon nilotica*).

Key impacts and risks

- direct loss (injury or mortality) of fauna from clearing, operations and vehicle interactions;
- Indirect impacts on conservation significant fauna species from which includes:
  - increased predation and competition due to introduced fauna species; and
  - impacts to fauna habitat due to altered fire regimes.

Management targets	Management Actions	Monitoring	Timing	Reporting
No significant impacts to Primary Bilby and Night Parrot habitat	• Surface Disturbance Permit procedure to be implemented, including: ◦ Review of clearing justification to minimise clearing required; ◦ Review of Significant Fauna Register to minimise clearing of Primary habitat; ◦ Implement 100 m exclusion buffer zones around Primary habitat for new disturbance areas, where possible; ◦ Surveying and demarcation of proposed clearing area; ◦ Pre-clearance inspections are to be undertaken in accordance with Section 2.5.1; ◦ Clearing activities to occur during day light hours, where practicable; and ◦ Clearing to be undertaken progressively, where possible, to minimise active disturbance; • Spatial data of current Primary Bilby and Night Parrot habitats and sightings to be maintained (Fauna Register) and used in planning clearing activities; • If Night Parrot Primary habitat is identified within 100 m of haul roads, acoustic recorders will be established annually to determine potential nesting sites; and • Disturbance to be progressively rehabilitated, where possible.	• Environmental Compliance Inspections • Clearing and Fauna Registers	• Pre-clearing • During clearing activities	• Compliance Audit Report
No significant impacts to significant fauna due to mortalities from clearing activities	• Surface Disturbance Permit process to be implemented, including: ◦ Review of Significant Fauna Register to identify any recent significant fauna observations; ◦ Implement a 100 m buffer around active denning or nesting sites for new disturbance, where possible; ◦ Demarcation of proposed clearing area; ◦ Pre-clearance inspections are to be undertaken in accordance with Section 2.5.1; and ◦ Clearing activities to occur during day light hours, where practicable. • A suitably qualified fauna handler will be trained and available, as required; • Injured fauna individuals will be managed as per Section 2.3.1.3; and • Fauna Sighting, Injury and Mortality Reporting as per Section 2.4	• Environmental Compliance Inspections • Post clearing survey • Fauna register	• During clearing activities	• Compliance Audit Report • Significant fauna injury reporting to DBCA
No significant impacts to significant fauna due to mortalities from entrapment	• During construction, all construction pipes, culverts, or similar structures stored on–site overnight, will be inspected (where possible) before the pipe is buried, capped, used, or moved; • If the inspection indicates fauna presence inside stored materials, trenches or equipment, work on those materials will cease until the individual has been relocated by a suitably qualified Fauna handler or displaced; • Drill holes (excluding those located in active open pits) are plugged when not in use and rehabilitated when no longer required;	• Environmental Compliance Inspections • Fauna register	• Ongoing	• Compliance Audit Report • Significant fauna injury reporting to DBCA

	• Open holes and trenches are to be minimised. If required, steep-walled holes or trenches more than one metre deep will be secured against animal entry at the close of each day or egress options (ramps or egress matting) will be installed. • Permanent fauna water resources have egress matting; • Assess the requirement for fencing to decrease risk of Night Parrot interactions, where possible; • Injured fauna individuals will be managed as per Section 2.3.1.3; and • Fauna Sighting, Injury and Mortality Reporting as per Section 2.4			
No significant impacts to significant fauna due to mortality from vehicle interactions	• Significant fauna register to include locations of significant fauna sightings; • Vehicle speed limits will be implemented, in particular decreased speed limits (by at least 20 km/hr) within 500 m of active significant fauna sites (Primary habitat, nesting or denning sites) with associated signage; • No unauthorised off-track driving; • If Night Parrot Primary habitat is identified within 100 m of haul roads, acoustic recorders will be established annually to determine potential nesting sites; • Injured fauna individuals will be managed as per Section 2.3.1.3; and • Fauna Sighting, Injury and Mortality Reporting as per Section 2.4.	• Environmental Compliance Inspections • Fauna register	• Ongoing	• Compliance Audit Report • Significant fauna injury reporting to DBCA
No significant increase of predation	• Minimisation of ponding water in the irrigation area through irrigation rotation, inspections and fencing to exclude fauna; • Potential fauna water resources are to be minimised and permanent water sources are to be contained through fencing where appropriate; • Food waste bins to be securely closed to prevent fauna entry; • Landfill to be covered at on a regular basis to minimise windblown rubbish and it's attraction to wildlife; • Workplace inspections for waste management; • Feral animal sightings shall be reported to the Environmental Department and recorded to monitor occurrences; • Predator (feral cat (*Felis catus*), feral dog (*Canis lupis*) and the European red fox (*Vulpes vulpes*)) sightings to be recorded; • Predator species control will be undertaken including: ◦ Baiting, trapping and/or culling for the feral cat (*Felis catus*), the feral dog (*Canis lupis*) and the European red fox (*Vulpes vulpes*); ◦ Cat traps to be set based on sightings in Development Envelope. Traps shall be left open overnight and checked with two hours of sunrise; ◦ All introduced fauna caught shall be transported immediately for euthanising; ◦ No feeding of any animals shall occur. Disciplinary action will be taken if it's discovered that feeding has occurred; and ◦ Monitoring of incident reports for significant fauna species predation.	• Environmental Compliance Inspections • Fauna register • Incident report monitoring	• Ongoing	• Compliance Audit Report
Minimise risk of Project related fires impacting fauna habitat	• Firefighting equipment will be permanently located on site; • Emergency response team will be trained to respond to fire emergencies; • A Hot Work Permit system will be developed and implemented; • All machinery and vehicles undertaking clearing activities will be equipped with firefighting equipment; and • Implementation of fire management procedures (e.g. maintenance of fire breaks, Hot Work Permit system, firefighting training, Emergency Response Plan, controlled burns).	• Workplace and Environmental Compliance Inspections • Incident Register	• Ongoing	• Compliance Audit Report • Incident Reports

EPA Factor and Objective:
Terrestrial Flora and Vegetation – "To protect flora and vegetation so that biological diversity and ecological integrity are maintained"

Management Objective:
To avoid or minimize the potential environmental effect of the Amended Proposal to significant flora and vegetation. The following objectives have been established:

- No significant adverse indirect impacts to significant flora species and vegetation within the local region

Key Environmental Values:
The following significant flora and vegetation have been recorded within the area of the Project and surrounds:

- *Goodenia hartiana*
- Vegetation type Banded Mulga (VT2 (Spectrum 2022) and 3a (Hart, Simpson and Associates 2002)) and VT6 (Spectrum 2002)

Key impacts and risks

- Indirect impacts on conservation flora and vegetation, including:
  - Impacts of dust deposition;
  - Impacts from overspray of water used for dust suppression;
  - Altered surface drainage flow patterns and spread of weeds resulting in changes to vegetation structure and composition; and
  - Impacts from spills of hydrocarbons and saline water.

Management targets	Management Actions	Monitoring	Timing	Reporting
No significant impact to flora and vegetation from dust deposition	• Avoid land clearing activities during windy conditions, where possible; • Stage clearing activities to minimise exposure of bare areas where possible; • Use dust suppression where required; • Regularly inspect and maintain water sprays and water trucks; and • Progressively rehabilitate or cover (using vegetation, rock, water and/or appropriate dust suppressant) exposed areas as soon as practicable.	• Environmental Compliance Inspections • Incident Register	• Ongoing	• Compliance Audit Report • Incident Reports

No significant impact to flora and vegetation from saline water, hydrocarbons and chemicals	• Maintain and inspect vehicles and machinery to prevent spills and leaks; • Segregate hydrocarbon wastes from other wastes; • Use of licenced contractors to dispose of hydrocarbon waste offsite; • Storage of hydrocarbons and chemicals in accordance with Australian Standards AS1940 and AS1692; • Construct new haul roads with drainage management controls (i.e. drains) to capture minor hydrocarbons spills or saline water run-off (from dust suppression); and • Implement a spill response procedure that includes spill containment and clean up, as soon as possible. • Saline water runoff from dust suppression activities on roads will be contained to prevent impact on surrounding vegetation; • Environmentally hazardous material pipelines located in V drains to contain potential spills or have telemetry and automatic cut off; • Environmentally hazardous material sumps and turkeys nests to be lined; • Provide adequate freeboard on evaporation ponds for significant rainfall event; • Capture accidental spills or contaminated run-off from within infrastructure areas; and • Prevent discharge of contaminated run-off from infrastructure areas.	• Vehicle inspections • Vehicle maintenance • Environmental Compliance Inspections • Incident Register	• Periodically • During construction activities	• Compliance Audit Report • Incident Reports
No significant impact to flora and vegetation (particularly significant vegetation types) from altered surface water patterns	• Locate new access and haul roads outside of the known flooding areas, where possible; • Avoid new disturbance to claypans and maintain micro catchments to the extent possible; • Use of culverts, floodways, drains to minimise surface hydrology changes; • Sediment controls (including drains and traps) around operations areas;	• Workplace and Environmental Compliance Inspections • Incident Register	• Ongoing	• Compliance Audit Report • Incident Reports
No significant impact to flora and vegetation from Amended Proposal introduced weed species	• Identify the extent and distribution of introduced flora within areas prior and post-clearing activities; • Weed hygiene procedures for all ground-engaging machinery and equipment entering the Project area; • Imported fill material is sourced from weed-free locations and inspected prior to entering the Project area; • Periodically inspect areas susceptible to weed infestation (e.g. disturbed lands topsoils and subsoils stockpiles); • Stockpile weed-infested topsoils and subsoils separately from other soils; • Manage topsoil stockpiles to minimise weed infestations and maintain viability of seed stock; • Implement a weed control program; and • Maintain a weed register.	• Environmental Compliance Inspections • Vehicle hygiene inspections • Imported fill inspections • Incident Register	• Ongoing • Prior to entering Project area	• Compliance Audit Report • Incident Reports

2.3 Monitoring

A summary of the monitoring actions required to implement this SSMP for both fauna and flora and vegetation are provided in Table 5.2 and Table 5.3.

Table 2.3: Monitoring action summary

Outcome / Management Target	Monitoring Event	Monitoring Action	Frequency	Records
• No removal of active Bilby burrows within the Development Envelope • No impacts to Night Parrot nesting sites within the Development Envelope • No significant impacts to Primary Bilby and Night Parrot habitat • No significant fauna mortalities due to clearing activities	Pre-Clearance Surveys	• Pre-clearance surveys when clearing occurs within Bilby and Night Parrot habitat as required	As required	Pre-clearance survey reports
• No significant impact to significant fauna due to mortalities from clearing activities	Annual Night Parrot monitoring	• Acoustic monitoring of Primary Night Parrot habitat if within 100 m of haul roads	Annual	Monitoring report
• No significant impact to significant fauna due to mortalities fauna entrapment • No significant impact to significant fauna due to mortality from vehicle interactions	Fauna Interactions	• Monitoring of incident reports for significant fauna injury or mortality. • Routine and regular inspection of open trenches where these present a risk to small animals, with recovery and relocation of animals • Environmental Compliance Inspections to ensure management measures are implemented	Ongoing and annual review	Records of notifications to CEO of DBCA (under r124 of the BC Act) and DWER CEO Fauna register
• No significant increase of predation	Predator monitoring	• Monitoring of predator populations (focussing on cat populations)	Ongoing and annual review	Fauna register
• Clearing of no more than 1,266 ha of fauna habitat and native vegetation within the Development Envelope	Clearing monitoring	• Environmental compliance inspection of clearing areas	Ongoing and annual review	Surface Disturbance Permits
• Minimise risk of Project related fires impacting on fauna habitat • No significant impact to flora and vegetation from Amended Proposal introduced weed species • No significant impact to flora and vegetation from saline water, hydrocarbons and chemicals	Local population monitoring	• Annual acoustic monitoring of Primary Night Parrot habitat if within 100 m of haul roads	Annually	Monitoring report
	Vegetation monitoring	• Vegetation photo monitoring to identify indirect impacts	Annual	Monitoring report
	Project monitoring	• Environmental compliance inspections • Monitoring of weed populations	Ongoing	Inspection Reports

Outcome / Management Target	Monitoring Event	Monitoring Action	Frequency	Records
• No significant impact to flora and vegetation from dust deposition • No significant impact to flora and vegetation (particularly significant vegetation types) from altered surface water patterns		• Monitoring of incident reports		
• Clearing of no more than 21.56% of *Goodenia hartiana* local records	Targeted surveys	• Targeted survey prior to clearing within current populations boundary	As required	Targeted survey report
• No significant impact to flora and vegetation (particularly significant vegetation types) from altered surface water patterns	Vegetation monitoring	• Vegetation photo monitoring of Banded Mulga Vegetation Type	Annual	Monitoring report

2.3.1 Pre-clearance surveys

2.3.1.1 General approach

The pre-clearance survey intent is to:

- Confirm areas of Primary fauna habitat to ensure avoidance if possible, as habitat suitability may change over time depending on fire frequency and extent, and other factors;
- Confirm locations of significant flora species and vegetation;
- Areas to be cleared will be surveyed and visually marked to ensure that clearing only occurs within approved areas and supervised.
- Identify any active breeding or nesting sites for significant fauna, in particular Bilby active burrows and Night Parrot nesting sites;
- Relocate individuals from active burrows or sites (with the exception of Night Parrot);
- Confirm sites are inactive prior to clearing;
- Destroy inactive sites to prevent re-entry prior to clearing; and
- Areas to be cleared will be visually marked to ensure that clearing only occurs within approved areas and supervised.

Pre-clearance surveys will occur as per Table 2.4 by personnel with suitable experience to identify relevant species, classify habitat suitability and potential active breeding or nesting sites (Fauna specialist).

Table 2.4: Pre-clearance survey requirements

Relevant species	Requirement for pre-clearance surveys
Bilby Great Desert Skink	Pre-clearance surveys are required within: • Suitable primary or secondary habitat due to the mobile and transient nature of the species Pre-clearance surveys are not required if clearing is to occur within 50 m of existing disturbance where displacement has likely occurred due to noise and vibration.

Relevant species	Requirement for pre-clearance surveys
Night Parrot	Pre-clearance surveys are required within: • Suitable primary breeding or foraging habitat • Within 100 m of Primary breeding or foraging habitat Pre-clearance surveys are not required in Secondary habitat.

Relevant pre-clearance survey guidelines include:

- Guideline for the survey and relocation of bilby in Western Australia (DBCA 2017g) however, the following should occur:
  - Pre-clearance surveys should occur a maximum of two weeks prior to clearing occurring;
  - Transects spaced 200 m apart to identify evidence of Bilby;
  - If significant evidence of Bilby is identified, 20 m transects will be conducted in the area to identify potential burrows;
  - Any identified burrows will be assessed for activity to determine status;
  - Records of pre-clearance survey areas and outcomes will be recorded as evidence; and
  - Cameras deployed for a minimum of three nights to confirm burrow as inactive.
- Survey guidelines for Australia's threatened birds (DEWHA 2010) and Interim guideline for preliminary surveys of Night Parrot (*Pezoporus occidentalis*) in Western Australia (DPaW 2017), however the following should occur:
  - One Acoustic recorder placed in Primary habitat and clearing area for at least six nights; and
  - Analysis of recordings by suitably qualified expert.
- Technical Guidance, Terrestrial vertebrate fauna surveys for environmental impact assessment, Environmental Protection Authority (Environmental Protection Authority, 2020).

2.3.1.2 Relocations

In the event that active sites or significant fauna individuals are identified, displacement and relocation shall occur as per the following species-specific requirements by a Fauna Specialist. No relocation of Night Parrot nests or individuals will occur, unless prior consultation has occurred with EPA, DAWE and DBCA. Clearing of sites will occur once confirmed as inactive by the Fauna Specialist. Methods to confirm that the individuals as successfully been displaced can include the use of motion sensors/cameras and/or secondary activity

A fauna handler may assist in significant fauna individual injury management and displacement. The fauna handler should have the following licensing and experience requirements:

- Significant fauna identification experience, including identification of active and inactive burrows;
- Training in assessing injured fauna and their suitability for release (Refer to DBCA (2017c) – SOP First Aid for Animals);

- An understanding of animal welfare legislation, provision of emergency care and performing euthanasia (Refer to DBCA (2017b) - SOP First Aid for Animals and DBCA (2017d) – SOP Human Killing of Animals under Field Conditions) with suitable equipment available;
- Appropriate training in fauna handling techniques (Refer to DBCA (2017a) - SOP Hand Capture of Wildlife and DBCA (2017b) – SOP Hand Restraint of Wildlife and DBCA (2017e) – SOP Animal Handling and Restraint Using Soft Containment).

The temporary holding process for significant fauna consists of:

- Individuals shall be relocated immediately if possible;
- Individuals shall be bagged (soft containment – calico, cotton or synthetic bag) ensuring a secure and ventilated environment;
- Storage shall occur in a stress free environment (quiet, dark, 15 to 25 degrees Celsius). It is expected a vacant room will be utilised;
- Individuals shall be separated where appropriate;
- Individuals shall be checked at regular intervals; and
- Refer to DBCA (2017f) - SOP Transport and Temporary Holding of Wildlife for further information.

The transportation process consists of:

- Transportation on foot or vehicle;
- Individuals shall be within a bag, with placement in a box or hard container for secure transport; and
- Temperature of vehicle will not exceed 25 degrees Celsius.

Refer to DBCA (2017f) - SOP Transport and Temporary Holding of Wildlife for further information.

Relocation shall be to a suitable habitat at an appropriate distance from the clearing area (dependent on species and habitat) determined by the Fauna Specialist:

- Small species with small home ranges or specific home ranges should be relocated within this home range, which may be close; and
- Large species (Bilby) with large home ranges can be released over 500 m from the clearing area.

Bilby

Active burrows will not be cleared until the burrow relocation process has been successfully implemented. Burrow relocation process consists of:

- A suitably qualified fauna specialist will undertake relocation activities ;
- Relocation method is to be determined by the fauna specialist, taking into account conditions and be conducted in a manner that minimises stress to fauna and risk of injury to fauna and handler;
- Recommended relocation process is via displacement, rather than capture to minimise stress on animal. Displacement attempts should occur for three nights, then three nights of trapping

- One burrow entry is to be excavated and the burrow progressively destroyed to encourage Bilby to exit;
- Methods to confirm that the Bilby has successfully been displaced can include the use of motion sensors/cameras and/or secondary activity;
- In the event the relocation is not successful within a minimum of six nights, clearing may proceed around active burrow, however a buffer of 100 m shall be maintained around the burrow. The associated noise and vibration may encourage the Bilby to exit the burrow;
- Clearing of a burrow shall only occur once successful relocation is confirmed and the burrow has been destroyed to prevent re-entry;
- If relocation is not confirmed within three days, trapping to capture animals will also be undertaken;
- Clearing will not occur until the burrow is classified as inactive by the fauna specialist; and
- In the event that trapping is required, the following trapping methodology should be used:
    - A galvanised wire mesh cage trap (20cm x 20cm x 56cm) with a treadle plate release mechanism should be used;
    - Traps are baited with a universal bait mix (ie oats, peanut butter, sardines);
    - Traps positioned at entrance with minor fences to corral individuals into trap;
    - Traps will be checked throughout night for immediate relocation;
    - A final trap check is completed within three hours of sunrise then no further trapping during day light hours; and
    - Refer to DBCA (2018a) - SOP – Cage Traps for Live Capture of Terrestrial Vertebrates for further information.

Great Desert Skink

In the event Great Desert Skinks are identified in the clearing area, avoidance is preferred however if required, capture and relocation will occur. Capture will be via trapping or digging up the burrow complex. Release will be into suitable habitat with closest proximity possible with minimal evidence of predators. Consideration shall be given to fencing the relocation site to exclude predators to allow sufficient time for burrows to be established. Consultation with DBCA will occur regarding the relocation process.

Brush-tailed Mulgara

In the event Brush-tailed Mulgara active burrows are identified in the clearing area, displacement methods are preferred. Alternatively, burrows should be dug out and Mulgara caught and held until night and released into suitable habitat.

2.3.1.3 Injured Fauna Management

The following management actions for injured fauna management should be undertaken by a fauna handler:

- An assessment if the fauna approach is safe and capture is necessary;
- Fauna capture will be undertaken by a suitably qualified fauna handler;

- If handling is the preferred method, safely confine (wrap in towel and place in cardboard box) ensuring the animal can breathe;
- Keep box closed but not sealed to allow for ventilation and place box in a dry, warm, dark and quiet place;
- First response wound management will be undertaken in accordance with DBCA (2017c) - SOP First aid for animals:
    - Ensure gloves are worn;
    - If immediate wound care is required (i.e. life threatening), apply pressure to the wound until it stops;
    - Due to the remote location of Project, any additional care such as transport to Marble Bar, Port Hedland or Perth for further medical attention is to be assessed on a case by case basis in consultation with the fauna handler, a veterinarian and the Project Manager; and
    - In the event the animal is injured (or is dependent young) and is not able to be re-released (based on veterinarian advice), the DBCA shall be consulted for rehabilitation options.
- Euthanasia of the fauna will only be undertaken under the instruction of a veterinarian, however, DBCA (2017d) - SOP Human Killing of Animals under Field Conditions should be considered.

2.4 Reporting

The reporting requirements relating to the implementation of the SSMP are detailed in Table 2.5.

Table 2.5: Reporting actions

Notification event	Action	Responsibility	Timing
Annual Environmental Reporting	Preparation of an Annual Environmental Report (AER) to DMIRS and DWER – Industry Regulation	Environmental Department	Annually as per tenement conditions and DWER Part V Licence
Opportunistic sightings	Opportunistic sightings of significant fauna are reported to DBCA (fauna@dbca.wa.gov.au).	Environmental Department	Within one week of event
Significant Fauna injury or death	The relevant regulatory authorities (DBCA) will be notified for any death or injury of significant fauna via email (fauna@dbca.wa.gov.au) within 24 hours	Environmental Department	Within 24 hours of event
SSMP compliance	Compliance with this SSMP will be reported to DWER CEO and DCCEEW annually through a Compliance Assessment Report (CAR) as required by the approvals for the Project.	Environmental Department	As required by Project approvals
Evaluation and revision of the SSMP	A review of this SSMP will be undertaken every two years	Environmental Department	Every two years

3. ADAPTIVE MANAGEMENT AND SSMP REVIEW

Newcrest recognises the dynamic nature of ecosystems and supports adaptive management under this SSMP. Adaptive management involves:

- implementing mitigation measures;
- monitoring and evaluation against management targets (including early response triggers); and
- systematically adapting management and mitigation measures and monitoring to meet the environmental objectives.

There is limited information regarding the size of the local Night Parrot population. Whilst Amended Proposal impacts are not expected to be significant, Newcrest proposes to undertake annual population monitoring to understand local Night Parrot population dynamics. Annual population monitoring will assist in confirming adequacy of management actions. In addition, it is acknowledged that the extent of primary habitat may change as a result of fire, vegetation growth and rainfall. The SSMP is proposed to be revised after two years of annual population monitoring to determine appropriate early response actions. In the interim, the management measures proposed are expected to minimise any potential impact to the local population.

3.1 Early response Indicators, Criteria and Actions

Early response triggers have been established for the management of significant fauna and flora and vegetation are detailed in Table 3.1.

Table 3.1: Early Response Triggers and Actions for Objectives

Objective	Management targets	Early response trigger	Early response action
No significant impact to Primary Greater Bilby and Night Parrot habitat within the local region	No significant impacts to Primary Bilby and Night Parrot habitat	Unauthorised clearing incident	• Report internally as an incident in accordance with internal procedures. Review management strategies and implement changes to prevent future occurrences which may include the following: • Audit and review of training and staff inductions (ie. Increase in staff training and awareness to include information on legislative requirements, appropriate clearing procedures). • Surface Disturbance Permit competency training. • Installation of signage where appropriate. • Undertake rehabilitation of unauthorised clearing (ie disturbance from vehicle tracks, vegetation clearing).
No significant impact to significant fauna species or habitat within the local region No significant adverse indirect impacts to conservation significant flora species and vegetation within the local region	No significant impact to significant fauna due to mortalities from clearing activities	Any significant fauna injury or near miss recorded	Early response actions may include but are not limited to the following: • Undertake investigation into cause of injury • Review associated management actions and confirm adequacy • Inform DBCA of significant fauna injury and consult regarding adequacy of management measures • Implement improved management actions • Re-implement training and awareness as required
	No significant impact to significant fauna due mortalities from entrapment		
	No significant fauna mortality from vehicle interactions		
	No significant increase of predation	25% increase in predator species (dog, fox or cat) sightings (opportunistic sightings) over two consecutive years.	Early response actions may include but are not limited to the following: • Review introduced species and predator control programme and amend as required. A review of extent and timing of control programme is required • Inspection potential predator food and waste sources and design elimination controls • Re-implement training and awareness as required
	Minimise risk of Project related fires impacting fauna habitat	Unplanned fire occurs in fauna habitat in Development Envelope	Early response actions may include but are not limited to the following: • Undertake incident investigation • Review fire prevention and response management measures and amend as required • Determine if additional fire breaks or controlled burns are required • Re-implement training and awareness as required

Objective	Management targets	Early response trigger	Early response action
	No significant impact to flora and vegetation from dust deposition	Dust or water overspray incident reported within vegetation	Early response actions may include but are not limited to the following: • Undertake incident investigation • Review dust management measures and amend as required • Assess significance of impact, particularly to significant species and vegetation / habitat • Re-implement training and awareness as required.
	No significant impact to flora and vegetation from saline water, hydrocarbons and chemicals	Spill incident reported within vegetation	Early response actions may include but are not limited to the following: • Undertake incident investigation • Review management measures and amend as required • Assess significance of impact, particularly to significant species and vegetation / habitat • Re-implement training and awareness as required.
	No significant impact to flora and vegetation (particularly significant vegetation types) from altered surface water patterns	Surface water incident occurs in Development Envelope	Early response actions may include but are not limited to the following: • Undertake incident investigation • Review existing surface water controls • Determine if additional controls are required • Assess significance of impact, particularly to significant species and vegetation / habitat • Re-implement training and awareness as required.
	No significant impact to flora and vegetation from Amended Proposal introduced weed species	Identification of new weed species within the Development Envelope	Early response actions may include but are not limited to the following: • Undertake investigation into weed introduction • Review vehicle hygiene and weed control management measures and amend as required • Assess significance of impact, particularly to significant species and vegetation / habitat • Re-implement training and awareness as required.

4. STAKEHOLDER CONSULTATION

Stakeholder consultation undertaken in the development of this SSMP is summarised in Table 4.1.

Further consultation will be undertaken as the SSMP is implemented and it is therefore likely that revisions will be made if further guidance is provided by these stakeholders.

Table 4.1: Stakeholder Consultation

Date	Stakeholder	Summary	Stakeholder Comments	Proponent Response
26/06/2020	Phil Boglio (DMIRS) Louise Whitley (Strategen JBS&G)	Project update including Greater Bilby results.	No issues	-
8/09/2020	Phil Boglio (DMIRS) Matt Boardman (DMIRS) Tara Garrood (Newcrest) Louise Whitley (Strategen JBS&G)	Project update with outcomes of environmental surveys and key approval management measures	DMIRS advice on heritage, operational and environmental management measures was given	Development of approvals to incorporate feedback
8/09/2020	Troy Sinclair (DWER EPA Services) Louise Whitley (Strategen JBS&G)	Project update with outcomes of environmental surveys and key approval management measures	-	-
15/12/2020	WDLAC representatives Tara Garrood (Newcrest) Louise Whitley (Strategen JBS&G)	Discuss environmental studies	Discussion about project timings, Heritage and field visits by Martu in 2021	Keep updated
5/02/2021	WDLAC representatives Tara Garrood, Rebecca Murphy, Michael Cotterell, Louise Whitley (Strategen)	Discuss survey scopes to determine WDLAC engagement		
10/02/2021	Troy Sinclair, Environment Officer (EPA Services), Louise Whitley (Strategen)	Outcome of fauna surveys		
4/03/2021	DBCA: Michelle Corbellini, Principal Env Officer Charlott Patrick, Env Officer David Pickles, Env Officer Allan Burbidge, Senior Zoologist Juantia Renwick, Zoologist Teagan Johnson, Technical Specialist DWER: Troy Sinclair, Assessing Officer Claire Stevenson, Zoologist Gareth Watkins, Zoologist Tara Garrood, Louise Whitley (Strategen JBS&G), Ryan Ellis & Chris Knuckey (Biologic)	Summary of Stage 1 and Stage 2 ecological surveys were presented with significant fauna records. Discussion on survey adequacy, additional work required and recommended management measures	Agreed call was NP, location and time of night supports foraging call Agreed with mature spinifex (for day time protection) was roosting habitat, often low in habitat and within proximity to salt lakes (as sufficient water and protected from fire). Foraging habitat is considered all other fauna habitats (excluding Stony Hills) due to presence of seeding grasses. Preclearance surveys may have limited effectiveness . Roost sites are spatially and temporally effected, particularly by fire.	Newcrest to continue consultation and provide any additional records

Date	Stakeholder	Summary	Stakeholder Comments	Proponent Response
			Agreed that habitat mapping should focus on disturbance areas and salt pans/mature spinifex should be avoided. radius of individuals known to be 10km from roosting site with a minimum of 40km in one night. Water is not required every night. Fire management should be considered with avoidance of ignition sources a priority. Prescribed/mosiac burns are preferrable to high intensity fires. Avoidance of night vehicle movement should be considered, however is not essential given low distribution and occurrence of individuals. Lack of knowledge of species was acknowledged. Survey effort and methodology considered adequate. Further commentary can be provided Consultation with Punmu community should occur Predation by feral cats are primary concern. Steve Murphy at Pullen undertaking research. Should ensure Management Plan address artificial light, although of limited concern to species Note that Threatened species location will be masked for public confidentiality	
5/03/2021	Allan Burbidge - Senior Zoologist	Confirmation that recording confirmed as significant fauna species		
1/04/2021	WDLAC and Martu representatives	Discussed project infrastructure	Outlined the preferred arrangements under which survey work could be done	Implemented

Date	Stakeholder	Summary	Stakeholder Comments	Proponent Response
		Pathway to ensure no impacts to heritage/cultural sites		
10/4/21 - 23/4/21	Martu	Involvement in Flora and fauna survey (second season detailed survey) along infrastructure corridor to share ecological knowledge		
6/7/21	Troy Sinclair, Helena Mills, Claire Stevenson, Gareth Watkins (DWER EPA Services) Tara Garrood, Louise Whitley (Strategen JBS&G)	1. Project overview provided 6. Discussed Bilby survey outcomes 7. Night Parrot additional recording and offsets	1. No comments 6a. Queried if Fauna MP would be included 6b. Queried SRE results - 7. Offsets needs to be above Project (Havieron/Telfer) fire/feral controls to show benefit to species. Recommended 10% indirect for research. Need to be able to quantify habitat and improvement, with presence of species recommended. TS noted offset strategy conceptually okay, acknowledge limited options. Need to understand habitats, responses to management measures and threats to be successful. Recommended consulting with Offsets Team. queried how improvement would occur. 8. Provide feedback once sediment hatching and genetics completed	6a. LW stated would be included and would have preclearance surveys with Bilby relocation and not allow Night Parrot Primary habitat impacts. 6b. LW stated approx 8 potentials, but no restricted SRE habitat 7. LW responded that presence of species would be problematic given elusive nature and intent is to not duplicate management

Date	Stakeholder	Summary	Stakeholder Comments	Proponent Response
				measures in DE. Would consider 10% indirect, however unlikely that presence of species would be recorded in Primary habitat. Requested further consultation with Offsets Team.
19/8/21	WDLAC representatives Tara Garrood, Greg Barrett (Talis Consultants) Technical specialists from Biologic and JBS&G	Presentation on the outcomes of various technical studies and surveys.	Information exchange.	Findings to be incorporated in referral documentation.
30/8/21	Troy Sinclair (DWER EPA Services) Tara Garrood, Greg Barrett (Talis Consultants)	Considerations for forthcoming referral.	Offsets, threatened species management.	Referral prepared.
31/8/21	WDLAC representatives Tara Garrood, Greg Barrett and Marc Wohling (Talis Consultants)	Discussion of potential offsets	Newcrest to put forward an outline of offset proposal.	Offset outline included in referral; further discussion of details require.
14/9/21	Dylan Stinton, Carolyn Young (DAWE) Tara Garrood, Greg Barrett (Talis Consultants)	Considerations for forthcoming referral.	Offsets, threatened species management.	Referral prepared.

5. DEFINITIONS

Descriptor	Definition
Active Burrow	Bilby Burrow as identified by a fauna specialist which is deemed likely to have presence of Bilby individuals
Environmentally hazardous material	Substances which may have a deleterious impact on the immediate surrounding environment
Fauna	Native terrestrial vertebrate species
Fauna handler	Personnel that should have the following experience requirements: • Significant fauna identification experience, including identification of active and inactive burrows; • Training in assessing injured fauna and their suitability for release (Refer to DBCA (2017c) – SOP First Aid for Animals); • An understanding of animal welfare legislation, provision of emergency care and performing euthanasia (Refer to DBCA (2017b) - SOP First Aid for Animals and DBCA (2017d) – SOP Human Killing of Animals under Field Conditions) with suitable equipment available; • Appropriate training in fauna handling techniques (Refer to DBCA (2017a) - SOP Hand Capture of Wildlife and DBCA (2017b) – SOP Hand Restraint of Wildlife and DBCA (2017e) – SOP Animal Handling and Restraint Using Soft Containment). Fauna handler is available for clearing activities and may assist in significant fauna individual injury management and displacement.
Fauna specialist	Personnel with suitable experience to identify relevant species, classify habitat suitability and potential active breeding or nesting sites which holds the relevant licences under s40 of the BC Act to take or disturb Threatened Flora. Fauna specialist undertakes pre-clearance surveys, threatened fauna relocations and confirms sites as inactive.
Haul road	Road whereby ore, waste rock or paste fill tailings is transported with heavy vehicles. For the purposes of this SSMP, transport within active mining areas where fauna habitat is absent (ie not within 100m) is not considered a haul road.
Inactive Burrow	Bilby Burrow as identified by a fauna specialist which is deemed unlikely to have presence of Bilby individuals: • has begun to collapse and no longer has a round entrance or cavity and would not enable a bilby to enter without additional digging, and there is no evidence that other vertebrates are using the burrow, or • it has vegetation in the entrance and spider webs across the entrance and there is no evidence that any vertebrates are using the burrow.
Primary habitat	Habitat that is recognised as critical habitat (areas necessary for activities such as foraging, breeding, roosting, or dispersal) as determined by a fauna specialist.
Secondary habitat	Habitat that is considered not critical for foraging, breeding, roosting or dispersal, but may support such activities and/ or habitats of marginal suitability for such activities as determined by a fauna specialist.
Significant	Adverse impacts to a species' local population or conservation significance rating
Significant fauna, flora and vegetation	Fauna and flora species that are defined as: • species or communities listed as Threatened under the EPBC Act and/or BC Act; • Conservation Dependent fauna listed under the EPBC Act or BC Act; • species listed under the BC Act as otherwise in need of special protection; and • species or communities listed on DBCA's non-statutory Priority list. Vegetation communities that are considered restricted, being representative of the range of a unit, and a novel combination of species.

6. REFERENCES

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Appendix A Risk Assessment

Risk Assessment Methodology

The risk assessment is completed in accordance with DAWE Environmental Management Plan Guidelines (DoE 2014) using the matrix shown in Table A1 and Table A2.

Table A1: Likelihood and consequence

Qualitative measure of likelihood (how likely is it that this event/circumstances will occur after management actions have been put in place/are being implemented)	
Highly likely	Is expected to occur in most circumstances
Likely	Will probably occur during the life of the project
Possible	Might occur during the life of the project
Unlikely	Could occur but considered unlikely or doubtful
Rare	May occur in exceptional circumstances
Qualitative measure of consequences (what will be the consequence/result if the issue does occur)	
Minor	Minor risk of failure to achieve the plan's objectives. Results in short term delays to achieving plan objectives, implementing low cost, well characterised corrective actions.
Moderate	Moderate risk of failure to achieve the plan's objectives. Results in short term delays to achieving plan objectives, implementing well characterised, high cost/effort corrective actions.
High	High risk of failure to achieve the plan's objectives. Results in medium-long term delays to achieving plan objectives, implementing uncertain, high cost/effort corrective actions.
Major	The plan's objectives are unlikely to be achieved, with significant legislative, technical, ecological and/or administrative barriers to attainment that have no evidenced mitigation strategies.
Critical	The plan's objectives are unable to be achieved, with no evidenced mitigation strategies.

Table A2: Risk matrix

		Consequence				
		Minor	**Moderate**	**High**	**Major**	**Critical**
Likelihood	**Highly Likely**	Medium	High	High	Severe	Severe
	Likely	Low	Medium	High	High	Severe
	Possible	Low	Medium	Medium	High	Severe
	Unlikely	Low	Low	Medium	High	High
	Rare	Low	Low	Low	Medium	High

Table A3: Risk Assessment for Fauna Related Impacts

Activity	Impact	Inherent Risk			Outcome / Management Targets	Management Actions	Residual Risk		
		Consequence	Likelihood	Rating			Consequence	Likelihood	Rating
Clearing of fauna habitat	Loss of fauna habitat	High	Likely	High	Clearing of no more than 1,266 ha of fauna habitat and native vegetation within the Development Envelope	• Surface Disturbance Permit process to be implemented, including: ◦ Demarcation of proposed clearing area ◦ Review of clearing justification to minimise clearing required, particularly in association with Primary Bilby or Night Parrot habitat ◦ Training and awareness of significant fauna and associated Primary habitat ◦ Clearing activities to occur during day light hours, where practicable ◦ Clearing to be undertaken progressively, where possible, to minimise active disturbance • Review of clearing justification to minimise clearing required	High	Unlikely	Medium
	Loss of fauna habitat	High	Likely	High	No significant impacts to Primary Bilby and Night Parrot habitat	Refer to Table 2.2	High	Possible	Medium

Activity	Impact	Inherent Risk			Outcome / Management Targets	Management Actions	Residual Risk		
		Consequence	Likelihood	Rating			Consequence	Likelihood	Rating
Clearing of fauna habitat	Loss of fauna habitat Individual injury or mortality	Major	Possible	High	No removal of active Bilby burrows within the Development Envelope	• Surface Disturbance Permit process to be implemented, including: ◦ Demarcation of proposed clearing area ◦ Review of clearing justification to minimise clearing required, particularly in association with Primary Bilby or Night Parrot habitat ◦ Training and awareness of significant fauna and associated Primary habitat ◦ Clearing activities to occur during day light hours, where practicable • Significant fauna register to include locations of active burrows and Bilby sightings • A suitably qualified fauna handler will be trained and available as required • Where possible, a 100 m avoidance buffer around active Bilby burrows will be implemented to minimise risk of unauthorised clearing and indirect impact. Signage will be implemented to restrict access to active burrows. • Preclearance surveys are to be undertaken a maximum of two weeks prior to clearing as per Section 2.5.1. • Active burrows will not be cleared until the burrow relocation process has been successfully implemented as per Section 2.5.1.1. • No unauthorised vehicle movement outside of cleared areas	Major	Rare	Medium

Activity	Impact	Inherent Risk			Outcome / Management Targets	Management Actions	Residual Risk		
		Consequence	Likelihood	Rating			Consequence	Likelihood	Rating
Clearing of fauna habitat	Loss of fauna habitat Individual injury or mortality	Major	Possible	High	No impacts to Night Parrot nesting sites within the Development Envelope	• Surface Disturbance Permit process to be implemented, including: ◦ Demarcation of proposed clearing area ◦ Review of clearing justification to minimise clearing required, particularly in association with Primary Night Parrot habitat ◦ Training and awareness of significant fauna and associated Primary habitat ◦ Clearing activities to occur during day light hours, where practicable • Significant fauna register to include locations of Primary habitat and recordings • A suitably qualified fauna handler will be trained and available as required • Where possible, a 100 m avoidance buffer around Primary Night Parrot will be implemented to minimise risk of unauthorised clearing and indirect impact. Signage will be implemented to restrict access to active burrows. • No unauthorised access to Primary Night Parrot habitat • No unauthorised vehicle movement outside of cleared areas • Preclearance surveys are to be undertaken prior to clearing as per Section 2.5.1	Major	Rare	Medium
Clearing of fauna habitat Vehicle movement	Individual injury or mortality	Major	Possible	High	No significant fauna mortalities due to clearing activities	Refer to Table 2.2	Major	Rare	Medium

Activity	Impact	Inherent Risk			Outcome / Management Targets	Management Actions	Residual Risk		
		Consequence	Likelihood	Rating			Consequence	Likelihood	Rating
Mining construction and operation	Individual injury or mortality	High	Possible	Medium	No significant fauna mortalities due to entrapment	Refer to Table 2.2	High	Rare	Low
Vehicle movement	Individual injury or mortality	High	Possible	Medium	No significant fauna mortality from vehicle interactions	Refer to Table 2.2	High	Rare	Low
Clearing of fauna habitat Mining activities Vehicle movement	Individual displacement Individual injury or mortality Increased predation and competition from introduced species Fauna habitat or vegetation decline	High	Likely	High	No significant increase of predation	Refer to Table 2.2	High	Unlikely	Medium
Clearing Mining activities Vehicle movement	Individual mortality Vegetation decline	High	Possible	Medium	Clearing of no more than 21.56% of *Goodenia hartiana* local records	Refer to Table 2.2	High	Unlikely	Medium

Activity	Impact	Inherent Risk			Outcome / Management Targets	Management Actions	Residual Risk		
		Consequence	Likelihood	Rating			Consequence	Likelihood	Rating
Mining operation and construction – unplanned fire	Loss of fauna habitat Fauna habitat or vegetation decline Individual displacement Individual injury or mortality	Moderate	Possible	Medium	Minimise risk of Project related fires impacting on fauna habitat	Refer to Table 2.2	Moderate	Unlikely	Low
Clearing of fauna habitat Mining activities Vehicle movement	Fauna habitat or vegetation decline	Minor	Likely	Low	No significant impact to flora and vegetation from Amended Proposal introduced weed species	Refer to Table 2.2	Minor	Unlikely	Low
Clearing of fauna habitat Mining activities Vehicle movement	Fauna habitat or vegetation decline	Minor	Likely	Low	No significant impact to flora and vegetation from dust deposition	Refer to Table 2.2	Minor	Unlikely	Low
Mining activities Infrastructure development	Fauna habitat or vegetation decline	Minor	Likely	Low	No significant impact to flora and vegetation (particularly significant vegetation types) from altered surface water patterns	Refer to Table 2.2	Minor	Unlikely	Low

Activity	Impact	Inherent Risk			Outcome / Management Targets	Management Actions	Residual Risk		
		Consequence	Likelihood	Rating			Consequence	Likelihood	Rating
Mining activities Vehicle movement	Fauna habitat or vegetation decline	Minor	Likely	Low	No significant impact to flora and vegetation from saline water, hydrocarbons and chemicals (including cyanide)	Refer to Table 2.2	Minor	Unlikely	Low

Table A4: Risk Assessment for Flora and Vegetation Related Impacts

Activity	Impact	Inherent Risk			Management Targets	Management Actions	Residual Risk		
		Consequence	Likelihood	Rating			Consequence	Likelihood	Rating
Clearing of flora and vegetation	Loss of native flora and vegetation	High	Likely	High	No native vegetation clearing beyond the approved clearing area or limits	• Surface Disturbance Permit process to be implemented, including: ◦ Review of clearing justification to minimise clearing required ◦ Review of existing approvals clearing areas and limits ◦ Surveying and demarcation of proposed clearing area ◦ Prior and post-construction inspections • Implement traffic management procedures to avoid accidental disturbance of flora and vegetation (e.g. keeping to designated tracks) • Plan for and manage fire risks at all times, particularly when conditions are unfavourable (e.g. high temperatures, windy conditions)	High	Unlikely	Medium
	Loss of *Seringia exastia*	Moderate	Likely	Medium	Avoid clearing of individuals of *Seringia exastia*	• Surface Disturbance Permit procedure to be implemented, including: ◦ Review of clearing justification to minimise clearing required; ◦ Use of spatial data of significant flora and vegetation locations in planning and ground-truthing ◦ Avoid locations of *Seringia exastia* when planning clearing activities; ◦ Surveying and demarcation of proposed clearing area	Moderate	Possible	Medium

Activity	Impact	Inherent Risk			Management Targets	Management Actions	Residual Risk		
		Consequence	Likelihood	Rating			Consequence	Likelihood	Rating
Clearing of flora and vegetation Mining operation and construction Vehicle movement	Vegetation decline	Minor	Likely	Low	Minimise risk of dust deposition and overspray from dust suppression during impacting on flora and vegetation	• Avoid land clearing activities during windy conditions, where possible; • Stage clearing activities to minimise exposure of bare areas where possible; • Minimise dust generation by dampening open cleared areas using water carts; • Regularly inspect and maintain water sprays and water trucks; • Progressively rehabilitate or cover (using vegetation, rock, water and/or appropriate dust suppressant) exposed areas as soon as practicable	Minor	Possible	Low
Mining operation and construction Vehicle movement	Vegetation death or decline	Minor	Likely	Low	Minimise risk of Project hydrocarbon and chemical management impacting on flora and vegetation	• Maintain and inspect vehicles and machinery to prevent spills and leaks • Segregate hydrocarbon wastes from other wastes • Use of licenced contractors to dispose of hydrocarbon waste offsite • Storage of hydrocarbons and chemicals in accordance with Australian Standards AS1940 and AS1692 • Construct haul roads with drainage management controls (i.e. drains) to capture minor hydrocarbons spills or saline water run-off (from dust suppression) • Implement a spill response procedure that includes spill containment and clean up, as soon as possible	Minor	Possible	Low

Activity	Impact	Inherent Risk			Management Targets	Management Actions	Residual Risk		
		Consequence	Likelihood	Rating			Consequence	Likelihood	Rating
Clearing of flora and vegetation Mining operation and construction Vehicle movement	Vegetation death or decline	Minor	Likely	Low	Minimise risk of altered surface water patterns from impacting on flora and vegetation	• Locate access and haul roads outside of the known flooding areas, where possible • Locate key infrastructure outside the 1 in 100 year flooding extent • Avoid new disturbance to claypans and maintain micro catchments to the extent possible • Use of culverts, floodways, drains • Sediment controls (including drains and traps) around operations areas • Minimise clearing in sandy areas with >40% vegetation cover • Import material for sheeting to prevent soil erosion and sediment movement • Saline water pipeline located in v drains to contain spills • Cover saline and hydrocarbon pipeline crossings with suitable material or placed within a culvert to prevent damage • Regularly inspect pipelines and work areas • Line saline water sumps and turkeys nests • Provide adequate freeboard on evaporation ponds for 1 in 100 ARI rainfall event • Capture accidental spills or contaminated run-off from within infrastructure areas • Prevent discharge of contaminated or saline run-off from infrastructure areas	Minor	Possible	Low

Activity	Impact	Inherent Risk			Management Targets	Management Actions	Residual Risk		
		Consequence	Likelihood	Rating			Consequence	Likelihood	Rating
Clearing of flora and vegetation Mining operation and construction Vehicle movement	Vegetation death or decline	Minor	Likely	Low	Minimise risk of Project introduced weed species impacting on flora and vegetation	• Identify the extent and distribution of introduced flora within the area prior and post-construction activities • Maintain a weed register • Weed hygiene procedures for all vehicles, machinery and equipment entering the Project area • Imported fill material is sourced from weed-free locations and inspected prior to entering the Project area • Periodically inspect areas susceptible to weed infestation (e.g. disturbed lands topsoils and subsoils stockpiles) • Stockpile weed-infested topsoils and subsoils separately from other soils • Manage topsoil stockpiles to minimise weed infestations and maintain viability of seed stock • Implement a weed control program	Minor	Likely	Low

Activity	Impact	Inherent Risk			Management Targets	Management Actions	Residual Risk		
		Consequence	Likelihood	Rating			Consequence	Likelihood	Rating
Mining operation and construction – unplanned fire	Vegetation death or decline	Moderate	Possible	Medium	Minimise risk of Project related fires impacting flora and vegetation	• Firefighting equipment will be permanently located on site • Emergency response team will be trained to respond to fire emergencies • Lightning protection equipment will be installed as part of the project design • A Hot Work Permit system will be developed and implemented • All machinery and vehicles undertaking clearing activities will be equipped with firefighting equipment • All personnel will be trained on prevention and management of fire • Implementation of fire management procedures (e.g. maintenance of fire breaks, Hot Work Permit system, firefighting training, Emergency Response Plan, controlled burns)	Moderate	Rare	Low