



KCGM

SIGNIFICANT SPECIES MANAGEMENT PLAN

FAUNA

**FIMISTON GOLD MINE OPERATIONS EXTENSION (STAGE 3)
FIMISTON SOUTH PROJECT
v6 December 2024**

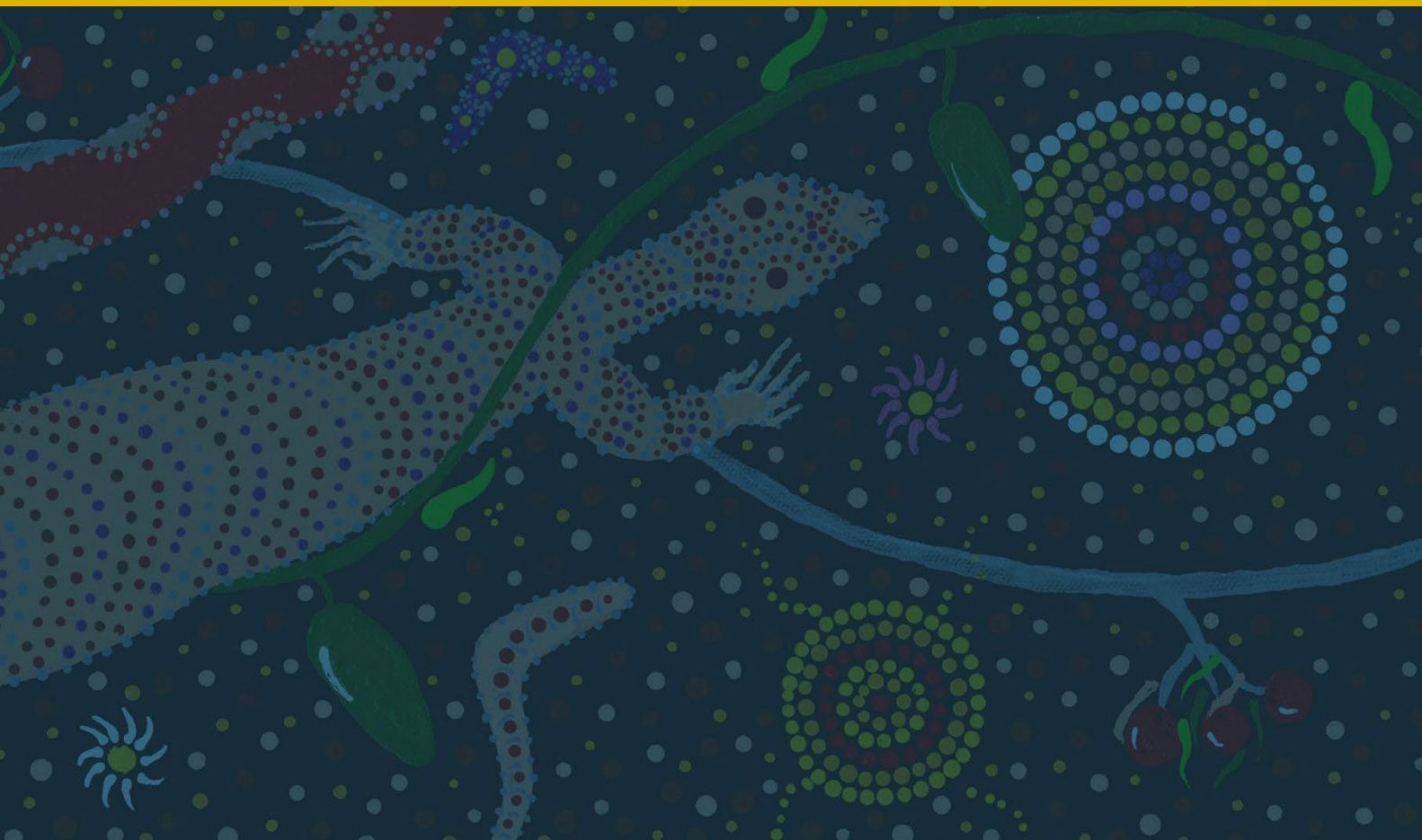


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VERSION CONTROL

Version	Date	Document Changes
1	Oct 2022	New Document. Specific Species Management Plan (SSMP) developed to meet the requirements of the Western Australian Environmental Protection Agency.
2	Mar 2023	Updated in Response to RFI to include more comprehensive management actions and monitoring
3	Mar 2024	Updated in response to Revised Proposal - ERD Response to Submissions second RFI
4	Jul 2024	Document updated to address clarification from the Revised Proposal - ERD Response to Submissions consultation.
5	Oct 2024	Document updated in response to Response to Submissions RFI and subsequent consultation
6	Nov 2024	Document split into two – flora and fauna – to assist with conditioning

1. SUMMARY

Kalgoorlie Consolidated Gold Mines Pty Ltd (KCGM) is the proponent for the Fimiston South (FS) Project (the Proposal). The objective of the proposal is to continue the ongoing operations of the Fimiston Gold Mine and enable uninterrupted mining and mineral processing until approximately 2034. The Revised Proposal is summarised in Section 2.1 of this Significant Species Management Plan (SSMP) for ease of reference.

This SSMP was prepared in accordance with the '*Instructions on how to prepare Environmental Protection Act 1986 – Part IV Environmental Management Plans*' (version 2.0, 2021) published by the Western Australian (WA) Environment Protection Authority (EPA). This SSMP details the measures that are required to manage potential impacts to conservation significant species from the Proposal. Table 1 summarises the information contained in this SSMP.

Table 1 Management Plan Summary

Title of Proposal	Fimiston Gold Mine Operations Extension (Stage 3) and Mine Closure Planning: Revised Proposal
Proponent	Kalgoorlie Consolidated Gold Mines Pty Ltd
Ministerial Statement Number	A Ministerial Statement and associated conditions are yet to be issued.
Purpose of the WFMP	The WFMP is submitted to fulfil the requirements of ' <i>Instructions on how to prepare Environmental Protection Act 1986 – Part IV Environmental Management Plans</i> ' (version 2.0, 2021).
Key Environmental Factors and Objectives	<u>Key Environmental Factors</u> : Flora and vegetation, Terrestrial fauna <u>EPA Objectives</u> : <u>Flora and vegetation</u> : 'To protect flora and vegetation so that biological diversity and ecological integrity are maintained' (EPA, 2022). <u>Terrestrial fauna</u> : 'To protect terrestrial fauna so that biological diversity and ecological integrity are maintained' (EPA, 2022).
Condition Clauses	NA
Proposed Construction Date	Continuation of existing operations
EMP requirements pre - construction	Yes – this document

2. CONTEXT, SCOPE, AND RATIONALE

2.1 The Project

KCGM manages and operates the following assets for the owner, Northern Star Resources Limited (NSR):

- Fimiston Open Pit: open pit mining and waste rock disposal.
- Mt Charlotte Underground Mine: underground mining.
- Fimiston Processing Plant: crushing, mineral processing, refining and tailings disposal.
- Gidji Gold Processing Plant: mineral processing and tailings disposal.
- Exploration: mineral resource definition drilling and core processing.

The following operational areas are incorporated within the revised FS Project submission package directly as the proposed activities include active open pit mining by traditional methods and continued mineral processing:

- Fimiston Open Pit;
- Fimiston Tailings Storage Facilities (TSFs);
- Fimiston Processing Plant; and
- Fimiston Waste Rock Dumps (WRD).

2.1.1 Location of the Fimiston Operations

The Fimiston operations are located adjacent to the City of Kalgoorlie-Boulder (CKB) approximately 600 kilometers (km) east of Perth, Western Australia. On average KCGM produces 500,000 ounces of gold each year and has a current operating mine life until 2034 (via the FS Project). Currently, up to 80 million tonnes (Mt) of ore and waste rock material are currently mined from the Fimiston Open Pit per annum through traditional truck and shovel methods. Ore is then continuously processed through the Fimiston Processing Plant, whilst waste rock material is transported to various designated WRD, or marginal or low-grade ore is stockpiled adjacent to the open pit operations. The current footprint of the Fimiston Open Pit extends approximately 1.5 km wide by 3.5 km in length, making it one of the largest open pit gold mines in Australia.

2.2 The Revised Proposal – FS Project

The Revised FS Project submission package supports the Fimiston Gold Mine Operations Extension (Stage 3) and Mine Closure Planning: Fimiston South Project (FS Project) application which details the mining out of the Ivanhoe cutback at the southern extent of the pre-existing Fimiston Open Pit. Proposed future mining activities would continue to utilise traditional mining methods currently employed within the open pit. The cutback will amend the overall pit design by both additional widening and deepening of the pit. The works will extend the current operational life of open pit to approximately 2034.

The Revised Proposal includes:

- A cut back of the Fimiston Open Pit, the Ivanhoe cutback
- Additional Fimiston II Extension Tailings Storage Facility (TSF) cell;
- Construction of the new Fimiston III TSF;
- An extension to the existing Southern WRD; and
- Development of areas for supporting infrastructure and services are also required.

Fimiston Operations will continue to operate under currently approved Ministerial Conditions and existing FAQMP and approved management practices.

2.3 Key Environmental Factors

This SSMP specifically addresses the 'Terrestrial Fauna; environmental factor, as defined within the EPA's *Statement of Environmental Principles, Factors and Objectives and Aims of EIA* (EPA, 2022).

The environmental objective of the Terrestrial Fauna factor, as defined within the EPA's *Environmental Factor Guideline: Terrestrial Fauna* (EPA, 2022), is:

To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.

2.3.1 Activities affecting Key Environmental Factor – Terrestrial Fauna

Potential threats and impacts on terrestrial fauna potentially resulting from the FS Project are:

- loss of habitat and/or habitat fragmentation due proposed vegetation clearing;
- vehicle strike causing injury or death;
- fauna entrapment leading to injury or death;
- dust generation, noise and vibration causing temporary displacement of fauna;
- increase in pest species impacting native fauna due to predation and competition;
- altered surface water hydrological regimes impacting on vegetation health; and
- altered fire regimes.

2.4 Condition Requirements

The current MS 782 limits on the total area to be cleared.

The Environmental Protection Act 1986 (EP Act) and Biodiversity Conservation Act 2016 (BC Act) has been considered in preparation of this SSMP for *Jalmenus aridus* (Priority 1). Regional surveys completed by KCGM support significant growth in species knowledge, home range and understanding of this species.

The Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) is not applicable to *J. aridus* as the species is not listed under federal legislation.

The Malleefowl, *Leipoa ocellata* (Vulnerable) is listed under the EPBC Act, and is potentially found in the area, based on generalised information obtained from a national vegetation mapping tool. To provide more information on this species, a targeted Malleefowl habitat condition and mound survey was completed in March 2023 by Alexander Holm and Associates. This targeted survey resulted in the identification of small areas of marginal foraging area along the eastern boundary of a proposed tailings dam and confirmed that there are no recently active mounds. The targeted survey and assessment concluded that *L. ocellata* (Malleefowl) are unlikely to utilise these small areas for breeding or mound construction due to unsuitable soils. As a consequence of these findings, management actions and targets for *L. ocellata* (Malleefowl) have not been included in this SSMP. Approvals would be sought if tailings storage development was to extend further east, but this is not currently envisaged by KCGM. To acknowledge the importance of *L. ocellata* under Federal regulatory requirements, NSR have developed and released a "NSR – Malleefowl Awareness Training" (2023) session online (INX network learning system) to all personnel who are working on NSR sites that are located near areas of known or potential *L. ocellata* (Malleefowl) populations.

2.5 Rationale and Approach

The FS Project has been designed to avoid, where possible, impacts to key environmental factors located within the design footprint, including the location of *J. aridus* in relation to key landform placement. Adjustments to designs have been undertaken to ensure there is the best possible balance between environmental values and project requirements.

The location of the significant species was considered when selecting a preferred location for landforms. Whenever possible, these locations were avoided or landform designs were adjusted.

2.6 Survey and Study Findings

2.6.1 Terrestrial Fauna

Extensive field surveys were undertaken for *J. aridus* and *L. ocellata* for the FS Project. Results from terrestrial fauna surveys have been utilised to support the assessment of potential impacts of the FS Project implementation on terrestrial fauna. The most recent assessments were completed by Phoenix Environmental Sciences and Dr Rod Eastwood, Dr Floyd Holmes, Caitlin Nagle (2021) and Phoenix Environmental Sciences and Alexander Holm & Associates in 2023. Additional surveys and consolidation of collected information has been completed by KCGM and Phoenix since the October 2022 Revised Proposal submission. These additional surveys and assessments of data have expanded local and regional knowledge of both fauna species (*J. aridus* and *L. ocellata*).

Local and regional surveys are planned to occur each spring to further knowledge on the *J. aridus* species and to provide more detailed regional knowledge to use as reference for species monitoring. Known *J. aridus* habitat shrubs on KCGM's tenements location and condition will be used as the baseline for monitoring over time to evaluate long term resilience to indirect impacts to maintain viable populations throughout and beyond the mine life. These populations will be compared with references sites at local nature reserves (Appendix A). These reserves have been confirmed in 2024 as appropriate reference sites as they do have healthy populations present and therefore do have breeding shrubs that are comparable with Fimiston.

Reports that document regional terrestrial fauna within the surrounding area of the MDE are also included within the revised consolidated terrestrial assessment (Phoenix, May 2023), as outlined in Table 3.

Table 2 Terrestrial Fauna Surveys 2017-2024

Report	Survey Description	Field Survey Date
Survey (Level 2 – Phase 1 and 2) for Proposed Tails Storage Facility Expansion 2015. Harewood.	Fauna survey (Level 2 – Phase 1 and 2).	-
Flora and vegetation, and fauna surveys for proposed infrastructure within the Development Envelope of the Fimiston Gold Mine Operations, Phoenix, 2018.	Investigation of proposed infrastructure areas in the floodway and north of the Fimiston II TSF.	6-8 September and 11-12 November 2017.
Regional flora, vegetation and terrestrial fauna survey for the Gidji Operation, Phoenix 2019.	Level 1 terrestrial fauna	10–11 November 2017 & 8 November 2018.
Targeted flora and short-range endemic invertebrate study for the FIM IIE Project, Phoenix, 2019a.	Targeted <i>E. praecox</i> and general short range endemic survey for the Fimiston II Cell E TSF Project, December 2019.	13-14 November 2018.
Memo report: records of <i>J. aridus</i> at Fimiston Spring (Butterfly Survey), Dr Rod Eastwood, Dr Floyd Holmes and Caitlin Nagle, Phoenix, 2022.	Completion of on ground Targeted <i>J. aridus</i> survey (as basic fauna survey) to the east of the WRD and Fimiston TSF, included eastern floodway.	14-15, 26 and 29 October 2021.

Basic fauna and SRE survey and targeted SRE survey for the Fimiston Gold Mine Operations. Phoenix 2022b	Basic fauna and SRE survey and targeted SRE survey	
Regional habitat reconnaissance survey for Critically Endangered Arid Bronze Azure Butterfly (<i>Ogyris subterrestris petrina</i>) and P1 Inland Hairstreak Butterfly (<i>J. aridus</i>). Dr Rod Eastwood, Dr Floyd Holmes, Caitlin Nagle and Anna Jacks, Phoenix 2022c.	To locate suitable habitat for the target species of butterfly, ground truthing potential habitat within approximately	25 March 2022 Evolution site 28 March 2022 KCGM site 29 March and 1 April 2022
	100 km of the Fimiston operations.	
Fimiston Consolidated <i>J. aridus</i> Memo Report, Phoenix, 2023	Desktop consolidation of site and regional information. 14/04/2023.	N/A consolidation of information – Desktop.
Targeted <i>L. ocellata</i> activity and mound searches within the FS Project DE. Alexander Holm & Associates, March 2023	Infield survey (tracked) for physical evidence of <i>L. ocellata</i> and nesting mounds.	Mapping and assessment March 10 to 15, 2023.
Terrestrial Fauna assessments for the Fimiston Gold Mine Operations (Revised) Phoenix May 2023	Revised and consolidated report of data to date. Included with the EPA referral as Appendix I.	
Memo report: <i>Jalmenus aridus</i> at Fimiston, February 2024 (Phoenix, 2024a)	Memo summarising survey data and current knowledge of the <i>J. aridus</i> species	Summary report and recommendations for protection
Unpublished field notes from Spring 2024 regional survey	Known regional population numbers increased from 13 in Spring 2023 to 24 after Spring 2024	14 September 2024; 21 September 2024, Various between 28 September – 10 October 2024, 17-18 October 2024

Leipoa ocellata

This species has not been found within the project MDE and as such is unlikely to be impacted by the project. Refer to Section 2.3 for a more detailed explanation.

Jalmenus aridus

The Priority 1 butterfly, *J. aridus* was identified opportunistically during early fauna and SRE surveys being implemented to support the Revised Proposal, and as a result separate targeted surveys for this species were completed by KCGM and Phoenix. Collected information has been maintained under a cover of confidentiality to aid protecting the species, although IBSA data has been continually shared with DBCA.

Until recently, *J. aridus* was only known from its type locality at Lake Douglas approximately 12 km SW of Kalgoorlie. It was discovered in November 1983 breeding on a single *Acacia tetragonophylla*, but soon after its discovery the tree started to die, and the butterflies disappeared. The last sighting of *J. aridus* at Lake Douglas was in 2011 (R. P. Weir pers. comm. to R. Eastwood, 2022).

A consolidated confidential report has been provided to both the EPA (Appendix K) and DBCA (23/05/2023 by Phoenix) with a 24/01/24 revised and submitted to DBCA.

Figure 1 Known Regional Extent of *J.aridus* populations (October 2024) – Figure withheld to protect species

2.6.2 Hydrology

A catchment assessment was undertaken (WSP 2022 and revised in 2023) to identify and estimate the size of potential contributing catchments upslope of the *J. aridus* habitat areas (originally based on KCGM 2022 populations only, then updated population size in 2023). The population itself is not located in floodway areas, but on slightly elevated ground, and relies on incident rainfall.

The impact assessment investigated both existing and post-development scenarios of the TSF cell G. Two sub-catchments were identified during the assessment, which drain generally north to south following natural topography. These have been referred to as sub-catchment A and sub-catchment B and have areas of approximately 395 ha and 1113 ha respectively (Table 4).

The climatic conditions at the site are semi-arid, characterised by low annual rainfalls averaging approximately 265 mm, high rainfall variability, and a low frequency of rainfall events with an average of approximately 40 days of rainfall greater than 1 mm per year (BoM, 2023).

The site hydrological conditions are highly ephemeral in nature with surface water runoff occurring as shallow sheet flow on the rare occasion that flows occur. Due to the estimated high infiltration rates of the local soils within the study area, a period of prolonged rainfall (i.e. large total rainfall depth) or high rainfall intensity is required to generate surface water runoff within the catchment. These prolonged or high intensity rainfall events are typically associated with tropical low-pressure systems (such as remnant cyclonic activity) occurring during summer months (typically January – March) and their occurrence is highly variable (WSP, 2023). As the local sub-catchment conditions within the immediate areas that currently sustain this vegetation are unlikely to change due to the upslope Fimiston IIE TSF Cell G development, the project impacts on the JA populations are considered to be negligible. All breeding shrubs, except for one occur within Catchment B, which will remain unchanged. Due to the breeding shrubs occurring on slightly elevated ground, they are typically reliant on incident rainfall.

Table 3 Estimated Reduction in sub-catchment Areas Upslope of the *J. aridus* Habitat Areas

Potential Habitat Area ID	Sub-catchment	Sub-catchment area (Ha)		% Difference
		Existing	Post-Development	
North	A	395	173	-44%
South	B	1113	0	0%
Total		1508	1335	-11%

2.6.3 Weeds

Weeds are usually opportunistic plant species that are not native to an area, but once introduced, are able to compete effectively for resources (often out competing and displacing native vegetation). They can also be inadvertently or intentionally introduced and spread past their intended range, such as garden plants or even commercial crops.

The Fimiston Operational area has been altered and degraded from 'natural' conditions by historical mining, pastoral, livestock farming and other agricultural activities as well as urbanisation. Impacts include disturbance and alteration of the ground surface, higher rates of erosion by water and wind and recreational activities. Vegetation in the regional area surrounding Kalgoorlie Boulder has also been substantially altered by clear felling for wood (firewood, mining timber, boiler feed) in the 1900s, with most trees in the region considered regrowth.

As a result, many weed species have been introduced to the area and have become widespread. The region's low annual rainfall restricts weed populations to a large extent.

Weeds which have been found on the KCGM lease area, are considered a significant environmental or agricultural risk and are targeted for control and eradication include:

- *Rumex vesicarius* - Ruby Dock
- *Echium plantagineum* - Paterson's Curse (Declared Weed (DW))
- *Opuntia strict* - Prickly Pear (Weed of National Significance (WoNS))
- *Silybum marianum* - Milk Thistle, Variegated Thistle
- *Carthamus lanatus* - Saffron Thistle (DW)
- *Lycium ferocissimum* - African Boxthorn (WoNS)
- *Datura stramonium* - Thornapple (DW).

The WA Biosecurity and Agriculture Management Act 2007 requires removal of declared weeds. Weed management at KCGM is controlled as per the Northern Star Weed Management Procedure (Appendix B).

2.7 Key assumptions and uncertainties

A number of assumptions and uncertainties based on surveys undertaken to date form the basis of the proposed management approach, as set out below.

2.7.1 Assumptions

Key assumptions include:

- Utilising areas of existing disturbance to minimise clearing and implementing progressive rehabilitation throughout the life of the project will minimise the impacts of the Proposal on conservation significant species.
- Surveys to date provide sufficient information to confirm the presence of *J. aridus* within the MDE area and suggest a numerous healthy populations exist within the surrounding region.
- The MDE and broader regional areas have been adequately surveyed for terrestrial fauna, flora and vegetation and no other significant species identified that could be affected by the proposed mine development activities.

2.7.2 Uncertainties

Key uncertainties include:

- The extent to which climatic factors outside of KCGM control, including dust and fire, may impact on the health and extent of populations of significant species, including *S. artemisioides* subsp. *filifolia* as a host plant.
- The extent to which dust generated from implementation of the Proposal will travel from the source to receptor.
- Occurrence of extreme rainfall events, drought or fire during the proposed life of mine and post-closure time frames.
- Incomplete understanding of *J. aridus* ecology, including breeding and feeding habitat preferences and influences on breeding activity. This will improve as further survey work is conducted on the species. Management approach for *J. aridus* therefore needs to be adaptable as new information about the species becomes available.
- Difficulties in surveying for *J. aridus*; abundance is not practical to measure due to unpredictability of life cycle timing, potential for extended diapause and typically low densities. Similarly, confirmed breeding shrubs are difficult to detect in sufficient abundance to allow statistical analysis.

2.8 Management approach

Management measures to minimise the intensity of the potential effects of implementing the proposed mine waste storage development activities are necessary to ensure the proposed activities will not have a significant detrimental impact on key environmental factors.

Specific application of the mitigation hierarchy for the implementation of the proposed mine waste storage development activities is as follows.

2.8.1 Avoid

Based on the biology, behaviour and ecology of *J. aridus* and *F. kirbii* and what we know about the existing breeding site at Fimiston, DBCA recommend that a minimum buffer distance of 50 m be maintained between known or suitable breeding shrubs and any kind of permanent ground disturbance. This buffer only applies to development around the periphery of the Fimiston breeding site, i.e. no development to take place within the Fimiston site (R. Eastwood DBCA, 2024 Pers. Comm.).

Specific controls include:

- Avoid unnecessary habitat disturbance within *J. aridus* area.
- Set exclusion zones of 50 metres around the known breeding shrubs to prevent indirect disturbance. *J. aridus* are known to have extreme site fidelity (Braby 2013; Eastwood et al. 2023), and do not stray far from their host plants. They do not set up territories in open areas such as roads.
- Design surface hydrology to avoid changes in hydrology to the western side of the haul road.
- Maximise the use of existing cleared areas for roads and infrastructure corridors.
- Minimise clearing to the maximum extent practicable through implementation of internal clearing permit procedures, which include:
 - Prior and post construction inspections
 - Use of spatial data of significant flora and vegetation location in planning
 - Surveying and demarcation of clearing areas
- Clearing along one front to allow fauna to escape.

2.8.2 Minimise

Potential impacts on vegetation and fauna habitat from dust deposition will be managed via the implementation of the KCGM-ENV-010 Dust Monitoring and Management Procedure (DMMP), a subcomponent of the Fimiston Air Quality Management Plan (FAQMP).

Potential indirect impacts to native fauna due to disruption or disturbance to fauna as a result of noise, vibrations, light and dust emissions are managed to minimize any impacts. The KCGM Noise and Vibration Monitoring and Management Plan (NVMMMP) includes control measures and operational strategies that contribute to reducing the noise and vibration emissions produced by the site.

A supporting hydrological impact assessment (WSP, 2023) was completed and reviewed against historical climatic conditions of the area, refer to Appendix K. The report reviewed the impacts of the change in hydrology due to the placement of the TSF and WRD landforms and it is considered that the JA population vegetation is likely unaffected due to its reliance on incident rainfall and runoff.

Specific controls include:

- Maintain implementation of Fimiston Weed Management Procedure (Appendix B), with spraying or other suitable action when weed species are identified on KCGM leases or in rehabilitation areas.
- Maintain traffic management rules to minimise the likelihood of fauna injury or mortality. These rules include prohibition of off-road driving unless authorised and reduced speed limits on internal roads.
- Minimise the attraction of feral and native fauna to the proposal by ensuring proper food storage and disposal.

- Remove roadkill from roads to reduce scavenging where necessary.
- Direct light sources towards proposal activities to illuminate operational areas rather than surrounding areas.
- Maintain existing fauna exclusion management including the fencing of the TSFs to prevent fauna entering and management of trenches to allow fauna to escape.
- Minimise dust generation from mining and road use that could cause temporary disturbance to flora and fauna as per the FAQMP.
- Use of additional dust control measures where practical, such as application of saline water on an as needs basis dust suppression as per the FAQMP.
- Continue to implement the Seepage and Groundwater Management Plan (SGWMP) to minimise indirect impacts on vegetation from rising saline water.
- Ensure a fire management and emergency response plan is available at key locations and firefighting equipment is readily available on all vehicles and all facilities.
- Maintain existing procedures for feral animals, including cat trapping when numbers are identified as increasing (usually spring).
- Clearing activities will not be undertaken when the Fire Danger Rating is severe or higher.

2.8.3 Remediate

The habitat species *Senna artemisioides* ssp. *filifolia* and *A. tetragonophylla* are included in the rehabilitation seed mix and will continue to be included in future Fimiston mine revegetation activities and mine closure rehabilitation. These species germinate well and are present in rehabilitated areas. Progressive rehabilitation of bare ground areas will be undertaken to rehabilitate and to reproduce habitat values (as per KCGM Mine Closure Plan).

Rationale for choice of indicators and/or management actions

Monitoring indicators and triggers have been developed based on recent individual species knowledge has been successfully collected and verified as representative and acceptable to subject matter experts within specialist areas of science and regulatory departments (DBCA). KCGM is currently leading the collection of representative individual species baseline information within Western Australia and Australia (for *J. aridus*). Surveys at opportunistically appropriate times will be undertaken over the next three years in an attempt to increase the knowledge of these species.

This new species data can be used to develop meaningful and practical individual species management indicators (trigger levels and threshold limits). Specific studies where KCGM is assisting the scientific community to understand these species include:

- *J. aridus*: confirmation of species whole of life habitat and life stage requirements to ensure continued population health and diversity; and confirmation of overall distribution within the Kalgoorlie region.
- Continue to work with DBCA to refine the understanding of *J. aridus* and to determine a suitable method for long-term monitoring of this poorly understood species.
- Lead development of understanding and aid identification of conservation management strategies.

2.9 Management-based Provisions

The following management actions will assist in meeting the Trigger criteria and Threshold criteria in the outcome-based provisions (Section 3.1.1.1 Outcome-based Provisions). These actions will be reviewed as part of the monitoring and reporting processes, and changes made where required.

The management actions for this SSMP, as detailed in Table 5, are summarised as:

- Clearing management.
- Hydrology Management
- Weed management.
- Traffic management.
- Fauna exclusion zones
- Dust management
- Fire management
- Introduced predator management.

The management objectives for this SSMP are:

- Minimise the potential risk of impact on *J. aridus* from clearing activity, vehicle strike.
- Minimise the potential risk of a decline in *J. aridus* populations due to predation from introduced predator fauna.
- Minimise the potential risk of a decline of *J. aridus* populations due to dust, weeds and displacement.
- Minimise the potential risk of a decline in *J. aridus* habitat condition due to a change in fire regime.

Triggers and thresholds have been established for management targets and are detailed in 3.1 Triggers, Thresholds and Contingency Actions. These triggers and thresholds are initial estimates for early warning triggers. These will be modified and updated over time as more information is available on the species and habitats. Any modifications and adaptive management will be to improve on protections for the species and will be discussed with stakeholders prior to implementation.

Table 4 Management-based Provisions

Management Actions	Target	Monitoring	Reporting
Clearing Management - Implementation of an internal clearing permit procedure, including onsite demarcation and notification procedures. <i>J. aridus</i> breeding shrubs within close proximity to operational areas to be delineated with flagging tape, signage or similar to alert all personnel of their location. - Inductions of all site personnel to include information on significant species, management targets, measures and expectations. - Undertake progressive clearing, minimising the amount of active disturbance present. - Progressively rehabilitate areas as appropriate. - Clearing to occur outside the annual <i>J. aridus</i> larval and flight activity period (Spring – August to November) in relevant areas. - Where confirmed <i>J. aridus</i> breeding shrubs are located within the proposed footprint all <i>J. aridus</i> egg material is to be relocated to a suitable shrub outside the clearing footprint (refer to translocation protocol).	Minimise the potential for incidental damage to priority flora and shrub habitat	Annual vegetation and butterfly surveys	Annual reporting. Flora and Vegetation health reporting. Incident reports.
Hydrology Management - Design surface hydrology to avoid changes in hydrology to sensitive areas. - Maintain the supernatant pool size, under normal operating conditions, below a maximum of 15% of the total surface area of the paddock in which deposition is occurring on the Fimiston TSFs to mitigate the seepage rate. - Maintain Groundwater level to >4 mBGL to keep water below plant root level in the soil profile to protect the Eucalypt woodland vegetation in the vicinity of the Fimiston TSFs as per the Part V Licence (L6420/1988/14)	Maintain groundwater levels to >4 mBGL through seepage recovery. Minimise the normal operating supernatant pool size to <15%	Daily monitoring of supernatant pool. Quarterly Groundwater Monitoring as per Licence	Quarterly Groundwater Monitoring Report to DWER Annual Audit Report of the SGMP in the Annual Environment Report.

Management Actions	Target	Monitoring	Reporting
Fire Management Ensure a fire management and emergency response plan is available at key locations and firefighting equipment is readily available on all vehicles and all facilities.	Minimise decline in habitat condition due to changed fire regimes.	Annual vegetation and butterfly surveys.	
Traffic Management - Avoid accidental disturbance to fauna and habitat by enforcing strict traffic management rules: - keeping to designated tracks with no off-road driving permitted - driving to road and weather conditions - reduced speed limits within suitable habitat. - All sightings and interactions to be reported to Environmental personnel. - Worker awareness training.	Minimise the potential for incidental damage to shrub habitat		Internal audit reporting for speeding and off-road driving.
Fauna Exclusion zones - Maintain existing fauna exclusion management including the fencing of the TSFs to prevent fauna entering and implementation of a 50m buffer around the <i>J. aridus</i> habitat shrubs to prevent disturbance. - Management of trenches to allow fauna to escape - Minimise the attraction of feral and native fauna to the proposal by ensuring proper food storage and disposal; and - Direct light sources towards proposal activities to illuminate operational areas rather than surrounding areas.		Annual vegetation and butterfly surveys.	Annual reporting. Flora and Vegetation health reporting. Incident reports.

Dust, noise, vibration and light emissions Management • Implement the KCGM-ENV-010 Dust Monitoring and Management Procedure • Minimise dust generation from mining and road use that could cause temporary disturbance to flora and fauna • Undertake dust suppression measures that include good house-keeping practices for vehicles, cleared areas, and active stockpiles. • Implement dust suppression measures such as the use of watercarts will be used during dry and windy conditions, as required. • Implement the KCGM Noise and Vibration Monitoring and Management Plan (NVMMP) which includes control measures and operational strategies that contribute to reducing noise and vibration emissions.	Minimise the potential for decline in population due to dust, light, noise, vibration and displacement.	Annual vegetation and butterfly surveys. Dust, flora and vegetation health monitoring.
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2.9.1 Implementation

Implementation of this SSMP will be assisted through KCGM's Environmental Management System (EMS) incorporating systems, processes, procedures and work instructions relating to the management, monitoring and reporting components of this SSMP.

KCGM is committed to conducting its activities for the Project in an ecologically responsible manner. The key personnel involved in implementation of this SSMP, and their roles and responsibilities are listed in Table 6.

Table 5 Roles and Responsibilities

Role	Responsibility
KCGM	KCGM has the overall responsibility for implementation of this SSMP. If any roles are delegated to a contractor or consultant, KCGM has the responsibility to audit compliance and ensure any contingency actions are implemented.
Environmental Superintendent	Overall accountability for auditing and compliance assessment of the SSMP during operation to ensure it is maintained and meets objectives and targets. Provide technical support to all Project personnel to ensure the SSMP is implemented correctly and complied with. Implement and maintain the SSMP, review its effectiveness and review the implementation as required. Obtain relevant approvals from regulatory agencies for disturbance as required. Ensure all personnel involved in the Project are inducted and will adhere to the SSMP requirements. Implement monitoring programs and documenting results. Liaise with stakeholders and technical experts for advice and resolution of management aspects/objectives as required. Review and close out contingency actions as required. Report as required to regulating authorities. May delegate all or part responsibility to an appropriately qualified person.
Construction Manager / Registered Manager	Overall accountability for auditing and compliance assessment with the SSMP during construction and operations to ensure it is maintained and meets objectives and targets. Overall accountability to ensure the SSMP is implemented, reported and maintained on-site. Ensure personnel attend inductions, have sufficient resources and training to meet the requirements of the SSMP. Support KCGM's fauna and flora management initiative and culture. Comply with all legal requirements and the requirements of the SSMP. Seek advice when in doubt about requirements. Appoint appropriate consultants to undertake specific activities set out in the SSMP if required.
All personnel	Must receive induction prior to commencement of work on site. Comply with all legal requirements and the requirements of the SSMP. Attend area specific environmental inductions/ briefings and any other training required. Participate in toolbox meetings and encourage personnel to suggest improvements.

2.10 Monitoring

Monitoring will be undertaken in accordance with best-practice techniques and a summary of actions is outlined in Table 7.

Table 6 Monitoring Program Summary

Monitoring Event	Monitoring Action	Frequency	Responsibility
Pre-clearance Surveys/ desktop	To be undertaken prior to disturbance activities to confirm the locations of <i>J. aridus</i> breeding habitat shrubs. Monitoring of clearing register for compliance to approvals. Review of Indicative Site Layout to determine clearing proximity to habitat Shrubs. Add new occurrences of <i>J. aridus</i> breeding habitat shrubs to monitoring inventory and install buffers for protection.	Prior to clearing	Environmental Superintendent
Significant flora and fauna habitat Monitoring	Annual monitoring of health of vegetation that is habitat for significant flora and fauna. Monitoring to detect dust impacts on vegetation	Annually in Spring	Environmental Superintendent
Significant fauna monitoring	Annual monitoring of <i>J. aridus</i> during Breeding season	Annually in Spring or as advised by specialists	Environmental Superintendent

A detailed monitoring program has been prepared for *J. aridus* (see Appendices) based on the findings of recent surveys. KCGM is consulting with Phoenix Environmental Sciences in the preparation and implementation of the monitoring program.

Jalmenus aridus

Monitoring of *J. aridus* will be undertaken annually during the breeding season at the Fimiston population (impact site) and two reference populations (Appendix A). Initial baseline surveys conducted in 2023 and in 2024 (Phoenix 2024b) have highlighted several important considerations for the *J. aridus* monitoring program:

- Breeding shrub selection should include (as priority) any shrubs that have been observed to have breeding activity at any point in time. Where insufficient confirmed breeding shrubs are available for monitoring, potential breeding shrubs may be selected. Potential shrubs should be chosen from known breeding species within the vicinity of known breeding shrubs and/or records of butterflies).
- Confirmed/potential breeding shrubs should be established for regular monitoring per site to enable statistical analysis of results.
- A health scale tailored to Senna and Acacia should be developed with input from a botanist, and adopted for breeding shrub health assessment.
- The presence/absence of *Froggattella kirbii* ants (attendant ant species) should be incorporated into the breeding shrub health assessment.
- Butterfly activity monitoring should focus on detecting presence and evidence of butterfly breeding at each site, including presence of eggs, larvae or pupae and/or adult butterflies. Measuring abundance is not practical due to unpredictability in detections and low densities.
- Initial monitoring surveys should be conducted early in the breeding period. Where evidence of breeding activity is not detected in the initial survey, additional surveys should be conducted within

the same season to attempt to confirm breeding activity for that year (it is possible that breeding may not occur in some years, due to natural factors).

- A practical method for scoring nectaring habitat health is needed that is suitable for the monitoring sites, for example establishment of fixed transects through the extent of the known population at each site (rather than 3 replicate quadrats as originally proposed). This method should be developed with input by a botanist.
- Data from the monitoring surveys should be compared between the impact and reference sites at the time of survey, rather than variance between years, as activity is expected to be represented across sites.
- Interpretation of monitoring results should consider the findings for all factors as a whole, rather than in isolation.
- The monitoring plan for *J. aridus* should allow for review and refinement following each monitoring round (i.e. an adaptive management approach), as knowledge of the species ecology, behaviour, distribution and susceptibility to impacts increases.

2.10.1 Triggers and Threshold Rationale

Table 7 Rationale for *J. aridus* outcome-based provisions

Threshold	Rationale
Statistically significant (more than 20%) difference in mean health ratings of confirmed/potential <i>J. aridus</i> breeding shrubs and/or nectaring habitat at Fimiston population in comparison to confirmed/potential breeding shrubs at control populations.	If a difference in health of <i>J. aridus</i> habitat is identified between control and impact sites, the response actions will allow investigation to determine if the causes are attributed to the Proposal and, if necessary, allow for early intervention and further management measures to prevent impacts on <i>J. aridus</i> habitat. The criteria for habitat health decline will be compared between impact and control sites at time of survey, rather than between years as external factors such as climate are likely to influence all three sites concurrently.
No evidence of breeding at Fimiston population compared to control	Butterfly monitoring will focus on detecting continued presence and breeding activity of the Fimiston population in each season.
populations without attributable natural cause identified.	Monitoring of presence and breeding activity at the Fimiston population will be compared with the control populations within each season as activity is expected to be represented across all 3 sites concurrently. This approach takes account of the variability in life cycle timing across years, as well as the potential for extended diapause during unfavourable conditions. Abundance measures are not practical for this species given the unpredictability in flying periods and the low densities of adult butterflies encountered.

Table 8 Rationale for *J. aridus* objective-based provisions

Management	Rationale
Clearing procedure and authorised internal permit process for all clearing activities to prevent unauthorised clearing within the Development Envelope (DE).	If clearing occurs which has not received an approved internal clearing permit within the DE, it is considered a non-compliance or failure of the procedure which is in place to prevent vegetation clearing of host plants or nectaring vegetation.

3. EMP PROVISIONS

The key objectives of the SSMP are to review and ensure compliance against the “*Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plans*” (EPA version 2.0, 2021) and ensure that once approval of the FS Project (s38) is received that the impending activities of that Project will not inadvertently impact on Environmental Factors regarding flora and vegetation and terrestrial fauna, as per “*Statement of environmental principles, factors, objectives and aims of EIA*” (EPA version 4.1, 2022).

To meet this objective, management provisions have been established to assist implementation of practical and safe mitigation measures to minimise the potential impacts as summarised in Section 2.6. Environmental impacts incorporate quantifiable and non-quantifiable impacts, outcome-based and management-based provisions (included in this SSMP).

Early response triggers (thresholds) for management-based provisions are detailed in the tables below:

- Outcome-based provisions are performance-based and may be used where part of the environment is able to be objectively measured and reported. Therefore, outcome-based provisions have been established to specify triggers and thresholds of direct impacts and to ensure the Proposal achieves acceptable environmental outcomes.

Management-based provisions relate to management actions and may be used where the part of the environment is not capable of being objectively measured and reported. Therefore, management-based provisions have been established to specify management actions and targets, particularly for indirect impacts that are non-quantifiable. As monitoring is undertaken and additional population data is gathered, the management targets are expected to be reviewed and quantifiable outcome-based provisions established.

3.1 Triggers, Thresholds and Contingency Actions

The Trigger criteria have been developed with reference to the information available from the baseline **surveys and initial** monitoring. It is expected that once sufficient monitoring data is collated over time (i.e. 3 years) that Trigger criteria and Threshold criteria will be reviewed by an appropriate fauna specialist and revised as necessary, with this SSMP.

Contingency actions for *J. aridus* include:

- Increase in staff training and awareness on factors which have implications to vegetation health for example dust, changes to hydrology.
- Review impact of unauthorised clearing and report any noncompliance to DWER within 7 days of identification.
- Installation of signage where appropriate.
- Undertake rehabilitation of unauthorised clearing (i.e. disturbance from vehicle tracks, vegetation clearing) by appropriately qualified personnel as required, in accordance with rehabilitation procedure.
- Review all monitoring data (including control sites) in relation to management measures and any other available data such as weather or changes in hydrology to determine if the decrease is due to proposal related impacts.
- Review dust, weather and weed monitoring to compare *J. aridus* breeding shrub and shrubs of the same species at control sites. Determine whether the changes observed in the impact sites are comparable to the observations in the reference sites.
- Investigate potential causes for the observed decline in vegetation health which may include but are not limited to:
 - seasonal conditions (e.g., rainfall and temperatures)
 - effectiveness of weed control

- spatial variation (near-impact areas) versus sites located further from impact
- Develop strategies based on the outcomes of the investigation to prevent a recurrence and if necessary or possible reverse the decline in health of the breeding shrub. Management measures may include the following:
- Increase the frequency of health monitoring.
- Increase staff training and awareness on factors which have implications to health for example dust, changes to hydrology.

3.1.1 Jalmenus aridus

3.1.1.1 Outcome based provisions

Purpose of EMP: to comply with EPA Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plans.

Table 9 Outcome-based conditions for *J. aridus*

EPA factor/s and objective/s: Terrestrial Fauna. To avoid direct and minimise indirect impacts to <i>J. aridus</i> to the maximum extent practical Outcome/s: No observable impact to <i>J. aridus</i> from the Fimiston South operations Key environmental values: Presence of Priority 1 species, <i>J. aridus</i> Key impacts and risks: Reduction in presence and population viability of <i>J. aridus</i>				
Outcome-based				
Criteria: Trigger criteria Threshold criteria	Response actions: Trigger level actions Threshold contingency actions	Monitoring	Timing / frequency of monitoring	Reporting
Trigger criterion A 30% difference in health ratings of <i>J. aridus</i> confirmed/potential breeding shrubs and/or habitat at Fimiston population in comparison to control populations. Threshold criterion A 20% difference in health ratings of <i>J. aridus</i> confirmed/potential breeding shrubs and / or habitat at Fimiston population in comparison to control populations.	Trigger level actions - Review all monitoring data (including control sites) in relation to management measures and any other available data such as weather and climate to determine if the decrease is due to proposal related impacts. - Increase the frequency of health monitoring. - If decrease is due to changes attributable to the project then engineering and operational controls will be investigated to stop indirect impacts. - Alert relevant stakeholders and confirm measures are being undertaken. Threshold contingency actions - Review all monitoring data (including control sites) in relation to management measures and any other available data such as weather or changes in hydrology to determine if the decrease is due to proposal related impacts. - Review dust, weather and weed monitoring to compare <i>J. aridus</i> breeding shrub and shrubs of the same species at	Assessment of <i>J. aridus</i> confirmed/potential breeding shrub health at control and impact populations.	Annually, in spring.	Annual Compliance Assessment (CAR) Report to DWER/EPA (MS782). The Annual Environment Report (AER) to DMIRS.

	control sites. Determine whether the changes observed in the impact sites are comparable to the observations in the reference sites. - Investigate potential causes for the observed decline in vegetation health which may include but are not limited to: - seasonal conditions (e.g., rainfall and temperatures) - effectiveness of weed control - spatial variation (near-impact areas) versus sites located further from impact - natural aging of the shrub - Develop strategies based on the outcomes of the investigation to prevent a recurrence and if necessary or possible reverse the decline in health of the breeding shrub. Management measures may include the following: - Increase the frequency of health monitoring. Increase staff training and awareness on factors which have implications to health for example dust, changes to hydrology.			
Trigger criterion Difference in health ratings of <i>J. aridus</i> confirmed/potential nectaring habitat at Fimiston population in comparison to confirmed/potential nectaring habitat at control populations without attributable natural cause.	Trigger level actions Review all monitoring data (including control sites) in relation to management measures and any other available data such as weather and climate to determine if the decrease is due to proposal related impacts. Review general access to the area and any other potential cause of change of condition. Confirm that alternative breeding shrubs nearby.	Assessment of <i>J. aridus</i> confirmed/potential nectaring habitat health at control and impact populations.	Annually, in spring.	Annual Compliance Assessment (CAR) Report to DWER/EPA (MS782). The Annual Environment Report (AER) to DMIRS.

Threshold criterion Statistically significant (more than 20%) difference in mean health ratings of confirmed/potential <i>J. aridus</i> nectaring habitat at Fimiston population in comparison to confirmed/potential <i>J. aridus</i> nectaring habitat at control sites.	Threshold contingency actions Review all monitoring data (including control sites) in relation to management measures and any other available data such as weather or changes in hydrology to determine if the decrease is due to proposal related impacts. Review dust, weather and weed monitoring to compare nectaring habitat and similar vegetation at control sites. Determine whether the changes observed in the impact sites are comparable to the observations in the reference sites. Investigate potential causes for the observed decline in vegetation health which may include but are not limited to: • seasonal conditions (e.g., rainfall and temperatures) • effectiveness of weed control • natural aging of shrub • spatial variation (near-impact areas) versus sites located further from impact Develop strategies based on the outcomes of the investigation to prevent a recurrence and if necessary or possible reverse the decline in health of the breeding shrub. Management measures may include the following: • Review general access to the area and any other potential cause of change of condition. undertake weed management • staff training and awareness on factors which have implications to health for example dust, changes to hydrology.			
Trigger criterion Reduction in breeding at Fimiston population due to project activities compared to control populations during initial monitoring survey (within each breeding season). No evidence of breeding at Fimiston population compared to control populations during initial	Trigger level actions Review all monitoring data and any other available data such as weather and changes to hydrology to determine if the decrease is due to proposal- related impacts. • Report internally as an incident • Investigate cause and extent of mortality and if it is likely to result in the key environmental outcome not being achieved. Threshold response: • Report internally as an incident • Investigate cause and extent of mortality and if it is	Surveys for butterfly presence and breeding activity at control and impact populations. Surveys for additional regional	Annually, in spring for monitoring of impact and control populations – providing suitable spring climate. Further	Annual Compliance Assessment (CAR) Report to DWER/EPA (MS782). The Annual Environment Report (AER) to DMIRS. Engagement with

monitoring survey (within each breeding season) without attributable natural cause identified. Threshold criterion No evidence of breeding in additional surveys (within same season) at Fimiston population compared to control populations without attributable natural cause identified.	likely to result in the key environmental outcome not being achieved. If necessary (deemed to be proposal related) consider measures to prevent a re-occurrence of the incident and/or remediation strategies to address the impact and to protect the species habitat from any further impact. Engagement with key stakeholders including DBCA, and relevant specialists where required to determine any appropriate contingency actions.	populations.	surveys for additional regional populations may be conducted until it has been sufficiently demonstrated that the species is much more common and widespread than currently known.	DBCA – lodgement IBSA data packages.
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3.1.1.2 Objective-based EMPs

Purpose of EMP: to comply with EPA Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plans.

Table 10 Objective-based conditions for *J. aridus*

EPA factor/s and objective/s: Terrestrial fauna. To avoid direct and minimise indirect impacts to <i>J. aridus</i> to the maximum extent practical. Objective/s: To avoid clearing and impacts to <i>J. aridus</i> Key environmental values: Presence of Priority 1 species, <i>J. aridus</i> Key impacts and risks: Reduction in presence of <i>J. aridus</i>				
Objective-based				
Management targets	Management actions	Monitoring	Timing / frequency of actions	Reporting
Objective Manage clearing boundaries and clearing permitting process to prevent unauthorised clearing.	Management Actions • Train staff in clearing procedures • Survey and peg boundaries of areas prior to clearing • Environmental Officer to confirm boundaries prior to clearing occurring. • Maintain clearing buffer of 50m for <i>J. aridus</i> breeding shrubs • Clearing only with an authorised internal permit within the Mine Development Envelope (MDE).	Internal monitoring of recorded <i>J. aridus</i> and continued engagement with DBCA.	Annual auditing of internal clearing permits and documentation of any contingency actions. Annual report cycle to assist annual fees and calculation of disturbance footprint. Monitoring and reporting of areas cleared and/or rehabilitated in the previous 12 months.	Annual Compliance Assessment (CAR) Report to DWER/EPA (MS782). The Annual Environment Report (AER) to DMIRS.
Non-compliance Near miss – clearing within 20 m of known habitat without appropriate clearing procedures followed.	Contingency actions 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 i.e. Increase in staff training and awareness to include information on legislative requirements, appropriate clearing procedures). • Ground Disturbance Permit competency training • Review impact on species and reinstate area, if possible to prevent further damage.			

EPA factor/s and objective/s: Terrestrial fauna. To avoid direct and minimise indirect impacts to <i>J. aridus</i> to the maximum extent practical. Objective/s: To avoid clearing and impacts to <i>J. aridus</i> Key environmental values: Presence of Priority 1 species, <i>J. aridus</i> Key impacts and risks: Reduction in presence of <i>J. aridus</i>				
Objective-based				
Management targets	Management actions	Monitoring	Timing / frequency of actions	Reporting
<u>Non-conformance</u> Clearing without an authorised internal permit within the Mine Development Envelope (MDE) but outside the approved clearing areas.	Contingency actions - Review impact of unauthorised clearing and report any noncompliance to DWER within 7 days of identification. - Undertake rehabilitation of unauthorised clearing (i.e. disturbance from vehicle tracks, vegetation clearing) by appropriately qualified personnel as required, in accordance with rehabilitation procedure.			
Objective Design facilities to Minimise changes to hydrology to potential <i>J. aridus</i> habitat areas. Non-conformance Near miss – Ground Disturbance Permit not reviewed for potentially impacting facilities. Non-conformance Construction of facilities that impact upon the hydrology of the <i>J. aridus</i> potential habitat areas.	Management Actions Assess design for new facilities with potential to impact on hydrology of <i>J. aridus</i> area through Ground Disturbance Permit. Contingency actions Report internally as an incident in accordance with internal procedures. Ensure Ground Disturbance Permit process is followed. Implement engineering controls such as diversions to maintain ecological flows to habitat Contingency actions Report internally as an incident in accordance with internal procedures. Review impact on hydrology and determine if remedial works are required Review Ground Disturbance Permit process.	New Projects to identify potential development/ construction or disturbance footprint very early during pre-feasibility phase studies. Conduct spring surveys if potential for <i>J. aridus</i> occurrence. Conduct environmental impact assessments and apply risk and probability.	Annual auditing of internal clearing permits and documentation of any contingency actions. Annual report cycle to assist annual fees and calculation of disturbance footprint. Monitoring and reporting of areas cleared and/or rehabilitated in the previous 12 months.	Annual Compliance Assessment (CAR) Report to DWER/EPA (MS782). The Annual Environment Report (AER) to DMIRS.

4. ADAPTIVE MANAGEMENT AND REVIEW OF THE SSMP

KCGM operations recognises the dynamic nature of both natural ecosystems, man-made work areas and changing legislative environment and supports adaptive management under this SSMP.

Adaptive management involves:

- Monitoring and evaluation against management targets (including trigger thresholds) and environmental criteria (trigger limits);
- Implementing mitigation measures, reviewing and assessing new technologies or survey techniques; and
- Systematically adapting management of change to assist maintaining the under pinning environmental factor objectives of the EP Act.

Any changes to a Project will instigate a review and consideration of risks, mitigation controls and management actions. Assumptions and uncertainties will be evaluated against collected monitoring data on a recurrent basis in a process of continual improvement and establishing early response indicators/criteria. Any review and consideration of management actions or additions to this plan made in relation to adaptive management/continuous improvement may be made available to DBCA and/or DWER on request.

Examples of adaptive management include:

- The introduction of a different / alternative species-specific monitoring technique;
- The identification of potential trigger criteria to aid identification and development of conservation management strategies;
- Change to conservation status of a species triggers a review in the requirements of this SSMP;
- Changes to state or national regulatory or other standards triggering a review of this SSMP;
- Early identification of new proposal/projects which may pose potential risk, whether actual or frivolous, and complete environmental impact assessment if unclear identification or magnitude of impact/s.
- Because knowledge of *J. aridus* is still emerging and confidential, it is proposed to review this SSMP after three years of implementation to adapt the program to the latest understanding of the species.

5. STAKEHOLDER CONSULTATION

KCGM has undertaken extensive stakeholder engagement with regards to the development of the Revised Proposal. Reflecting the diverse range of stakeholders, their needs and engagement preferences, KCGM has employed a range of strategies to inform stakeholders of the Fimiston South Revised Proposal over the last two years and collate their feedback.

The consultation and engagement process involved:

- Identifying key stakeholders and interests
- Developing and implementing the consultation and engagement program
- Recording stakeholder feedback.

The outcomes of consultation are recorded in a Stakeholder Consultation Register. Consultation to date has been comprised predominately of meetings and correspondence with a number of State agencies, Local Government, Traditional Owners and non-government organisations and interest groups.

KCGM is committed to ongoing stakeholder identification, communication, engagement and consultation through the expansion planning and approval phase, and through to construction, operational and closure phases of the Project.

The relevant stakeholders for this SSMP are:

- Department of Biodiversity, Conservation and Attractions (DBCA): Conservation of Priority Species.
- Western Australian Environmental Protection Authority (EPA): Assessment of the proposal under Part IV of the EP Act and assessment of this SSMP.
 - All comments received during the assessment period from decision-making authorities and the public that relate to this SSMP will be considered and changes made as/where required.
 - Provision of technical reports and field opportunities have been arranged with DBCA.
- Community: Part of public consultation phase under Revised Proposal assessment.

At this stage KCGM would prefer that this EMP remain confidential to protect the significant species from detection and most particularly to protect *J. aridus* from butterfly collectors.

Phoenix has been working in close collaboration for several years with R Eastwood and A Williams from DBCA to undertake additional surveys at Fimiston and regionally to add to the scientific knowledge of the poorly known *J. aridus* species. This work is ongoing and means that survey methods will be refined over time as the scientific knowledge grows and details about the species habitat, breeding and persistence at the site is better understood. This collaboration has already resulted in a peer reviewed scientific publication on the current state of knowledge of *J. aridus* including distribution, biology, behaviour and habitat preferences (Eastwood et. al. 2023).

The community have not been consulted specifically about the SSMP as it is considered confidential information in order to protect the species. The community has been consulted about the Fimiston Project.

6. DOCUMENT HISTORY

Complexity of changes	Minor revisions ☐	Moderate revisions ☒	Major revisions ☐
Number of Key Environmental Factors	One	2-3 ☒	> 3 ☐
Date of revision for submission to EPA: 31/10/2024			
Proponent's operational requirement timeframe for approval of revision	< One Month ☒	< Six Months ☐	> Six Months ☐
Reason for Timeframe:	None ☐		

Item no.	EMP section no.	EMP pg no.	Summary of change	Reason for change
1	General	A	Overall framework amended	Comply with 'Instructions on how to prepare Environmental Protection Act 1986 - Part IV Environmental Management Plans, (version 2.0; 2021)'
2		ii	Document History/Version control	More suitable to be at the front of the document.
3	Section 1	2	Present background of the project	To provide the purpose of the SSMP and update the Management Plan Summary as per the EPA guidelines
4	Section 2	3	Inclusion of Priority 1 and 2 species (<i>Jalmenus aridus</i> and <i>Eremophila praecox</i> respectively), and the Vulnerable Malleefowl (<i>Leipoa ocellata</i>)2.4	Shows knowledge/awareness of Significant Species within the area and ability to plan around this
5		5	Update to survey and study findings (Section 2.6)	Included to align with EPA guidelines and give new in sight to the extent of significant species prevalence.
6		11	Update to the Management approach (Section 2.8)	Section and sub-section included to describe rationale of the management approach against the potential impacts on the environment as per EPA EMP template and guideline
7		13	Inclusion of Monitoring Program (Section 2.8.4)	Section and table included to describe the rationale for the management actions against the potential impacts on the environment as per EPA EMP template and guideline.
8	Section 6	48	Included Changes to EMP	Updated to align with EPA EMP template
			Version 13 as of July 2024	
9	2.6.1		Update of reference	The reference by Phoenix (2023) in relation to the last sighting of <i>J. aridus</i> at the Lake Douglas location has been amended to

				R.P. Weir pers.com to R. Eastwood, (2022).
10	2.7.1		Typo	Included the word 'not' when referencing the likely impact to flora and vegetation, and fauna to.
11	2.7.2		Clarification of role of <i>S. artemisioides</i> subsp. <i>filifolia</i> .	<i>S. artemisioides</i> subsp. <i>filifolia</i> as a host plant, and not a feed plant as previously noted.
12	2.9		Clarify timeframes for clearing.	Address comment from DBCA for the ERD consultation period.
13	2.9		Included reference to the Translocation Protocol.	Address comment from DBCA for the ERD consultation period.
14	3.1.2		Amend the reference of habitat shrub to breeding shrub for <i>J. aridus</i> .	Clarification required to demonstrate accurate use by the species.
15	5		Update of reference to published research papers.	Research has now been published and peer reviewed.
Version 14 as of 31 October 2024 – 3 December 2024				
	2.6.1 and 2.6.2		Added in reference to regional surveys for both <i>E. praecox</i> and <i>J. aridus</i> and updated population numbers based on recent surveys	To confirm that these will be undertaken
	2.7.1		Removed reference waste storage	Not relevant
	2.9		Added adaptive management for triggers.	As requested by DBCA
	2.10		Committed to adding newly found shrubs to the monitoring program. Added references to the monitoring program appendices	As requested by DBCA
	3.1		Additional actions included in adaptive management	As requested by DBCA
	3.1.1		Updates to response actions. Removed reference to changing monitoring frequency	As requested by DBCA
	3.1.2		Updated triggers and thresholds and actions. Removed reference to changing monitoring frequency	As requested by DBCA
	Appendix C		New/ updated <i>J. aridus</i> monitoring plan	As requested by DBCA
	Whole document		Separate fauna SSMP prepared	As requested by DWER

7. GLOSSARY

Term	Explanation
DBCA	Department of Biodiversity, Conservation and Attractions
DE	Development Envelope
DWER	Department of Water and Environmental Regulation
EMP	Environmental Management Plan
EPA	Environmental Protection Authority (Western Australian)
EP Act	Environmental Protection Act 1986 (Western Australian)
Fimiston	KCGM's Fimiston gold mine
FS Project	Fimiston South Project
KCGM	Kalgoorlie Consolidated Gold Mines Pty Ltd
Mt	Million tonnes
NVCP	Native Vegetation Clearance Permit
p.a	Per annum
SSMP	Significant Species Management Plan
TSF	Tailings Storage Facility
WRD	Waste Rock Dump

8. REFERENCES

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9. APPENDIX A: *J. aridus* Monitoring Procedure

9.1 Personnel

The monitoring will be conducted by experienced personnel with experience undertaking butterfly surveys. Dr Eastwood is a research associate at the WA Museum (WAM) and a specialist Lepidopterist with a particular interest in Lycaenidae; he is familiar with *J. aridus* behaviour, flight characteristics and general habits (Eastwood et al. 2023), and is the lead specialist for this work.

9.2 Timing

The surveys will be undertaken during the primary flight season which is normally between late September and November.

The timing of *J. aridus* adult phenology appears to be highly dependent on local environmental conditions, climate, and other factors which themselves may also be dependent on weather conditions leading up to the appearance of butterflies. For example, *J. aridus* adult activity is intimately tied to Senna flowering phenology which, in turn is highly dependent on weather conditions. Thus, *J. aridus* adult activity cannot be predicted very far in advance.

A reconnaissance survey (or two) will be undertaken in September to determine expected activity of *J. aridus*, and a follow up survey will be planned to coincide with emergence and/or flying.

9.3 Reference Sites

Based on the recent 2024 data, two comparable reference sites have been selected also considering predicted size of the *J. aridus* population, accessibility, tenure, and proximity to Fimiston.

Both of these sites are relatively close to the *J. aridus* site at Fimiston, therefore any local conditions or changes are likely to be reflected in all 3 populations.

9.4 Breeding Shrub Health Assessment

Breeding shrubs are identified when eggs, larvae and/or pupae are present on the host plant. Two factors assist in the location of breeding shrubs:

- The presence of *Froggattella kirbii* (host-ant) is also indicative of potential breeding shrubs.
- Adult butterflies assist in locating potential breeding shrubs as they generally stay relatively close to their host plant.

Pupae, larvae and eggs, the latter of which is much harder to locate due to the minute size, is searched for under the bark, in debris around the base, borers holes, phylodes and other places where early stages could be found on shrubs that had been identified as potential breeding shrubs, as well as other Senna plants.

Confirmed/potential potential shrubs will be selected for monitoring at each site, for statistical analysis. If this number of confirmed breeding shrubs is low, potential breeding shrubs will be selected.

Potential breeding shrubs are classified as those which have high potential to be used as a breeding shrub (ie. *Senna arteriotomies filifolia* (or *A. tetragonophylla* or another species of plant they are known to breed on at the respective site), presence of *Froggattella kirbii*, and at plants located within the known range of breeding shrubs and/or butterfly activity. It should be noted that the same shrub may not be used in consecutive years.

In Spring 2023, initial breeding shrubs were identified, however due to the low butterfly activity fewer than expected breeding shrubs were found within 16 populations.

In Spring 2024, the number of populations increased to 25, with a larger regional extent as well as additional

potential breeding shrubs at known populations added to the dataset in 2024.

The locations of shrubs selected for health assessment are recorded on a GPS unit and the presence/absence of *F. kirbii* and *J. aridus* larvae are noted. Each shrub with larvae or a high confidence of breeding were marked with a peg marker placed under or within 0.5 m of the shrub to enable identification on future monitoring surveys.

A health score utilising the Tree Health Scale of Casson et al. (2009) is trialed in the 2023 spring survey to assess shrub health. The scale is inverted so that higher scores reflect greater health, allowing for easier interpretation (Table 1). The mean, median and range of scores will be used to determine changes in health in relation to the threshold criteria.

The survival rates of the breeding shrubs at all three sites be analysed using the Kaplan-Meier survivorship method with staggered entry (Pollock et al 1987). This would enable analysis to be undertaken (and any impacts to be detected) as the data accumulates.

Table 1 Tree Health Scale (Casson et al. 2009)

Tree Health rating	Description
6	Healthy, no dead leaves
5	Occasional dead leaves
4	Epicormic shoots (therefore stressed)
3	Tips of branches stressed or dying
2	Entire or whole branches dying or dead (NB some lower branches excluded from this assessment)
1	More than half tree dead
0	Tree dead

The Casson's scale was trialed in the 2023 spring survey, but was not found to be an appropriate method. As a result a Defoliation scale was used as an alternative method in the 2024 spring monitoring, and found to be more appropriate.

Table 2 Shrub Defoliation Scale ()

Scale	Description
Defoliation 4	0 - 25% defoliation
Defoliation 3	25 – 50% defoliation
Defoliation 2	50 – 75% defoliation
Defoliation 1	75 – 100% defoliation

The methodology for monitoring the breeding shrub health is:

- 1 Breeding shrub density will be measured with 50 m intercept transect. Two strata per transect will be measured for canopy cover: the tall tree stratum (where present), and potential breeding shrubs, *Senna artemisioides* subsp. *filifolia* and *Acacia tetragonopylla*, in the mid stratum. These two species have been selected as they are confirmed breeding shrubs for *J. aridus* (Eastwood et al. 2023).
- 2 The potential breeding shrubs will be scored with a Defoliation scale (Table 3).
- 3 Heights and phenology will be recorded.
- 4 Breeding shrubs will be added to the dataset if *J. aridus* is found breeding in either of the known breeding shrubs or in any other species in the area.
- 5 Overall canopy cover per transect will be determined from the sum of covers of all species measured.

9.5 Vegetation Health of Nectaring Habitat Assessment

In spring 2023, 10 x 10 m quadrats were set up as a trial monitoring method, but not found to describe the nectaring habitat. Vegetation health was assessed using the Casson et al. (2009) Vegetation Health Scale (Table 4), where the quadrat is scored as a single unit and given a single score.

In 2023, the Fimiston site was assigned a health rating of 4. Health ratings were not taken at the reference sites due to uncertainty of the primary nectaring habitat as there were few adults recorded at these sites during spring 2023. It should be noted that *J. aridus* has generally been found on older shrubs, usually with a rating of 2, not on younger shrubs.

Table 3 Vegetation Health Scale Casson et al. (2009)

Health rating	Description
4	Healthy no signs of stress
3	Some early signs of stress, a few individuals, likely one species
2	Signs of stress in several individuals, one or more species
1	Signs of stress in many individuals, several species
0	Advanced decline and/or death of many individuals and several or most species

A similar method was used again in spring 2024, using transects instead of quadrants, with the transect scored as a single unit and given a single score of one of the ratings.

The methodology for nectaring habitat shrub health is:

- 1 Canopy covers for selected nectaring habitat genera will be measured in the same 50 m intercept transect utilised for breeding shrub health assessment. The selected genera for nectaring habitat assessment will be *Eremophila*, *Scaevola*, and *Maireana* species.
- 2 Overall canopy cover per transect will be determined from the sum of covers of all species measured.
- 3 Data will be recorded for species flowering/not flowering during the monitoring, as well as shrub/tree height.

9.6 Presence of *J. aridus*

Due to the difficult and unpredictable nature of butterfly emergence which is dependent on environmental and biological factors, and the life cycle of the species, the detection of *J. aridus*, whether in early stage or adult form is adequate to determine if the species is present at a site.

To enable the best chance of detecting *J. aridus*, searches are undertaken by experienced personnel, within the expected period of larvae, pupae or adult activity, and in ideal conditions, i.e. sunny, above 23°C and low wind. Adult butterflies are observed opportunistically within suitable habitat by targeting prospective microhabitats, such as nectaring, courtship or breeding areas. Larvae and pupae are searched for on known breeding shrubs, particularly at the site (ie. *S. artemisoides filifolia*) which have *Froggattella kirbii* and is within the range of known breeding shrubs and/or butterfly activity.

Adult butterflies are identified on the wing, while some specimens may be collected with a hand net and euthanized with ethyl acetate before placing in a glassine envelope and storing at 3°C until returning to Perth to be lodged in the WAM as primary data recording spatial and temporal distribution of the species. Adult *J. aridus* butterflies will be collected under approved Fauna taking licences.

In Spring 2023, *J. aridus* adults were recorded at the 3 monitoring sites. Most of these were ‘worn’, i.e. older specimens. In addition to adult butterflies, several juvenile lifestages were recorded at Fimiston, however no early stages have been identified at Nature Reserves yet due to the short period the larvae and pupae were present, which did not appear to be at the same time as at Fimiston, despite these being the closest sites.

Figure 1: Regional extent of known *J. aridus* populations (October 2024)

9.7 Site Details

Fimiston Site

Figure 2 Fimiston - Location of Monitored Breeding Shrubs & Nectaring Habitat

Reference Sites

Figure 3 Reference Site - Location of Monitored Breeding Shrubs & Nectaring Habitat

Figure 4 Reference Site - Location of Monitored Breeding Shrubs & Nectaring Habitat

9.8 Data Analysis and Reporting

Data from the monitoring surveys will be compared between sites (Fimiston, Nature Reserves) at the time of survey, rather than variance between years, as activity is expected to be represented across all three sites concurrently. Interpretation of monitoring results will consider the findings for all factors as a whole, rather than in isolation. A report outlining the findings and recommendations will be published within 2 months of monitoring. If the trigger criterion thresholds are reached (ie. a significant reduction in breeding or nectaring vegetation health, or lack of evidence of breeding) these will be communicated immediately after the survey to determine if further investigation is required.

Table 3 Habitat shrubs in monitoring program

Site	Site code	Health score	<i>F. kirbii</i> observed	Early stages observed 2023	Early stages observed 2022	Latitude	Longitude
	1602-Ja-XXX-01	6	Yes	No			
	1602-Ja-XXX-02	2	Yes	No			
	1602-Ja-XXX-03	2	Yes	No			
	1602-Ja-XXX-04	2	Yes	No			
	1602-Ja-XXX-05	2		No			
	1602-Ja-XXX-06	2	Yes	No			
	1602-Ja-XXX-07	2		No			
	1602-Ja-XXX-08	2		No			

	1602-Ja-XXX-09	2		No			
	1602-Ja-XXX-10	2	Yes	No			
	1602-Ja-XXX-11	2		No			
	1602-Ja-XXX-12	2		No			
	1602-Ja-YYY-01	2	No	No			
	1602-Ja-YYY-02	6	No	No			
	1602-Ja-YYY-03	6	No	No			
	1602-Ja-YYY-04	6	No	No			
	1602-Ja-YYY-05	6	No	No			
	1602-Ja-YYY-06	2		No			
	1602-Ja-YYY-07	2		No			
	1602-Ja-YYY-08	2		No			
	1602-Ja-YYY-09	2		No			
	1602-Ja-YYY-10	2		No			
	1602-Ja-Fim-01	6	Yes	No			
	1602-Ja-Fim-02	6		No			
	1602-Ja-Fim-03	6		No			
	1602-Ja-Fim-04	6		No			
	1602-Ja-Fim-05	6		No			
	1602-Ja-Fim-06	6		No	unconfirmed		
	1602-Ja-Fim-07	6		No	unconfirmed		
	1602-Ja-Fim-08	6		No	Yes		
	1602-Ja-Fim-09	6		No	Yes		
	1602-Ja-Fim-10	6		No	Yes		
	1602-Ja-Fim-11	2		No	Yes		
	1602-Ja-Fim-12	2		No	Yes		
	1602-Ja-Fim-13	2		No			
	1602-Ja-Fim-14	2		No			
	1602-Ja-Fim-15	2	Yes	No			
	1602-Ja-Fim-16	2	No	No			
	1602-Ja-Fim-17	6		Eggs	Yes		
	1602-Ja-Fim-18	6		Eggs	Yes - original		

10. APPENDIX B: WEED MANAGEMENT PROCEDURE