GOVERNMENT OF WESTERN AUSTRALIA

Environmental Protection Authority

Medcalf Vanadium Project

Audalia Resources Limited

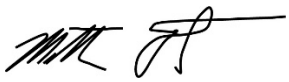
Report 1765

May 2024

This assessment report has been prepared by the Environmental Protection Authority (EPA) under s. 44 of the *Environmental Protection Act 1986* (WA). It describes the outcomes of the EPA's assessment of the Medcalf Project proposal by Audalia Resources Limited.

This assessment report is for the Western Australian Minister for Environment and sets out:

- what the EPA considers to be the key environmental factors identified in the course of the assessment
- the EPA's recommendations as to whether or not the proposal may be implemented and, if it recommends that implementation be allowed, the conditions and procedures, if any, to which implementation should be subject
- other information, advice and recommendations as the EPA thinks fit.



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23 April 2024

ISSN 1836-0491 (Online)
Assessment No. 2156

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Proposal

The Medcalf Vanadium Project (Medcalf Project) is a proposal to develop a vanadium, titanium and iron mining operation. The proposal is located approximately 100 kilometres west of Norseman, in the Goldfields Esperance region of Western Australia. The proponent for the proposal is Audalia Resources Limited (Audalia Resources).

The proposal includes the development of open mine pits, beneficiation plant, tailings storage facility, evaporation ponds, private haul road, road train transfer area and associated infrastructure such as laydown areas, borrow and gravel pits, groundwater bores, workshops and accommodation camp.

Environmental values

The proposal is located within the Great Western Woodlands. A small portion of the proposal Haul Road Development Envelope and most of the Mine Development Envelope is located within the boundary and buffer of the *Bremer Range vegetation assemblages* Priority 1 ecological community (Bremer Range PEC).

The proposal development envelopes contain one Threatened flora, *Marianthus aquilonaris,* and several priority flora species were recorded in the development envelopes, including two species that have the potential to be listed as Threatened (*Eucalyptus rhomboidea* and *Stenanthemum bremerense*) due to their current known range.

Evidence of three conservation significant vertebrate species were recorded in the development envelopes. No active breeding habitat for the three fauna species was observed.

Consultation

The Environmental Protection Authority (EPA) published the proponent's referral information for the proposal on its website for seven days public comment. The EPA also published the proponent's environmental review document (ERD) on its website for public review for 8 weeks (from 8 March 2021 to 3 May 2021). The EPA considered the comments received during these public consultation periods in its assessment.

Mitigation hierarchy

The mitigation hierarchy is a sequence of proposed actions to reduce adverse environmental impacts and emissions. The sequence commences with avoidance, then moves to minimisation, rehabilitation, and offsets are considered as the last step in the sequence.

The proponent considered the mitigation hierarchy in the development and assessment of its proposal, and as a result has proposed the following key measures:

Avoidance measures

- redesigning the mine to avoid all Threatened flora (*Marianthus aquilonaris*) populations and optimal habitat from the proposal development envelopes
- relocation of infrastructure away from known Threatened and Priority flora records, reducing impacts on areas with greater biodiversity
- selecting the haul road alignment that avoids significant surface water flow crossings and landforms of ecological and Aboriginal heritage importance such as granite outcrops and salt lakes
- designing the project to avoid direct impacts to five of the ten priority flora species recorded during surveys, including all Priority 1 species
- redesigning the borrow pit in the Haul Road Development Envelope to avoid the location of the record of the potential SRE species Garypidae `BPS333`.

Minimisation measures

- modification of the Mine Development Envelope to minimise impacts on priority flora species
- disturbance limits on significant vegetation and flora
- implementation of measures in the Significant Flora Management Plan, including for *Marianthus aquilonaris*, *Eucalyptus rhomboidea* and *Stenanthemum bremerense* and other priority flora
- implementation of measures in the Dust Control Management Strategy to minimise dust deposition on vegetation
- pre-clearance surveys (and actions if required) for flora and fauna to ensure impacts are as predicted and can be minimised further during implementation
- implementation of measures in the Fauna Management Plan, including measures to reduce injury / death to fauna, a feral animal management program and measures for *Marianthus aquilonaris* pollinators.

Rehabilitation measures

- implementation of measures in the Rehabilitation Plan, for the rehabilitation and revegetation of significant flora and vegetation
- implementation of measures in the Mine Closure Plan.

Offset and enhancement measures

- provision of a 427 hectare (ha) on-tenement exclusion zone for areas within Audalia Resources' *Mining Act 1978* tenure, including land management costs (Figure S1)
- provision of 6,940 ha off-tenement exclusion zone and direct offset to protect flora values (Figure S2)

- provision for ongoing conservation management within the Bremer Range PEC, including significant flora populations
- ongoing *Marianthus aquilonaris*, *Eucalyptus rhomboidea* and *Stenanthemum bremerense* research
- research on the re-establishment of *Eucalyptus rhomboidei* and *Stenanthemum bremerense* individuals impacted by the proposal.

For further information on direct offsets see other advice below.

Assessment of key environmental factors

The EPA has identified the key environmental factors (listed below) in the course of the assessment. For each factor, the EPA has assessed the residual impacts of the proposal on the environmental values and considered whether the environmental outcomes are likely to be consistent with the EPA environmental factor objectives.

Flora and vegetation

Residual impact or risk to environmental value		Assessment finding
1.	Loss of up to 1.51 ha sub-optimal habitat for Threatened *Marianthus aquilonaris*, from ground disturbance.	The proposal will result in the loss of individuals of priority flora that have the potential to be listed as Threatened and habitat for significant flora. The EPA advises that subject to the recommended conditions to limit the extent of clearing and require rehabilitation and offsets, the significant residual impact can be managed and counterbalanced so that the environmental outcome is likely to be consistent with the EPA objective for flora and vegetation.
2.	Loss of priority flora that has the potential to be listed as Threatened: • up to 4.5% of the *Eucalyptus rhomboidea* population • up to 5.1% of the *Stenanthemum bremerense* population • up to 11% of the *Hakea pendens* population.	
3.	Potential reduction in health of Threatened flora and priority flora that is likely to be listed as Threatened from indirect impacts of dust, erosion and/or reduction in overland flow.	The proposal may result in a reduction in health of Threatened flora and priority flora that have the potential to be listed as Threatened. The EPA advises that subject to the recommended conditions to require mitigation and rehabilitation, the residual impact can be managed so that the environmental outcome is likely to be consistent with the EPA objective for flora and vegetation.
4.	Loss of other priority flora, from the direct impact from clearing:	

Residual impact or risk to environmental value		Assessment finding
	• up to 2.9% of the *Acacia mutabilis* subsp. *Stipulifera* population • up to 7.1% of the *Teucrium diabolicum* R.W.Davis & Wege population.	The proposal will result in the loss of individuals and potential impacts to the health of other priority flora. The EPA advises that subject to the recommended conditions to limit the extent of clearing and the requirement for mitigation and rehabilitation, the residual impact can be managed so that the environmental outcome is likely to be consistent with the EPA objective for flora and vegetation.
5.	Potential reduction in health of other priority flora, from indirect impacts.	
6.	Loss of native vegetation in good to very good condition from the direct impact of clearing, including: • 285 ha of the Bremer Range PEC.	The proposal will result in the loss of native vegetation. The EPA advises that subject to the recommended conditions to limit the extent of clearing and require rehabilitation and offsets, the significant residual impact can be managed and counterbalanced so that the environmental outcome is likely to be consistent with the EPA objective for flora and vegetation.
7.	Potential reduction in health of native vegetation in the Bremer Range PEC, from indirect impacts.	The proposal may result in a reduction in health of native vegetation in the Bremer Range PEC. The EPA advises that subject to the recommended conditions to require mitigation and rehabilitation, the residual impact can be managed so that the environmental outcome is likely to be consistent with the EPA objective for flora and vegetation.

Terrestrial fauna

Residual impact or risk to environmental value		Assessment finding
1.	Loss of native vegetation that supports significant fauna in the Great Western Woodlands, from the direct impact of clearing.	The proposal will result in the loss of native vegetation that supports significant fauna and habitat degradation in the Great Western Woodlands. The EPA advises that subject to the recommended conditions to limit the proposal's clearing extent and to require mitigation and rehabilitation, the residual impact can be managed so that the environmental outcome is likely to be consistent with the EPA objective for terrestrial fauna.
2.	Habitat degradation due to the indirect impact of fire, weeds and fragmentation.	

Residual impact or risk to environmental value		Assessment finding
3.	Potential injury / mortality to significant vertebrate fauna from light pollution, vehicle strike, fire and introduced fauna.	There is the potential for the proposal to result in the loss of individuals. The EPA advises that subject to the recommended conditions to require mitigation, the residual impact can be managed so that the environmental outcome is likely to be consistent with the EPA objective for terrestrial fauna.
4.	Potential loss of individuals of SRE species.	There is the potential for the proposal to result in the loss of individuals of SRE species. The EPA advises that subject to the recommended conditions to require mitigation, the residual impact can be managed so that the environmental outcome is likely to be consistent with the EPA objective for terrestrial fauna.

Holistic assessment

The EPA considered the connections and interactions between relevant environmental factors and values to inform a holistic view of impacts to the whole environment. The EPA formed the view that the holistic impacts would not alter the EPA's conclusions about consistency with the EPA factor objectives.

Conclusion and recommendations

The EPA has taken the following into account in its assessment of the proposal:

- environmental values which may be significantly affected by the proposal
- assessment of key environmental factors, separately and holistically (this has included considering cumulative impacts of the proposal where relevant)
- likely environmental outcomes which can be achieved with the imposition of conditions
- consistency of environmental outcomes with the EPA objectives for the key environmental factors
- EPA's confidence in the proponent's proposed mitigation measures
- whether other statutory decision-making processes can mitigate the potential impacts of the proposal on the environment
- principles of the *Environmental Protection Act 1986*.

The EPA has recommended that the proposal may be implemented subject to conditions recommended in Appendix A.

Other advice

The EPA provides the following information for consideration by the Minister.

Proponent's application of the mitigation hierarchy

The EPA considers that the proponent has proposed appropriate mitigation and offset measures for the impacts and has gone to significant lengths to avoid impacts to Threatened, priority flora and a priority ecological community. The EPA notes that the proponent has undertaken extensive searches and identified a 6,940 ha site, which includes high biodiversity values such as *Eucalyptus rhomboidei. Eucalyptus rhomboidei* was a primary reason the area of the proposal was considered for inclusion as a nature reserve (Henry-Hall 1990).

The proposed offset site provides a linkage between Frank Hann National Park and Bremer Range and was identified with the assistance of the Department of Energy, Mines, Industry Regulation and Safety who support the site becoming a nature reserve. Almost half of the proposed off-tenement offset site occurs within the proposed Bremer Range Nature Reserve (Figure S2). The site is not supported by the Department of Biodiversity, Conservation and Attractions (DBCA) for inclusion as a nature reserve. DBCA consider that the site does not contain values it wants to include in the conservation estate.

The EPA notes that the proposed Bremer Range Nature Reserve has not been enacted by government and the proponent has gone to considerable lengths to identify and work with government, where possible, to find a site that can counterbalance the impacts from the proposal. In particular, the EPA notes that the proposed offset does contain *Eucalyptus rhomboidei* which was a primary reason for the proposed Bremer Range Nature Reserve. The EPA further notes that nearly half of the proposed offset site occurs within the proposed Bremer Range Nature Reserve and the spatial area within the proposed nature reserve is significantly higher than the area of proposed impacts from implementation of the proposal. The EPA advises the Minister that it is outside its scope to request government agencies to accept proposals for nature reserves but considers on a values basis that the proposed offset site, under the current offset guidelines, is an appropriate option to counterbalance the impacts to *Eucalyptus rhomboidei* and impacts to the proposed Bremer Range Nature Reserve.

Strategic approach to offsets

The EPA notes that the proponent has worked with Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) and Department of Water and Environmental Regulation (DWER), for the provision of a 6,940 ha off-tenement exclusion zone offset to protect significant flora values, including *Eucalyptus Rhomboidei,* which was a key value for the proposed Bremer Range Nature Reserve in the area of the proposal (Henry-Hall, 1990). The off-tenement offset provides connectivity with the proposed Bremer Range Nature Reserve and Frank Hann National Park, and has the potential to extend the area protected by the Frank Hann National Park by approximately 7,000 ha. The proponent has also provided a 427 ha on-tenement exclusion zone that provides indirect and potential direct offsets for significant flora and vegetation values.

The exclusion zones will prevent the clearing of native vegetation and all mining activities for a period of 20 years, and are a presumption against development, in an area of high ecological value and with the potential to become under pressure due to a large number of mining tenements and mineralisation in the area (Figure S3). The EPA's preference is that the 6,940 ha off-tenement direct offset area be converted to conservation estate to achieve security of tenure and managed by DBCA or the Prescribed Body Corporate who holds native title over the land in conjunction with DBCA. However, DBCA are not in a position to support the site for inclusion as a nature reserve at this time.

The EPA is of the view that there is a need for a coordinated and strategic approach to offsets across government. The EPA further advises that there is not always a clear linkage between land requested for the conservation estate at a landscape scale and the offsetting of specific values from a development. The EPA considers that a whole-of-government approach is needed to enable prioritisation and use of lands for offsets in the Great Western Woodlands. The EPA considers that the government should use a similar approach to Plan for our Parks to develop advanced offsets in areas of higher biodiversity for future developments. The EPA advises that the program would reduce the need for detailed assessment and provide better environmental outcomes for future developments.

The EPA recognises the pressure within the Great Western Woodlands from the large number of mining tenements and significant mineralisation in the area (Figure S3). This highlights a need for a strategic approach for the management and offset of environmental values within the area. The EPA's Strategic Plan promotes the development of regional environmental protection frameworks for significant environmental assets and intended to identify regions for inclusion. The EPA considers there is a need for a regional environmental protection framework for the Great Western Woodlands given the significant environmental values and potential cumulative impacts from critical minerals in the area.

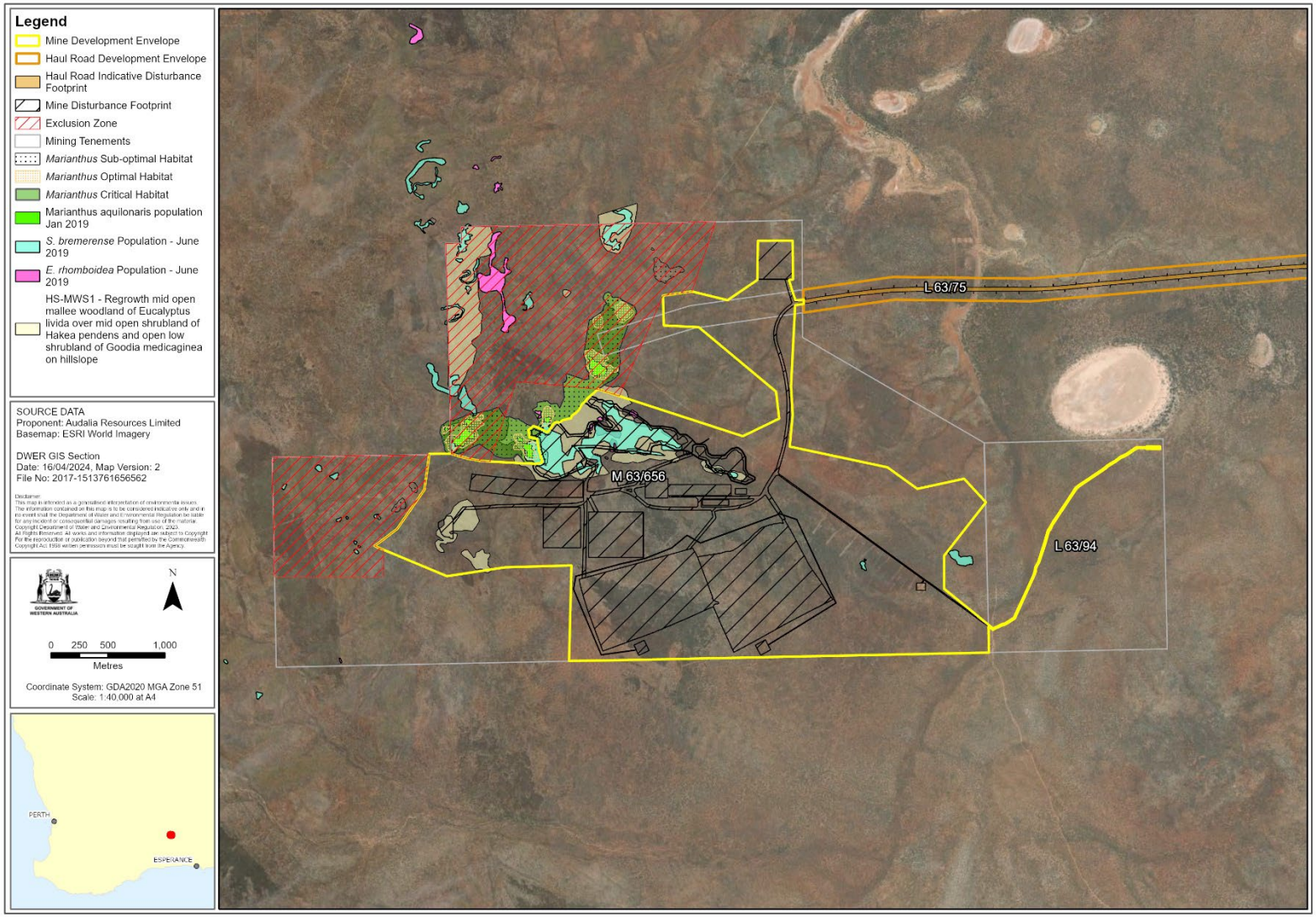

Figure S1: On-tenement exclusion zone offset area

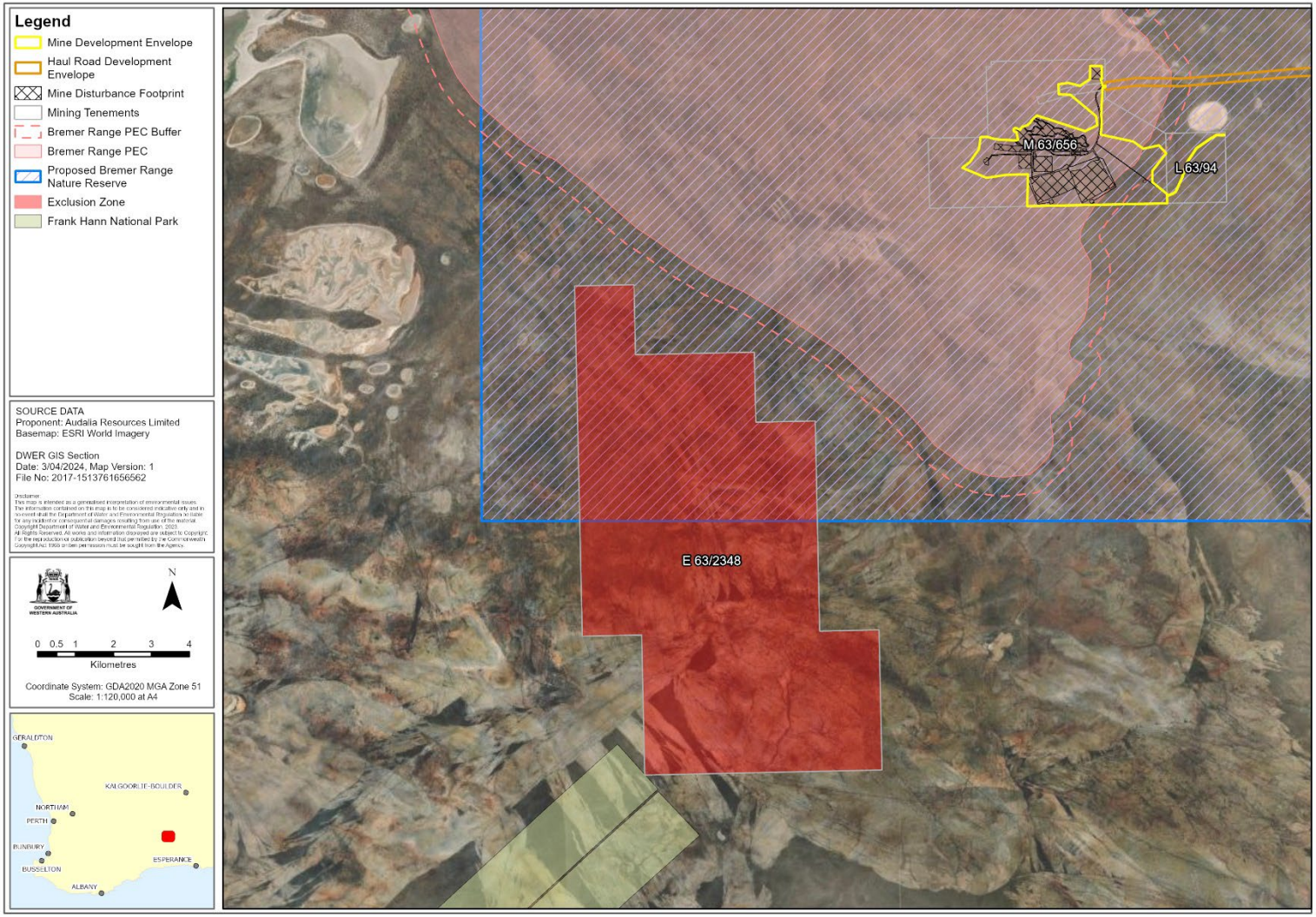

Figure S2: Off-tenement exclusion zone offset area

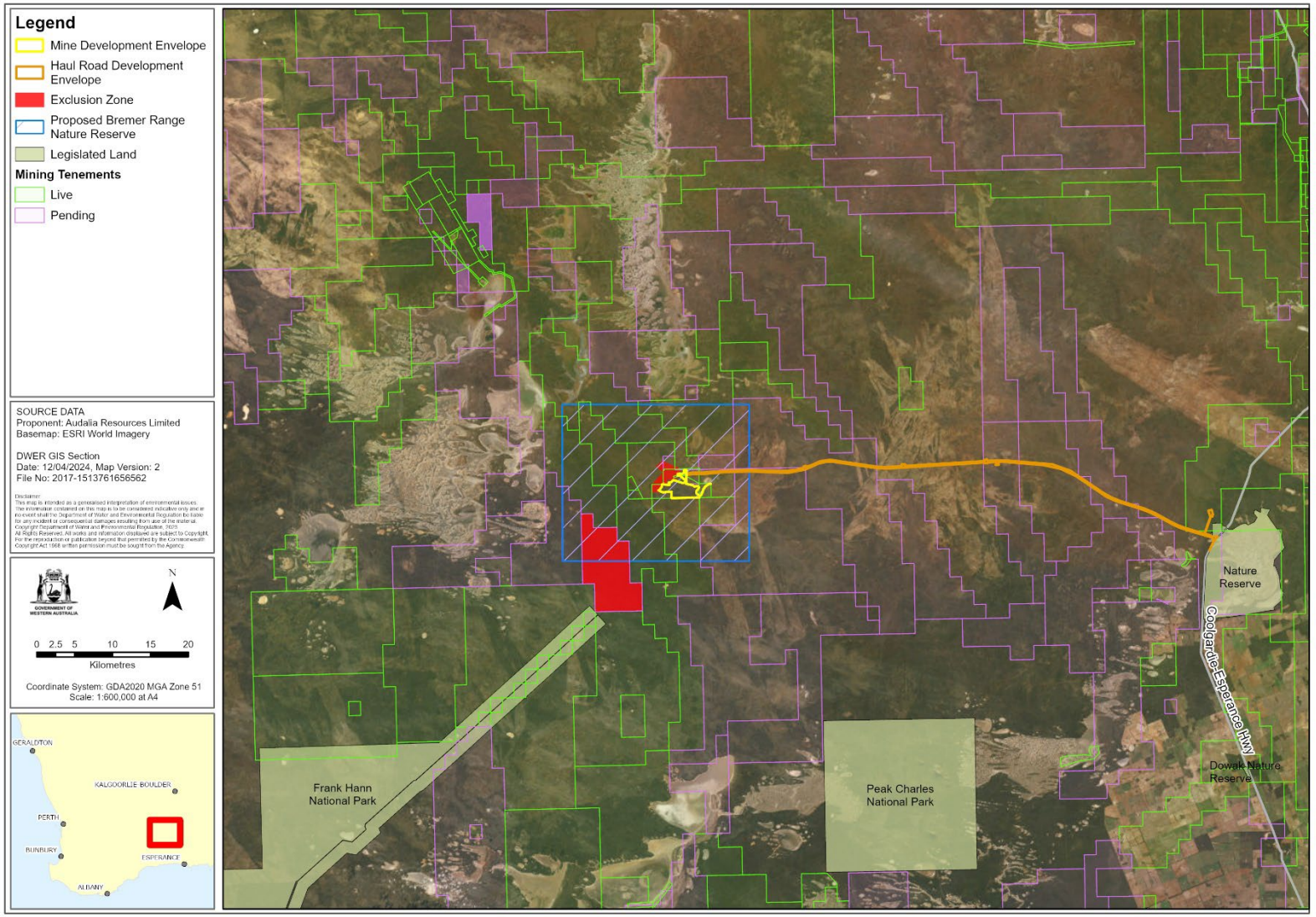

Figure S3: Mining tenements and proposal exclusion zones

1 Proposal

The Medcalf Vanadium Project (Medcalf Project) is a proposal to develop a vanadium, titanium and iron mining operation. The proposal is located approximately 100 kilometres (km) west of Norseman, in the Goldfields Esperance region of Western Australia (see Figure 1 and Figure 2). The proposal is listed as a critical minerals proposal at a state and commonwealth level.

The proposal includes the development of open mine pits, beneficiation plant, tailings storage facility, evaporation ponds, private haul road, road train transfer area and associated infrastructure such as laydown areas, borrow and gravel pits, groundwater bores, workshops and an accommodation camp (see Figure 3).

The proponent for the proposal is Audalia Resources Limited (Audalia Resources). The proponent referred the proposal to the Environmental Protection Authority (EPA) on 20 December 2017. The referral information was published on the EPA website for seven days public comment. On 13 March 2018, the EPA decided to assess the proposal at the level of Public Environmental Review. The EPA also published the environmental review document (Preston 2021a) on its website for public review for 8 weeks (from 8 March 2021 to 3 May 2021).

The proposal was determined on 9 January 2018 not to be a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999* (reference number 2017/8113).

Proposal amendments

The original proposal is set out in Part A: Proposal Description of the proponent's referral supporting report (Preston 2017), which is available on the EPA website.

During the assessment process the EPA encouraged the proponent to identify avoidance and mitigation measures for the proposal in addition to those included in the original proposal. The proponent has undertaken a number of changes to the proposal to reduce the significance of its potential impacts on the environment.

The proponent requested changes to the original proposal during the assessment under *s*. 43A of the *Environmental Protection Act 1986*. The changes were assessed to be unlikely to significantly increase any impacts of the proposal and the changes reduced potential impacts on the environment. The EPA Chair's notices, of 4 November 2020 and 9 April 2024 consenting to the changes, are available on the EPA website.

Figure 1: Proposal context

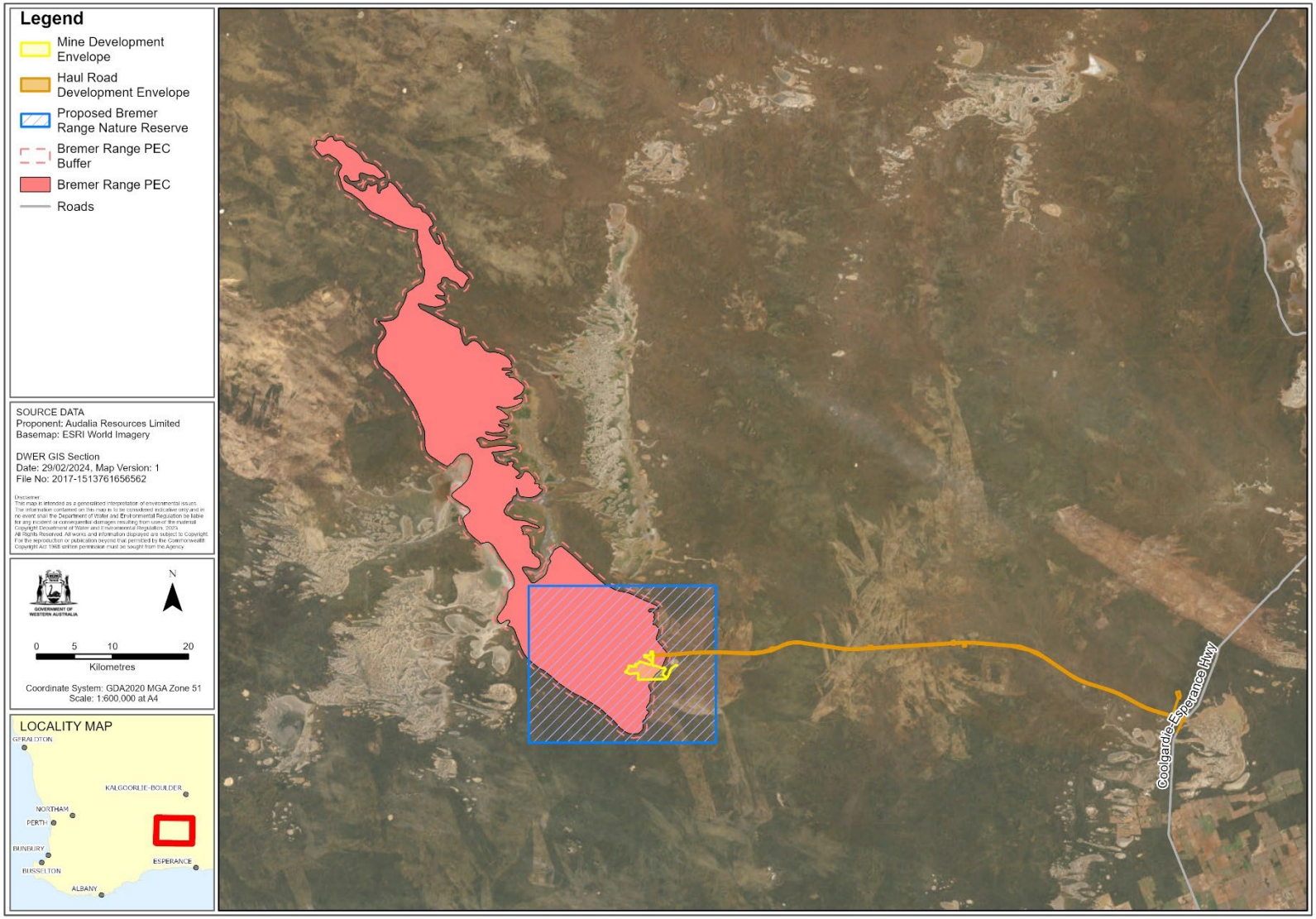

Figure 2: Project location

Figure 3: Development envelope and disturbance footprint.

The consolidated and updated elements of the proposal which has been subject to the EPA's assessment are included in Table 1.

Table 1: Proposal content elements

Proposal element	Location	Maximum extent or range
Physical elements		
Mine and associated infrastructure	Figure 2 and Figure 3 of ERD	Clearing of no more than 300 ha within the 898 ha Mine Development Envelope
Haul Road and associated infrastructure	Figure 2, Figure 4 and Figure 5 of ERD	Clearing of no more than 350 ha within the 1,633 ha Haul Road Development Envelope
Operational elements		
Tailings disposal	Figure 3 of ERD	Disposal of no more than 7.5 million m^3 of tailings into the tailings storage facility
Groundwater supply	Figure 3 of ERD	Abstraction of no more than 1.2 GL/a
Proposal elements with greenhouse gas emissions		
Construction elements:		
Scope 1	Total of 58,146 t CO_2-e for 1 year • Construction activities: 22,591 t CO_2-e • Land use change: 35,555 t CO_2-e	
Scope 2	N/A	
Scope 3	223 t CO_2-e/yr are estimated to be produced as a result of people traveling to and from site or within site	
Operational elements:		
Scope 1	Average of 50,288 t CO_2-e/yr over the 13 year life of the proposal	
Scope 2	N/A	
Scope 3	Estimated 136 t CO_2-e/yr as a result of light vehicle transport energy purposes and other usages	
Decomissioning elements:		
Scope 1	9,036 t CO_2-e (total)	
Scope 2	N/A	
Scope 3	Negligible	
Rehabilitation		
Mine and Haul Road are to be completely closed and rehabilitated at the completion of the Proposal (no infrastructure is to be retained)		
Commissioning		
N/A		
Decommissioning		
Mine and Haul Road are to be completely closed and rehabilitated at the completion of the Proposal (no infrastructure is to be retained)		

Proposal element	Location	Maximum extent or range
Other elements which affect extent of effects on the environment		
Proposal time	Maximum project life	15 years
	Construction phase	1 year
	Operations phase	13 years
	Decommissioning phase	1 year post operations

Units and abbreviations
ERD – Environmental Review Document
ha – hectare
m^3 – metres cubed
GL/a – gigalitres per annum
t CO_2-e/yr - tonnes carbon dioxide equivalent per year
N/A – not applicable

Proposal alternatives

Mine

In late 2020, as part of the request under *s*. 43A of the EP Act to change (now amend) the proposal during assessment, the proponent considered alternatives to the mine design. The Vesuvius mine pit design was changed to avoids all direct impacts to the threatened flora *Marianthus aquilonaris* and reduce the impact to four priority flora species. The waste rock landform was also removed as the waste rock will instead be used for construction material for the Tailings Storage Facility (TSF) and evaporation ponds. Any excess waste rock will be placed as backfill within a void created by sourcing construction material for the TSF (EPA 2020a).

One of the public consultation submissions queried why an underground mine was not considered as a minimisation measure. The proponent responded that an underground mine was not practical as the mineralisation is at the surface and the geology is very weathered, making worker safety a major issue for an underground mine (Preston 2022a).

Haul Road

The proposal includes the transportation of ore to the Port of Esperance for export to overseas markets. The proponent engaged stakeholders and road engineers to perform an options assessment analysis to consider various transportation options, including a slurry pipeline and construction of a new haul road. A slurry pipeline and nine haul road transport options were analysed for environmental, safety, heritage, Native Title and other social considerations (Preston 2021a). The slurry pipeline option was discounted due to the significant capital cost and the risk of leakages. Option 9 (develop a private haul road directly east) was selected for the haul road for the following reasons:

- removes safety risks associated with a public road and does not cross public roads reducing the likelihood of collisions with the general public
- avoids landforms of ecological and Aboriginal heritage importance such as

granite outcrops and salt lakes

- requires the least new clearing of vegetation as it follows the proponent's access track formed during the exploration phase of the proposal.

Proposal context

The proposal is located within the Great Western Woodlands, which covers an area of 16 million hectares (ha). The proposal is on land held by the Ngadju people, who have lived on country between Kalgoorlie and Esperance for an estimated 50,000 years. The proposal is within the Ngadju Native Title determination area (Preston 2021a).

The proposed Mine Development Envelope is mostly within (and approximately 2.5 km of the Haul Road Development Envelope is within) the boundary and buffer of the *Bremer Range vegetation assemblages* Priority 1 ecological community (Bremer Range PEC) (DBCA 2021). The PEC is associated with three ridges (Mt Day, Round Top Hill and Honman Ridge), which lie 55, 50 and 20 km respectively north-west of the Mine Development Envelope (Preston 2021a). The Bremer Range PEC covers 72,845 ha and 88,129 ha including the 500 metre (m) PEC buffer (Figure 2).

The proposal Mine Development Envelope is within (and approximately 8 km of the Haul Road Development Envelope is within) the edge of the proposed Bremer Range Nature Reserve (Figure 2), which covers 50,908 ha. The Frank Hann National Park is located approximately 18 km southwest of the Mine Development Envelope.

Given its vast size, the Great Western Woodlands currently includes towns, highways, roads, railways, private property, Crown Reserves, agricultural activities (largely pastoralism) and mining tenements (Preston 2021a; Figure 1). As at 2010, mining tenements covered nearly 10 million of the 16 million ha in the Great Western Woodlands and there were 334 operating mines (DEC 2010a), of which many are in the Goldfields area centred around Kalgoorlie (Figure 4). The local area has a history of exploration, however, there are currently no operating mines. The Lake Johnston nickel project (Emily Ann and Maggie Hays mines) is located about 50 km north of the proposal. It was an operating mine until 2014 and is currently in care and maintenance (Preston 2021a, Poseidon Nickel 2022). The Lake Johnston nickel project is located within the Bremer Range PEC.

The area is characterised by existing roads and tracks. There is an estimated 150,000 km of linear infrastructure in the region with vehicle tracks making up most of the disturbance footprint in the Great Western Woodlands (Raiter 2016) (Preston 2021a). The 289 km Hyden to Norseman Road (also known as the Woodlands Discovery Trail) runs west to east approximately 36 km north of the proposed haul road. The proposed haul road extends 74 km west to east from the proposed mine to the Coolgardie Esperance Highway and utilises the proponent's access track formed in 2018 (Preston 2021a). The existing track is 62 km in length and approximately 4 m wide. The access track is used for exploration activities and has been used by the Department of Biodiversity, Conservation and Attractions (DBCA) for access to bush fires (pers. com. Preston June 2022).

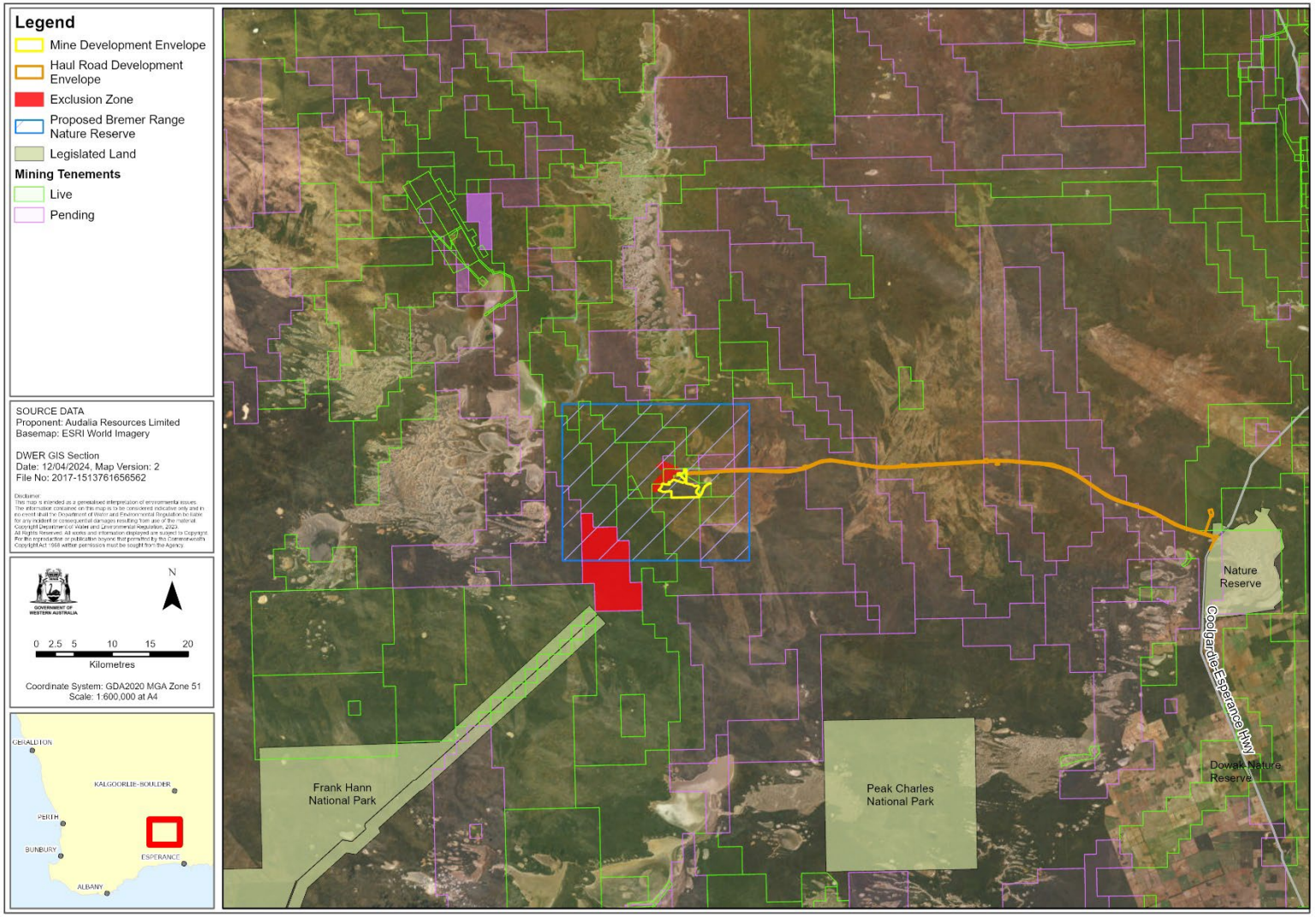

Figure 4: Project location tenements and proposal exclusion zones

2 Assessment of key environmental factors

This section includes the EPA's assessment of the key environmental factors. The EPA also evaluated the impacts of the proposal on other environmental factors (Greenhouse Gas Emissions and Social Surroundings) and concluded these were not key factors for the assessment. This evaluation is included in Appendix E.

2.1 Flora and vegetation

2.1.1 Environmental objective

The EPA environmental objective for flora and vegetation is *to protect flora and vegetation so that biological diversity and ecological integrity are maintained* (EPA 2016a).

2.1.2 Investigations and surveys

Desktop assessment and field surveys for flora and vegetation have been conducted over the Mine Development Envelope and Haul Road Development Envelope since 2012, as detailed in the proponent's environmental review document (ERD) (Preston 2021a). Additional studies and assessments were conducted to assess soil characteristics, habitat and growth habits of Threatened flora species *Marianthus aquilonaris* and the effects on the conservation status of priority flora and the Bremer Range PEC. The additional studies are discussed in the proponent's Response to Submissions document (RtS) (Preston 2022a).

The EPA advises that in addition to the past survey work undertaken, the following investigations and surveys were used to inform the assessment of the potential impacts to flora and vegetation:

- Soils of the Audalia Medcalf area: Investigations into the soils on which *M. aquilonaris, E. rhomboidea and S. bremerense* grow - for use in defining critical habitats (Western Horticultural Consulting 2019) (appendix 2 of the ERD)
- Geomorphology of the *Marianthus Aquilonaris* sub-populations. Bremer Range West Australia (World Technical Services Group Pty Limited 2019) (appendix 3.1 of the ERD)
- Assessment of genetic diversity in sub-populations of *Marianthus aquilonaris* (DBCA 2019) (appendix 3.2 of the ERD)
- *Marianthus aquilonaris* Demographic Monitoring: Spring 2018-Spring 2019 (Botanica 2020a) (appendix 3.3 of the ERD)
- *Marianthus aquilonaris* Landform Monitoring: Spring 2018 (Botanica 2019) (appendix 3.4 of the ERD)
- Audalia Resources Medcalf Project Dust Control Management Strategy (Ramboll 2020a) (appendix 3.5 of the ERD)
- Audalia Resources Limited Medcalf Project - Haul Road Dust Deposition Study (Ramboll 2020b) (appendix 3.6 of the ERD).

- Audalia Resources Limited Medcalf Project - CFD Wind Study (Ramboll 2020c) (appendix 3.7 of the ERD, Preston 2021a)
- Seed quality of *Eucalyptus rhomboidea*, *Hakea pendens* and *Marianthus aquilonaris* seed collections collected by Botanica for Audalia Resources Limited (Botanica 2020b) (appendix 3.8 of the ERD)
- Detailed Flora & Vegetation Survey Medcalf Vanadium Mining Project & Proposed Haul Road (Botanica 2020c) (appendix 3.9 of the ERD)
- Flora and Vegetation Impact Assessment Medcalf Project (Botanica 2020d) (appendix 3.10 of the ERD)
- Updated Summary on ecology of *Marianthus aquilonaris* (Botanica 2020e) (appendix 3.11 of the ERD)
- Evaluation of the effects of mineral dust deposition on vegetation with reference to the Audalia Medcalf Project (Doley 2020) (appendix 3.13 of the ERD)
- Critical Habitat Assessment - *Eucalyptus rhomboidea* and *Stenanthemum bremerense* (Botanica 2020f) (appendix 3.14 of the ERD)
- Insect visitors to *M. aquilonaris* and surrounding flora Nov 2 - 4, 2019 (Prendergast 2019) (appendix 5.3 of the ERD)
- Revised Response to Impact Assessment Review (Doley 2021) (appendix 6 of the RtS document)
- Memorandum: Bremer Range Priority Flora and Communities Conservation Assessment (Botanica 2022a) (appendix 9 of the RtS document)
- Memorandum Medcalf Project Sterile Flora Assessment (Botanica 2021) (appendix 15 of the RtS document)
- Potential pollinators of the Critically Endangered *Marianthus aquilonaris* Follow-up survey (Pendergast 2021) (appendix 16 of the RtS document).

The surveys were consistent, and are likely to exceed, the *Technical Guidance – Flora and vegetation surveys for environmental impact assessment* (EPA 2016b).

In response to queries from the EPA following board meetings in August 2022 and March 2023, and a site visit by EPA members in April 2023, the proponent provided additional information including an expert review of the impacts from the proposed development to flora species *Marianthus aquilonaris, Eucalyptus rhomboidea, Stenanthemum bremerense* and *Hakea pendens,* an update of the conservation assessment and a review of conservation values:

- Memo Report Addressing EPA Queries, Medcalf Project, April 2023, Our Ref WB997 version 4a (Western Botanical 2023)
- Memorandum: Bremer Range Priority Flora and Communities Conservation Assessment (Botanica 2023)
- Review of Conservation Values, E63/2348, Potential Offset Package (Western Botanical 2024).

The proponent also proposed a range of additional enhancements and offsets including additional direct and indirect offsets.

2.1.3 Assessment context – existing environment

As discussed in Section 1, the proposal is located within the Great Western Woodlands (Figure 1) and is also partly within the boundaries of the Bremer Range PEC. The area is of important biodiversity values due to the presence of endemic plant and restricted plant taxa and communities. The species include *Marianthus aquilonaris*, a Threatened flora under the *Biodiversity Conservation Act 2016* (BC Act) (Preston 2021a) and two priority flora that have the potential to become listed as Threatened due largely to their smaller ranges.

Most of the vegetation within the Mine Study Area is in a state of regeneration after being burnt during a series of major fires in 2009/2010. Fires in 2010 also extended across over 50% of the Haul Road Development Envelope (Preston 2021a). Fire, such as from lightning strikes, appears to be a key threat to the flora in area and may intensify due to climate change.

Significant vegetation

The detailed flora and vegetation survey was conducted within a 18,770 ha survey area. No vegetation associations were identified as potential groundwater dependent ecosystems.

No Threatened Ecological Communities (TECs) defined under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or the BC Act occur within the development envelopes (Preston 2021a).

Most of the 898 ha Mine Development Envelope (841 ha or 94%) and approximately 2.2 km of the 1,633 ha Haul Road Development Envelope (45 ha or 3%) are within the Bremer Range PEC boundary and buffer (Figure 2).

The majority of floristic communities identified in surveys resemble the floristic values of the Bremer Range PEC. One community, HS-MWS1, also provides habitat for *Marianthus aquilonaris* (Preston 2021a). Vegetation was rated as good to very good condition with most in various stages of regrowth after fire events (Preston 2021a).

Significant flora

One Threatened flora taxon under the BC Act was identified within the survey area; *Marianthus aquilonaris* (Threatened – Critically Endangered). This taxon is not listed as threatened under the EPBC Act.

Seven priority flora taxa were recorded in the development envelopes:

- *Acacia mutabilis* subsp. *stipulifera* (Priority 3; P3)
- *Eucalyptus pterocarpa* (P3)
- *Eucalyptus rhomboidea* (P4)
- *Hakea pendens* (P3)

- *Microcybe* sp. Windy Hill (G.F. Craig 6583) (P3)
- *Stenanthemum bremerense* (P4)
- *Teucrium diabolicum* R.W.Davis & Wege (P3).

Some of the above priority species have the potential to be listed as Threatened. This is discussed in Section 2.1.9 Assessment of impacts.

Eucalyptus pterocarpa (P3) was recorded in the Haul Road Development Envelope. Considering the proponent has committed to avoid direct impacts to all current records of the species and maintain a 10 m buffer (Preston pers. comm. May 2022), the likelihood of indirect impacts is limited. The species is a large tree and not likely to be impacted by dust or weeds. Given the impacts are not likely to be significant, no further assessment has been undertaken.

The Mine Development Envelope contains 20 individuals of *Microcybe* sp. Windy Hill (G.F. Craig 6583) (P3) that will be avoided. Considering 26,962 individuals have been recorded, any impacts would be negligible, and no further assessment has been undertaken.

Eight sterile specimens that could not be identified to species level were recorded during the surveys, including four located within the development envelopes. Botanica (2020c) considered the likelihood of these specimens being significant flora to be low, however, given the area is known for its endemism, further work was commissioned on the four specimens located within the development envelopes. The additional survey was able to identify the species, and none were identified as significant flora (Preston 2022a), therefore no further assessment has been undertaken.

No flora species representative of significant range extensions were identified.

Introduced flora (weeds)

Nine introduced taxa were identified within the mine study area, with none identified within the haul road study area (Botanica 2020c). None of these taxa were considered Weeds of National Significance or Declared plants under the *Biosecurity and Agriculture Management Act 2007* (Preston 2021a).

2.1.4 Consultation

Matters raised during stakeholder consultation and the proponent's responses are provided in ERD (Preston 2021a) and the RtS document (Preston 2022a). During the public review, issues were raised regarding:

- impacts to significant flora and vegetation
- the suitability of proposed rehabilitation measures
- the proposed offsets measures.

The key issues raised during the public consultation on the proposal and how they have been considered in the assessment are described in sections 2.1.6, 2.1.7, 2.1.8 and 2.1.9.

The proponent consulted with DBCA regarding flora and vegetation, especially *Marianthus aquilonaris,* during the preparation of the ERD. As a result of DBCA feedback, the proponent revised its definition of *Marianthus aquilonaris* habitat.

The EPA consulted with the DBCA regarding the potential impacts on Threatened flora values and the proposed rehabilitation and offset measures. The DBCA recommended (should the proposal be recommended for implementation) that implementation conditions clearly specify approved limits of impacts, objectives and monitoring protocols to identify and manage impacts on conservation significant values. The DBCA also recommended that mitigation, management and offset measures focus on the rehabilitation and protection of existing conservation significant flora habitat and enhancement of natural regeneration. DBCA did not support the use of a direct offsets in this case.

2.1.5 Potential impacts from the proposal

The implementation of the proposal including the clearing of native vegetation (300 ha within the Mine Development Envelope and 350 ha within the Haul Road Development Envelope), has the potential to impact on flora and vegetation, from:

- loss of significant flora and habitat (threatened flora habitat and priority flora individuals and habitat) from the direct impact of clearing
- loss of vegetation in the Bremer Range PEC
- loss of or reduction in health of significant vegetation and flora
- fragmentation of vegetation.

2.1.6 Avoidance measures

The proponent has designed the proposal to avoid impacts to flora and vegetation by:

- redesigning the Vesuvius mine pit and Mine Development Envelope to avoid direct impacts to all current records of the threatened flora *Marianthus aquilonaris* - reduction from 3,453 individuals (24% of records) to 0 individuals
- designing the development envelopes and disturbance footprints to avoid 5 of the 10 priority flora species (including all Priority 1 species) and two locally important floristic communities.

2.1.7 Minimisation measures

During the assessment, the proponent modified the Mine Development Envelope to decrease its size from 1,736 ha to 898 ha (reduction of 48 percent), to minimise impacts to significant flora and vegetation. This has resulted in a reduction in the records of priority flora individuals in the current Mine Development Envelope, compared to the records in the referral Mine Development Envelope:

- *Eucalyptus rhomboidea*: from 1,461 individuals (9.4% of records) to 1,198 individuals (7.5% of current records)
- *Stenanthemum bremerense*: from 4,856 individuals (12.1% of records) to 3,455 individuals (8.6% of records)
- *Hakea pendens*: from 1,742 individuals (25.7% of records) to 1,246 individuals (18.4% of records)
- *Teucrium diabolicum*: from 1,250 individuals (7.7% of records) to 1,050 individuals (6.5% of records).

The proponent proposed measures to minimise impacts to flora and vegetation with details outlined in Section 5.6.2 of the ERD (Preston 2021a). In response to issues raised during the public consultation, the proponent prepared a Significant Flora Management Plan (Botanica 2022b) to include management and contingency actions, in addition to monitoring.

The proponent has proposed the following key minimisation measures:

- implement industry best practice management measures for flora and vegetation
- prepare and implement a Mine and Infrastructure Plan to locate mine pits and infrastructure to minimise disturbance of significant flora and vegetation
- implement additional controls upslope of *Marianthus aquilonaris* critical habitat and *Eucalyptus rhomboidea* or *Stenanthemum bremerense* population boundaries
- implement additional ground disturbance measures for any ground disturbance within *Marianthus aquilonaris* critical habitat, and *Eucalyptus rhomboidea* or *Stenanthemum bremerense* population boundaries
- implement clearing limits for significant flora (*Marianthus aquilonaris* sub-optimal habitat, and *Eucalyptus rhomboidea* or *Stenanthemum bremerense* population extent
- implement the Dust Control Management Strategy (Ramboll 2020) (appendix 10 of the ERD) to minimise dust deposition on vegetation, including the installation of an onsite meteorological station to provide reliable real-time wind direction data and continuous dust monitoring
- investigate dust deposition increases and cease mining activities at the Vesuvius mine pit if dust deposition reaches 4.5 g/m^2 at the boundary of *Marianthus aquilonaris* sub-populations during the key growth period of August to November
- investigate plant condition decline, fruit/seed set and/or mortality and undertake active propagation and seeding into other areas of the development envelope, if there is an annual decline greater than 20% plant condition and/or fruit/seed set, or mortality for populations of *Marianthus aquilonaris* and local populations of priority flora, from indirect impacts
- implement measures to minimise dust deposition on vegetation, including speed limits, dust suppression and spraying significant flora plants with water

- implement measures to prevent the introduction and spread of introduced flora (weeds), including vehicle hygiene procedure, weed control, stockpiling excavated topsoil separately and weed management program
- implement measures to prevent and control fires attributed to the project mining and associated activities
- design all surface water crossings to minimise the potential for erosion or sedimentation of downstream vegetation
- implement measures to minimise the risk and impact of hydrocarbon spills.

The proponent has also included the following minimisation measures relating to *Marianthus aquilonaris* pollinators (native bees) in the Fauna Management Plan (Audalia Resources 2022a):

- implement management actions, targets and monitoring to minimise the decline, abundance and composition of pollinator species and minimise the loss of important pollinator locations and habitat.

2.1.8 Rehabilitation measures

The proponent prepared an interim Mine Closure Plan as part of the supporting documentation for the ERD (Preston 2020a) (appendix 4 of the ERD, Preston 2021a). In response to issues related to the suitability of proposed rehabilitation measures raised during the public consultation, the proponent:

- prepared a Rehabilitation Plan (Botanica 2022c) (appendix 1 of RtS document, Preston 2022a), that outlines rehabilitation measures specific to re-establishing vegetation in the Bremer Range PEC and supporting growth of threatened and priority flora species
- revised the Interim Mine Closure Plan (Preston 2022b) (appendix 2 of RtS document, Preston 2022a), to clarify the rehabilitation commitments for the haul road and better define the criteria for areas of higher conservation value.

The proponent has proposed the following key rehabilitation measures:

- remove all infrastructure from site
- respread with topsoil (or rip and seed if topsoil is no longer viable) and rehabilitate all disturbance areas apart from the mine pit and TSF slopes
- clean free of any soil material all earthmoving equipment to minimise the risk of weed introduction
- collect seed from any *Eucalyptus rhomboidea* or *Stenanthemum bremerense* individuals recorded within the proposed ground disturbance area during the pre-clearance surveys
- conduct *Eucalyptus rhomboidea*, *Stenanthemum bremerense* and *Hakea pendens* germination trials during the life of the proposal to target the successful establishment of these species into rehabilitation areas
- include other priority flora in the rehabilitation seed mix

- include flowering plants in seeding to ensure pollinator habitat is adequately reinstated
- undertake earthworks on constructed landforms to ensure that water drainage is acceptable (i.e. backsloping berms, bunds and contouring of surface)
- shape all depressions to prevent the formation of new semi-permanent water sources.

The Rehabilitation Plan (Botanica 2022c) provides specific rehabilitation strategies (with further detail on the measures listed above) for flora (threatened and priority flora) and vegetation (floristic communities of the Bremer Range PEC).

2.1.9 Assessment of impacts to environmental values

The EPA considers that the key environmental values for flora and vegetation likely to be impacted by the proposal are significant flora (the threatened flora species *Marianthus aquilonaris* and priority flora) and native vegetation (Bremer Range PEC and locally important vegetation that resemble the floristic values of the Bremer Range PEC).

The EPA notes that there will be a loss of up to 309 ha of vegetation in the proposed Bremer Range Nature Reserve (0.61% of the proposed reserve extent). The EPA considers there is an overlap with the flora values of the area and the proposed Nature Reserve. The EPA acknowledges that to date, the proposed Bremer Range Nature Reserve has not been classified as a nature reserve. However, the EPA has made certain that the assessment of impacts and proposed avoidance, mitigation and enhancement measures for the flora values of the area would consider the flora values that occur in the area of the proposed Bremer Range Nature Reserve that would be impacted by the proposal.

Threatened and priority flora

Given the threatened status of *Marianthus aquilonaris* and potential future threatened status of priority flora, *Eucalyptus rhomboidea*, *Stenanthemum bremerense* and *Hakea pendens*, the assessment of impacts has included impacts on individuals, population extent (which includes individuals) and flora species habitat. Direct impacts include clearing (loss) and the indirect impacts from fire, erosion, dust, and hydrological changes (reduction in health).

Figure 5a and Figure 5b shows the location of significant flora recorded during surveys. Table 2 summarises the impacts to significant flora from the proposal.

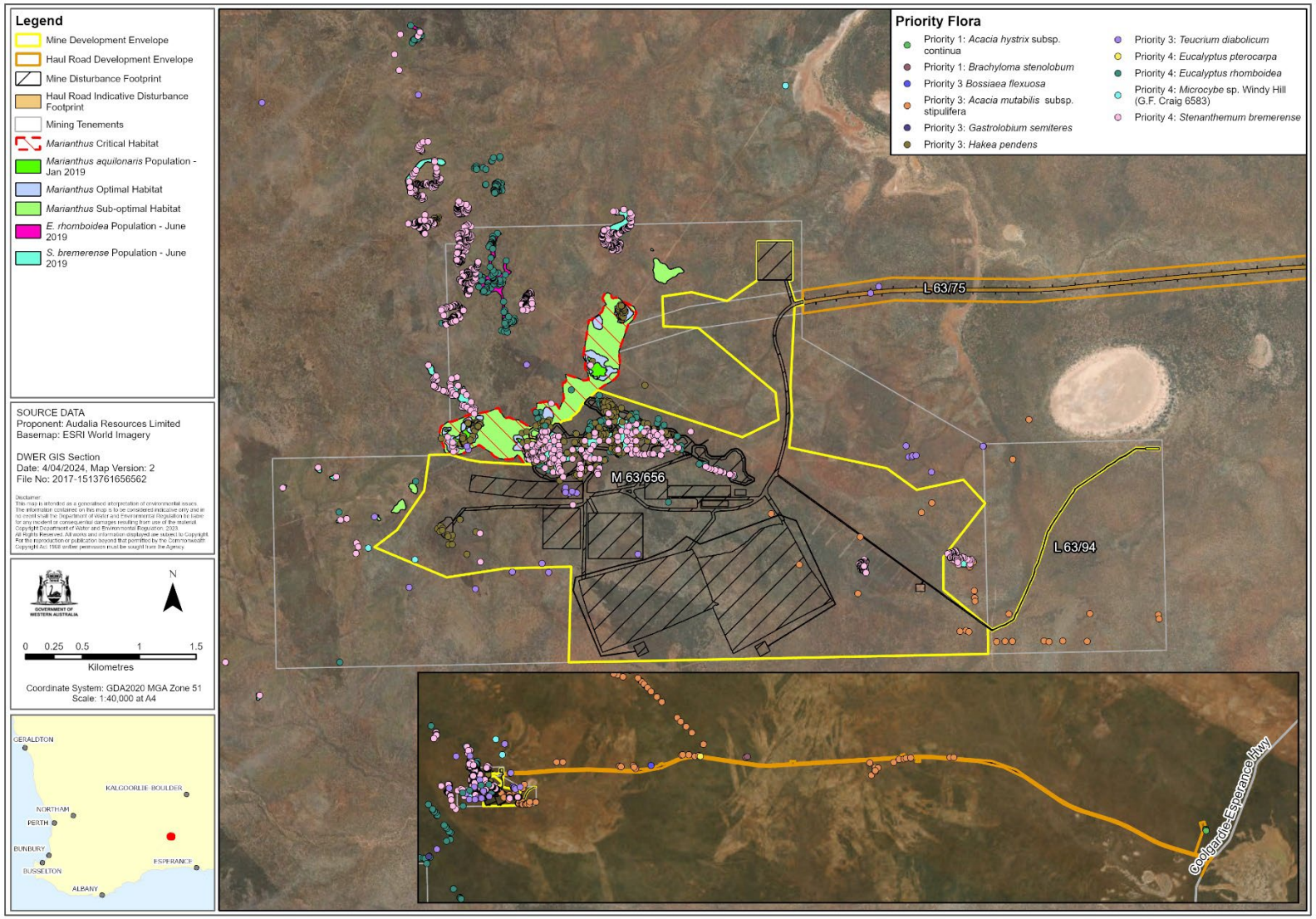

Figure 5a: Significant flora – vicinity of development envelopes

Figure 5b: Significant flora – southwest of Mine Development Envelope

Table 2: Summary of predicted impacts to significant flora individuals and populations

Species (and current conservation status)	Recorded individuals and populations	Individuals and populations within the development envelopes	Impacts (clearing) – in disturbance footprint	Impacts (clearing) as % of total records
M. aquilonaris (Threatened)	14,627	0	0	0%
	1 population			
E. rhomboidea (P4)	17,006	1,198	768	4.5%
	7 populations	2 populations	2 populations	
S. bremerense (P4)	40,126	3,455	2,049	5.1%
	25 populations	3 populations	2 populations	
H. pendens (P3)	7,950[2]	1,246	876	11%
	6 populations	2 populations	2 populations	
A. mutabilis subsp. *Stipulifera* (P3)	348,452	11,215	10,001	2.9%
	20 populations	3 populations	1 population	
T. diabolicum R.W.Davis & Wege[1] (P3)	16,153	1,450	1,150	7.1%
	12 populations	4 populations	3 populations	
E. pterocarpa (P3)	100	100	0	0%
	1 population	1 population		
Microcybe sp. Windy Hill (G.F. Craig 6583) (P3)	26,962	20	0	0%
	15 populations	1 population		

1. Also referred to as *Teucrium* sp. dwarf (R. Davis 8813)
2. Botanica Consulting (2023)

Threatened flora: Marianthus aquilonaris

Marianthus aquilonaris is known only from the Bremer Range. There have been 14,627 individuals recorded in one population, within an area of occupancy (population extent) of 4.51 ha (0.45 km^2). The extent of occurrence for this taxon is likely to be less than 0.5 km^2 (DEC 2010b; Preston 2021a).

While there are no current records of the species in the development envelopes (see Section 2.1.6) 69.39 ha of potential habitat that supports the *Marianthus aquilonaris* by providing habitat for pollinators and potential seedbank, has been identified in the Mine Development Envelope. Up to 64.5 ha is critical habitat (16.82 ha is defined as optimal habitat and 47.68 ha is defined as sub-optimal habitat) and a further 4.89 ha of sub optimal habitat is outside the critical habitat (Figure 5a).

The proponent has committed to limit the clearing of no more than 1.51 ha of *Marianthus aquilonaris* sub-optimal habitat and no clearing of optimal habitat. Therefore, the direct impacts of the proposal on *Marianthus aquilonaris* is the loss of up to 1.51 ha of sub-optimal habitat comprising 2.3% of the 64.5 ha mapped habitat extent.

The EPA acknowledges that due to the Mine Development Envelope redesign, the proposal will avoid direct impacts to all current records (individuals and populations) of the threatened flora *Marianthus aquilonaris*. Clearing impacts will be limited to 1.51 ha of sub-optimal habitat. The EPA acknowledges there is the potential for indirect impacts from the proposal but notes that no indirect impacts to flora is achievable, in particular for *Marianthus aquilonaris*. Based on advice from DBCA, the EPA has recommended conditions that limit indirect impacts to significant flora population extents (condition B1-2), however, the EPA's preference remains that the proponent manages the proposal toward the outcome of no indirect impacts.

The EPA expects that the Mine and Infrastructure Plan will be developed to demonstrate that mine pits and infrastructure have been located to minimise impacts to significant flora and vegetation (including *Marianthus aquilonaris*) and to confirm that impacts to significant flora will be as predicted. Results from the pre-clearance and pollinator surveys, required by conditions B1-5, B1-6 and C4-2, will be used to ensure impacts are as predicted (Preston 2021a).

The proponent has proposed detailed mitigation measures to minimise the indirect impacts of dust. This includes committing to cease mining activities at the Vesuvius mine pit if dust deposition reaches 4.5 g/m^2 at the boundary of *Marianthus aquilonaris* sub-populations during the key growth period of August to November.

In response to issues raised during the public consultation period, the proponent has proposed additional measures and provided further detail regarding monitoring and management of dust impacts in the draft Significant Flora Management Plan (Botanica 2022b). The EPA agrees that the most effective dust management will be to control dust before it deposits on plants, as management measures once dust deposition occurs are less effective. The EPA acknowledges the proponent's commitment to restrict mining activities if dust deposition reaches 4.5 g/m^2, considers that real-time dust monitoring is required at the boundary of the sub-populations and that the operational control strategies in the Dust Control Management Strategy are incorporated into the Significant Flora Management Plan. The EPA expects the proponent to use real time monitoring of dust, and have sub lethal measures of stress, so any potential impacts are predicted prior to mortality of any individual.

The EPA considers that potential indirect impacts to *Marianthus aquilonaris* individuals and critical habitat from changes to hydrology, contamination, weeds, and fire as a result of the proposal can be managed to minimise health impacts and potential loss of individuals subject to the implementation of the proposed measures e.g. the Significant Flora Management Plan. As discussed in Section 2.1.3, the EPA notes that extensive fires have already occurred in the proposal area and considers that successive fire events from sources other than the proposal presents a risk to *Marianthus aquilonaris* in its natural habitat. The EPA considers the species, like others in the area, is vulnerable to climate change due to its small range and seedbank.

The EPA has assessed that the proposal is unlikely to affect the viability of the local population of *Marianthus aquilonaris*. The EPA acknowledges that this has also been verified through a review (Western Botanical, 2023). The EPA considers the impacts

to this species may be a significant residual impact. The residual impact to *Marianthus aquilonaris* generally aligns with the definition of significant residual impact in the *WA Environmental Offset Guidelines*, which includes impacts to threatened species (Government of Western Australia 2014).

The proponent has proposed a 427 ha on-tenement exclusion zone (from all mining activity for a period of 20 years) within their Mining Act tenure (Figure 7) that is primarily situated within the original Mine Development Envelope referred (Figure 6; Preston 2024) but now outside the mining areas. The EPA acknowledges that the exclusion zone would protect 3.37 ha of *Marianthus aquilonaris* sub-population extent (74.7% of total extent), 38.7 ha of critical habitat (60.0% of total extent) and 71.9% of all known individuals. The EPA considers this to be an indirect (and potential direct) offset measure that provides environmental enhancement and some lasting benefits to the species. Given the likelihood of changes from climate change, and the limited range of the species, the EPA considers the enhancement in conjunction with indirect and potential direct offsets are an important preservation measure for the species against both natural and anthropogenic impacts.

The EPA notes the proponent's general operational controls for fire management and the proposed Construction and Operations Fire Management Plan (condition B1-3. The EPA notes the proponent has committed to provide funding for land management costs within the exclusion zone for a period of 20 years (Preston 2024). The EPA notes that the proposed management and indirect offsets such as research proposed within the exclusion zone has the potential to manage impacts and enhance the viability of the species. The EPA considers that the DBCA could work more with the proponent on the recovery strategies for the species. This may include research on long-term fire management regimes, genetic flows and pollination, and preservation of genetic material should the species be impacted by lower rainfall or successive fire events that deplete the seedbank in the future. In this regard, the proposed indirect offset requires further development but represents opportunities for species preservation.

The EPA considers a direct offset is not required in this case given the residual impact and the opportunity for better environmental outcomes for this species through research and enhancement measures. However, the 427 ha exclusion zone provides a potential direct offset for significant residual impacts to flora and vegetation. Further information on the proposed offsets is provided in section 4.

The EPA advises that the significant residual impact to *Marianthus aquilonaris* is likely to be able to be regulated through reasonable conditions (recommended conditions A1, B1 and B3), enhancement measures and counterbalanced by offsets (recommended condition B4) so that *Marianthus aquilonaris* is protected and the environmental outcome is likely to be consistent with the EPA objective for flora and vegetation.

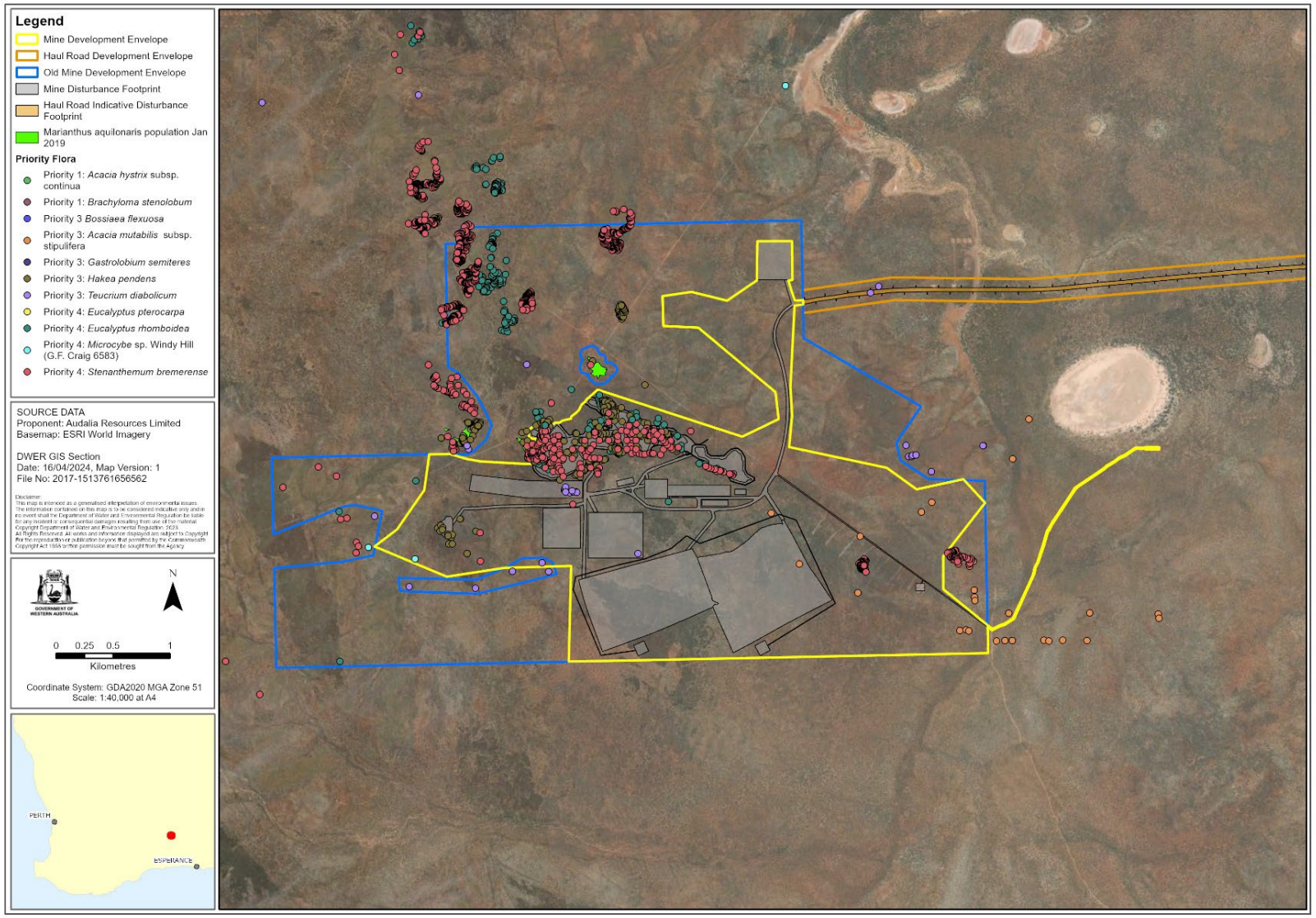

Figure 6: Original and current mine development envelope

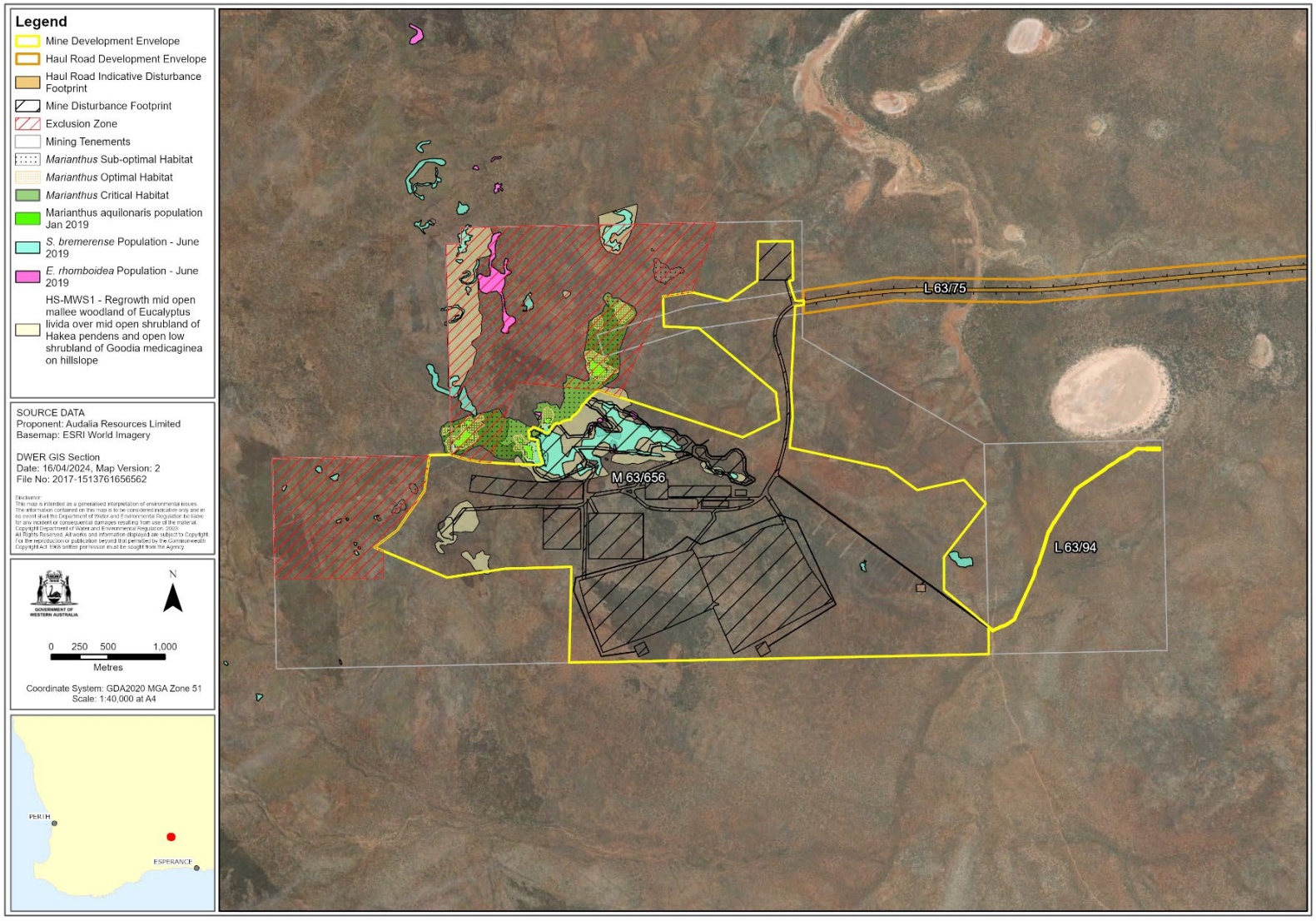

Figure 7: Proposed on-tenement exclusion zone offset area

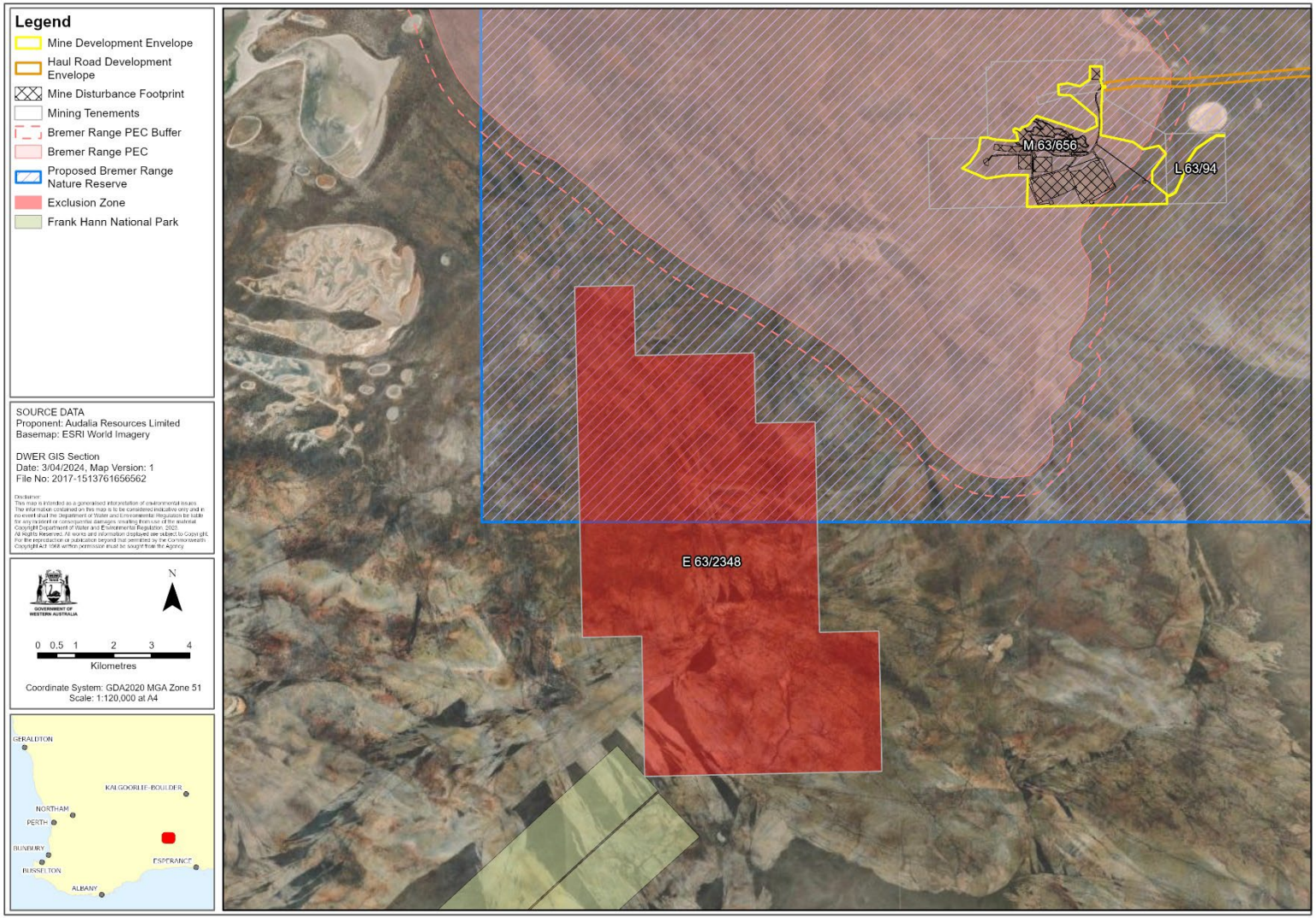

Figure 8: Proposed off-tenement exclusion zone offset area

Priority flora

The proposal will avoid direct impacts to five of the 10 priority flora species recorded during surveys including all priority 1 flora. The potential impacts to the other five species are discussed below, including how impacts from the proposal may affect the conservation status of the species. The proponent commissioned a conservation assessment on the five priority species and the Bremer Range PEC that would be impacted by the proposal, against the International Union for Conservation of Nature (IUCN) Red List categories and criteria and the Threatened Species Scientific Committee Guidelines for assessing the conservation status of native species, obtained from the Department of Agriculture, Water and Environment (DAWE) website (Botanica 2022a). The conservation assessment was updated in 2023 after feedback from the EPA (Botanica 2023).

Priority flora with the highest likelihood to become Threatened: *Eucalyptus rhomboidea, Stenanthemum bremerense* and *Hakea pendens*

Eucalyptus rhomboidea has been nominated by DBCA to the Threatened Species Scientific Committee (TSSC) for threatened status under the BC Act and it is expected to become Threatened (Preston 2021a). *Eucalyptus rhomboidea* has been recorded from seven populations with at least 17,006 known records of individuals within a local population extent of 5,200 ha (within 150 km of the Mine Development Envelope). Within the Mine Development Envelope, the local population extent is 1.0 ha with two populations and 1,198 individuals. Western Botanical (2023) completed a peer review of the long-term impacts to population viability for *Eucalyptus rhomboidea*. The review found that the proposal would not change the long-term viability of the *Eucalyptus rhomboidea* population. The EPA has assessed the likely residual impacts of the proposal on *Eucalyptus rhomboidea* to be the loss of 768 individuals from direct clearing, which is 4.5% of the known records and potential indirect impacts from dust, erosion and/or reduction in overland flow.

Stenanthemum bremerense has been recorded in the Bremer Range and Marvel Loch (south of Southern Cross) areas, although the EPA notes from DBCA advice that the Marvel Loch population is under taxonomic review (Preston 2022a). The species is being considered by DBCA for nomination to Threatened status under the BC Act (Preston 2021a). Excluding the Marvel Loch population, there are 25 populations with 40,126 known records of individuals within local population extent of 10,000 ha. The occupied area of local populations within 150 km (local population extent) that have not been impacted by fire is 56 ha. Within the Mine Development Envelope, the local population extent is 27 ha with 3 populations and 3,455 individuals. Western Botanical (2023) completed a peer review of the long-term impacts to population viability for *Stenanthemum bremerense*. The review found that the proposal would not change the long-term viability of the *Stenanthemum bremerense* population. The EPA has assessed the likely residual impacts of the proposal on *Stenanthemum bremerense* to be the loss of up to 2,049 individuals from direct clearing, which is 5.1% of the known records, and potential indirect impacts from dust and erosion.

The EPA has considered there is uncertainty with the listing of the two flora species and the proposal is not likely to be the only determinant in their listing. The EPA has

required the proponent to propose mitigation measures (particularly avoidance, management and enhancement) so that listing of the species is more likely to be the result of their natural population and ranges, rather than this proposal.

Hakea pendens (Priority 3) is found within the Bremer Range and Parker Range – Mt Holland area approximately 160 km north-west from the proposal area (Western Botanical 2023). *Hakea pendens* has not been nominated or considered by DBCA for Threatened status under the BC Act. The EPA, however, notes that *Hakea pendens* is the next species that has the potential for conservation status change and the EPA has included the species as a cautionary measure. Western Botanical (2023) notes the population to be 6,873 individuals, however, an assessment of conservation status by Botanica (2023) identified an increase in the population to 7,950 individuals. Western Botanical (2023) completed a peer review of the long-term impacts to population viability for *Hakea pendens* and found that the proposal would not change the long term viability of the Bremer Range population. The EPA has assessed the likely residual impacts of the proposal on *Hakea pendens* to be the loss of 876 individuals from direct clearing, which is 11% of the known records, and potential indirect impacts from dust, erosion and/or reduction in overland flow.

Mitigation of impacts
The EPA notes that the operational control strategies in the Dust Control Management Strategy and the dust measures in the Significant Flora Management Plan are specific to *Marianthus aquilonaris*, however, they provide benefits to the health of priority flora species.

As for *Marianthus aquilonaris*, the EPA considers that potential indirect impacts to *Eucalyptus Rhomboidea*, *Stenanthemum bremerense* and *Hakea pendens* local population extents and individuals from weeds and fire as a result of the proposal, can be managed to minimise health impacts and loss of population extent. As discussed in Section 2.1.3, the EPA notes that extensive fires have already occurred in the proposal area and have burnt a large portion of the population extent for the *Eucalyptus rhomboidea* (i.e. 12 ha of 5,000 ha is unburnt) and *Stenanthemum bremerense* (i.e. 56 ha of 10,000 ha is unburnt). Therefore, the EPA considers that fire from other sources (such as lightning) also presents a risk to *Eucalyptus rhomboidea* and *Stenanthemum bremerense*.

The EPA acknowledges that the proponent prepared a Rehabilitation Plan (Botanica 2022c) in response to issues raised during the public consultation, which outlines specific rehabilitation measures for supporting the growth of threatened and priority flora species within the development envelopes following mine closure. The EPA advises that an updated Rehabilitation Plan (condition B3-3) and Mine Closure Plan should include specific completion criteria for significant flora and specific monitoring to measure the success of the rehabilitation. These additional requirements are outlined in condition C4-4.

The EPA expects that the proponent will undertake progressive rehabilitation during operations, where practicable, and DEMIRS would regulate mine closure through a Mine Closure Plan. The Rehabilitation Plan will be an addendum to the Mine Closure Plan and include the outcomes specified by the EPA. The EPA expects that the proponent will undertake rehabilitation in all areas, with the exception of the mine

pits, that will remain as pit voids and will be backfilled and rehabilitated as much as practicable.

The EPA notes that the proposed on-tenement exclusion zone and enhancement measures would also protect *Eucalyptus Rhomboidea* and *Stenanthemum Bremerense* population extent (61.7% and 19.6% respectively), 30.4% of known *Stenanthemum Bremerense* individuals and 12.7% of known *hakea pendens* individuals. The additional enhancement in the exclusion zone would provide protection to these species during mining. The 6,940 ha off-tenement exclusion zone is proposed to protect significant flora values, such as *Eucalyptus rhomboidea*.

The EPA has assessed that the proposal is unlikely to affect the sustainability of the local *Eucalyptus Rhomboidea* population or threaten the long-term survival of *Stenanthemum Bremerense* at the Bremer Range as the direct clearing of individuals has been significantly reduced by the proponent. The management of weeds and dust deposition, and the implementation of an exclusion zone will protect a large amount of the known population/individuals and will include fire management. The EPA has recommended conditions that limit indirect impacts to *Eucalyptus rhomboidea*, *Stenanthemum bremerense* and *Hakea pendens* population extents (condition B1-2), however, the EPA's preference is that indirect impacts to priority flora are managed by the proponent toward the outcome of no indirect impacts.

The EPA considers the direct clearing of *Eucalyptus Rhomboidea*, *Stenanthemum Bremerense* and *Hakea pendens* individuals to likely be a significant residual impact considering the potential of these species to become listed as threatened.
The residual impact to *Eucalyptus Rhomboidea, Stenanthemum Bremerense* and *Hakea pendens* generally aligns with the definition of significant residual impact in the *WA Environmental Offset Guidelines*, which includes impacts to potentially threatened species (Government of Western Australia 2014). The guidelines specify that offsets may be considered where a priority species has the potential to be listed as Threatened. In this case, the offset is cautionary as the proponent has implemented a large number of mitigation measures including enhancement which limit the likelihood of the species being listed as a result of this proposal only.

The proposed offsets include a range of research programs designed to improve the viability of re-establishing plants. The EPA considers that the research similar to *Marianthus aquilonaris*, should focus on research on the genetics, pollination and perseveration of the species. Indirect offsets proposed for the Bremer Range PEC will directly benefit these three species (see below). Information on the proposed offsets is provided in section 4.

The EPA advises that the likely significant residual impact to *Eucalyptus Rhomboidea*, *Stenanthemum Bremerense* and *Hakea pendens* can be regulated through reasonable conditions (recommended conditions A1, B1, B3 and C4), enhancement measures and counterbalanced by offsets (recommended condition B4) so that *Eucalyptus Rhomboidea, Stenanthemum Bremerense* and *Hakea pendens* are protected, and the environmental outcome is likely to be consistent with the EPA objective for flora and vegetation.

Off-tenement offset site

The proponent has worked with DEMIRS and DWER on the provision of a 6,940 ha off-tenement offset site to protect flora values, including *Eucalyptus Rhomboidei,* which was a key value for the proposed Bremer Range Nature Reserve in the area of the proposal (Henry-Hall 1990). The proposed off-tenement offset site and nature reserve provides a direct linkage between Frank Hann National Park and the Bremer Range, and nearly half occurs within the proposed Bremer Range Nature Reserve. DBCA has not supported the proposed nature reserve and considers it does not contain priority flora that are not already protected in the existing reserve system. As outlined in the offset guidelines for Western Australia, offsets need to be like for like in terms of impacts.

In this case, the EPA considers the proposed off-tenement offset would be suitable to counterbalance impacts from this proposal and does include species such as *Eucalyptus Rhomboidei* (recommended condition B4). The proponent has also proposed other indirect offsets and environmental enhancements (recommended condition B4).

Other priority flora

The proposal may directly affect two other priority flora: *Acacia mutabilis* subsp. *Stipulifera* (P3) and *Teucrium diabolicum* (P3) (Table 2). The proponent assessed whether any impacts to the priority flora would meet the criteria for Threatened (Vulnerable) (Botanica 2023). The predicted impacts from the proposal were considered unlikely to change the current status of these priority flora directly impacted. The EPA acknowledges the outcomes of this assessment that the conservation status would be unlikely to change from implementation of the proposal.

The EPA has recommended limits for the removal of individuals for *Acacia mutabilis* subsp. *Stipulifera* (P3) and *Teucrium diabolicum* (P3), which would be directly impacted by the proposal. These species have large ranges and areas of occupancy, occur in a number of populations across their ranges. The proposal will not reduce the extent of occurrence below 5,000 km^2 or the area of occupancy below 10 km^2, and the number of mature individuals would remain in the several (or more) thousands. Even though further surveys on these species are likely to show the level of impact is low, the EPA has determined that the likelihood of significant impact to these species can be mitigated through limitations on removal in this case.

The EPA acknowledges the potential for indirect impacts to other priority flora and it is the EPA's preference that the proponent to manages these to avoid indirect impacts to this species and the other priority flora. The EPA recommends that monitoring and mitigation measures for *Acacia mutabilis* subsp. *Stipulifera* (P3) and *Teucrium diabolicum* (P3) should be included in the revised Significant Flora Management Plan (condition B1-4 and C4-2).

The EPA advises that the residual impact to the other priority flora should be subject to implementation conditions (recommended condition B1-1) to ensure that the environmental outcome is consistent with the EPA objective for flora and vegetation.

Vegetation

The proposal would clear up to 650 ha of native vegetation in good to very good condition, which includes vegetation in the Bremer Range PEC and locally important vegetation. Table 4 summarises impacts from clearing to significant vegetation from the proposal.

Table 4: Summary of predicted impacts to vegetation

Vegetation	Extent (ha)	Extent within the development envelopes (ha)	Direct impacts (loss) – in disturbance footprint (ha)	Direct impacts (loss) as % of extent
Bremer Range PEC (including buffer)	72,845 (88,129)	886	285	0.39%
Locally important vegetation				
CLP-EW1	10,022	1,237	279	2.8%
CLP-MWS1	1,975	464	144	7.3%
CLP-MWS2	2,561	234	54	2.1%
HS-EW1	15	5.0	1	6.7%
HS-MWS1	150	63	30	20%
HS-MWS2	16	0	0	0%
HS-MWS3	96	0	0	0%
HS-OS1	412	167	36	8.7%

Bremer Range PEC

The impacts of the proposal on the Bremer Range PEC are loss of up to 285 ha of the Bremer Range PEC (0.39% of the 72,845 ha PEC extent). The proponent's conservation assessment concluded that the Bremer Range PEC is unlikely to meet the criteria for Threatened status and this would not change as a result of the predicted impacts from the proposal (Botanica 2023). DBCA has advised that much of the criteria for Threatened conservation status is likely to have been met for the Bremer Range PEC. The EPA notes that the proposal will result in clearing less than 1% of the entire 72,845 ha Bremer Range PEC extent. As the mine is located at the edge of the Bremer Range PEC (Figure 2), impacts from fragmentation are not expected. The EPA therefore has considered that listing is unlikely to occur as a result of the proposal only.

Due to the value of the Bremer Range PEC, the EPA considers that a limit should be placed on the extent of native vegetation clearing in the Bremer Range PEC. The EPA considers that rehabilitation and revegetation is required to an appropriate standard. As discussed in the Significant flora section above, the EPA acknowledges that the proponent has proposed rehabilitation and decommissioning measures in the Rehabilitation Plan (Botanica 2022c) and the Mine Closure Plan (Preston 2022b). The proponent has committed to respreading topsoil to rehabilitate all disturbance areas requiring revegetation, except the mine pits (39.32 ha) which will remain as voids. The mine pits have been refined during the assessment to avoid

impacts, as much as practicable, to the PEC and significant flora. The EPA considers that environmental outcomes need to be outlined for the Rehabilitation Plan and Mine Closure Plan, but these can be implemented by DEMIRS.

The EPA considers that there may be indirect impacts to vegetation health to the Bremer Range PEC. The EPA notes that the proponent will be implementing best practice measures for management of indirect impacts to flora species. Whilst these measures apply to conservation significant flora, they will protect other plants within the PEC.

The EPA notes that the proponent proposes a 427 ha on-tenement exclusion zone and offset that covers up to 427 ha of the Bremer Range PEC. The EPA considers this to be a potential direct offset and an indirect offset with enhancement actions. This offset and enhancements will benefit the PEC and ensure greater resilience to the impacts from climate change.

The EPA considers that the residual impact to the Bremer Range PEC to likely be a significant residual impact but not likely to result in impacts reaching a critical threshold or inducing significant fragmentation of critical habitats. The residual impact to the Bremer Range PEC generally aligns with the definition of significant residual impact in the *WA Environmental Offset Guidelines*, which includes areas of high environmental value (Government of Western Australia 2014).

The EPA notes that the proponent proposes ongoing conservation management within the Bremer Range PEC, including activity to improve management of significant flora populations, and would be undertaking research on re-establishment of priority species found within the Bremer Range PEC. The EPA considers that due to the small scale of the significant residual impact to the Bremer Range PEC, indirect offsets are the most appropriate measures to counterbalance the impacts. Information on offsets is provided in section 4.

The EPA advises that the significant residual impact to the Bremer Range PEC is likely to be able to be regulated through reasonable conditions (recommended conditions A1, B1 and B3), and counterbalanced by offsets (recommended condition B4) so that the proposed Bremer Range Nature Reserve and Bremer Range PEC are protected, and the environmental outcome is likely to be consistent with the EPA objective for flora and vegetation.

Other Vegetation communities

The impacts of the proposal on local vegetation communities will be below 10% within the development envelopes, with the exception of HS-MWS1 which will be impacted by 20% (30 ha). The vegetation communities mostly occur within the Bremer Range PEC.

The EPA considers the HS-MWS1 floristic community to be the most important locally as it contains habitat for *Marianthus aquilonaris*. The EPA considers the impacts to the other communities to be small and these will be protected through the mitigation of impacts to the Bremer Range PEC. The EPA considers that while there may be impacts to vegetation health, the loss of vegetation from HS-MWS1 should

be limited to 20% to achieve the environmental outcome of maintaining representation and viability of the floristic community.

Floristic community G-H1 is described as Heathland of *Thryptomene* spp. over sparse tussock grassland of *Neurachne alopecuroidea* on granite outcrop. The community was raised in a public submission to be a potential restricted vegetation community. During the RtS the proponent reviewed boundaries of the community to determine if it could be avoided further. The proponent reduced impacts to the community to 3.42 ha, or from 5.3% to 1.29% of its mapped extent (Preston 2022a). The EPA considers that the impacts to the G-H1 floristic community are not likely to be significant, however, the EPA has recommended a condition with a specific limit on the clearing extent for the community (condition B1).

The EPA considers that the residual impact to the locally significant floristic community HS-MWS1 is the same as that of the Bremer Range PEC, as outlined above, and the mitigation would be the same, except for a specific limit on HS-MWS1.

The EPA advises that the residual impact to the locally significant floristic community HS-MWS1 is likely to be able to be regulated through reasonable conditions (recommended conditions B1 and B3), and counterbalanced by offsets (recommended condition B4) proposed for the Bremer Range PEC. As a result, the environmental outcome is likely to be consistent with the EPA objective for flora and vegetation.

Cumulative impacts

Cumulative impacts to flora and vegetation in the local area of the proposal will occur from the Lake Johnston nickel project (Emily Ann and Maggie Hays mines) located about 50 km north of the proposal. No other proposals are located in the proposed Bremer Range Nature Reserve.

Four priority species were identified as being impacted at both sites:

- *Stenanthemum bremerense*: loss of 2,049 individuals for the proposal and estimated 300 individuals at the Lake Johnston nickel project (total of 2,349 individuals)
- *Hakea pendens*: loss of 876 individuals for the proposal and estimated 20 individuals at the Lake Johnston nickel project (total of 896 individuals)
- *Acacia mutabilis* subsp. *Stipulifera*: loss of 10,001 individuals for the proposal and estimated 20 individuals at the Lake Johnston nickel project (total of 10,021 individuals)
- *Microcybe* sp. Windy Hill (G.F. Craig 6583): potential loss of 20 individuals for the proposal (if all individuals outside the disturbance footprint were cleared) and estimated 100 individuals at the Lake Johnston nickel project (total of 120 individuals).

The estimated impact to the Bremer Range PEC from the Lake Johnston nickel project is the disturbance to 202 ha. The cumulative effect of the proposal (285 ha)

and the Lake Johnston nickel project is loss of up to 487 ha (0.66%) of the Bremer Range PEC extent.

The cumulative impacts to priority flora from both the proposal and the Lake Johnston nickel project are minimal and are unlikely to result in a species or communities reaching a critical threshold by themselves. As a result, the environmental outcomes for priority flora and the Bremer Range PEC are still likely to be consistent with the EPA objective for flora and vegetation after the consideration of cumulative impacts.

2.1.10 Summary of key factor assessment and recommended regulation

The EPA has considered the likely residual impacts of the proposal on flora and vegetation environmental values. In doing so, the EPA has considered whether reasonable conditions could be imposed, or other decision-making processes can mitigate the potential impacts on the environment, to ensure consistency with the EPA factor objective. The EPA assessment findings are summarised in Table 5.

The EPA has also considered the principles of the *Environmental Protection Act 1986* (see Appendix D) in assessing whether the residual impacts will be consistent with its environmental factor objective and whether reasonable conditions can be imposed (see Appendix A).

The EPA has also had regard to its conclusions in other recent assessments, including the Earl Grey Lithium Project (Significant Amendment) (EPA Report 1730) and the Mt Weld Rare Earths Project – Life of Mine Proposal (Significant Amendment) (EPA Report 1752).

Table 5: Summary of assessment for flora and vegetation

Residual impact or risk to environmental value	Assessment finding	Recommended conditions and DMA regulation
1. Loss of up to 1.51 ha sub-optimal habitat for threatened *Marianthus aquilonaris*, from the direct impact of clearing.	The proposal will result in the loss of sub-optimal habitat for threatened *Marianthus aquilonaris* and direct loss of individuals of priority flora that is likely to be listed as threatened in the future. The proposal will also result in habitat loss for priority flora that is likely to be listed as threatened. The EPA advises that subject to the recommended conditions to limit the extent of clearing and require rehabilitation and offsets, the significant residual impact can be managed and counterbalanced so that the environmental outcome is likely to be consistent with the EPA objective for flora and vegetation.	Regulated through recommended conditions: **Condition A1 Limitations and extent of proposal** • limit extent of loss of vegetation. **Condition B1 Flora and Vegetation** • no loss of *Marianthus aquilonaris* individuals • limit extent of disturbance to priority flora individuals • pre-clearance survey/s. **Condition B3 Rehabilitation** Requirement to rehabilitate the disturbance footprint. **Condition B4 Offsets** Requirement for an offset to counterbalance the significant residual impacts.
2. Loss of priority flora that is likely to be listed as threatened: • up to 4.5% of the *Eucalyptus. rhomboidea* population • up to 5.1% of the *Stenanthemum bremerense* population • up to 11% of the *Hakea pendens* population.		
3. Potential reduction in health of threatened flora and priority flora that is likely to be listed as threatened from indirect impacts.	The proposal may result in a reduction in health of threatened flora and priority flora that is likely to be listed as threatened. The EPA advises that subject to the recommended conditions to require mitigation and rehabilitation, the residual impact can be managed so that the environmental outcome is likely to be consistent with the EPA objective for flora and vegetation.	**Condition B1 Flora and Vegetation:** • significant flora objectives – minimising indirect impacts dust, weeds, fire, limit extent of indirect impacts to known populations of significant flora • ceasing mining activities if dust levels are exceeded • environmental management plan/s demonstrating management and monitoring of outcomes and objectives. **Condition B3 Rehabilitation** Revision of Rehabilitation Plan.

Residual impact or risk to environmental value	Assessment finding	Recommended conditions and DMA regulation
Loss of other priority flora, from the direct impact from clearing: • up to 2.9% of the *Acacia mutabilis* subsp. *Stipulifera* population • up to 7.1% of the *Teucrium diabolicum* R.W.Davis & Wege population.	The proposal will result in the loss of individuals of other priority flora and may result in a reduction in health of other priority flora. The proposal will result in habitat loss for priority species. The EPA advises that subject to the recommended conditions to limit the extent of clearing and the requirement for mitigation and rehabilitation, the residual impact can be managed so that the environmental outcome is likely to be consistent with the EPA objective for flora and vegetation.	**Condition B1 Flora and Vegetation** • significant flora outcomes–- limit extent of loss of priority species individuals • significant flora objectives – minimising indirect impacts of dust, weeds, fire • environmental management plan/s demonstrating management and monitoring of outcomes and objectives. **Condition B3 Rehabilitation** Revision of Rehabilitation Plan.
4. Loss of native vegetation in good to very good condition from the direct impact of clearing, including: • 285 ha is the Bremer Range PEC • 30 ha of the HS-MWS1 floristic community • 3.42 ha of the G-H1 floristic community.	The proposal will result in the loss of significant native vegetation. The EPA advises that subject to the recommended conditions to limit the extent of clearing and require rehabilitation and offsets, the significant residual impact can be managed and counterbalanced so that the environmental outcome is likely to be consistent with the EPA objective for flora and vegetation.	**Condition A1 (Limitations and extent of proposal)** • limit on extent of open mine pits/voids. **Condition B1 Flora and Vegetation** • limit on extent of loss of native vegetation in the Bremer Range PEC • significant vegetation outcomes–- limit on extent of loss of HS-MWS1 and G-H1 floristic communities. **Condition B3 Rehabilitation** Revision of Rehabilitation Plan. **DMA regulation** Regulate mine closure under the Mining Act, including revision of Mine Closure Plan. **Condition B4 Offsets** Requirement for an offset to counterbalance the significant residual impacts.
5. Potential reduction in health of native vegetation in Bremer	The proposal may result in a reduction in health of	**Condition B1 Flora and Vegetation**:

Residual impact or risk to environmental value	Assessment finding	Recommended conditions and DMA regulation
Range PEC from indirect impacts.	native vegetation in the Bremer Range PEC. The EPA advises that subject to the recommended conditions to require mitigation, and rehabilitation, the residual impact can be managed so that the environmental outcome is likely to be consistent with the EPA objective for flora and vegetation.	• significant flora objectives – minimising indirect impacts of dust, weeds, fire • environmental management plan/s demonstrating management and monitoring of outcomes and objectives. **Condition B3 Rehabilitation** Revision of Rehabilitation Plan. **DMA regulation** Regulate mine closure under the Mining Act, including revision of Mine Closure Plan.

2.2 Terrestrial fauna

2.2.1 Environmental objective

The EPA environmental objective for terrestrial fauna is *to protect terrestrial fauna so that biological diversity and ecological integrity are maintained* (EPA 2016c).

2.2.2 Investigations and surveys

Desktop assessment and field surveys for terrestrial fauna have been conducted over the Mine Development Envelope and Haul Road Development Envelope since 2013, as detailed in the proponent's ERD (Preston 2021a). Additional malleefowl, short-range endemic (SRE) invertebrate and *Marianthus aquilonaris* pollinator surveys were undertaken. The additional surveys are discussed in the proponent's RtS (Preston 2022a).

The EPA advises that in addition to the past survey work undertaken, the following investigations and surveys were used to inform the assessment of the potential impacts to terrestrial fauna:

- Medcalf Vanadium Mining Project Audalia Resources Fauna Survey (Level 2) Phase 1 and Phase 2 (Harewood 2020a) (appendix 5.1 of the ERD)
- Short-range endemic fauna at the Medcalf Project (Bennelongia 2020a) (appendix 5.2 of the ERD)
- Medcalf Vanadium Mining Project Proposed Haul Road Fauna Assessment (Harewood 2020b) (appendix 5.3 of the ERD)
- Short-range endemic fauna survey at the Medcalf Project (Bennelongia, 2022) (appendix 8 of the RtS document)
- Audalia Phase 2 Level 2 Fauna Survey Report v5 (Harewood 2021a) (appendix 11 of the RtS document)
- Proposed Haul Road Fauna Assessment v5 (Harewood 2021b) (appendix 12 of the RtS document)
- Survey for Malleefowl (*Leipoa ocellata*) Proposed transport development envelope (Botanica 2021) (appendix 14 of the RtS document).

The proponent has undertaken a range of surveys during the assessment and had undertaken surveys in burnt and unburnt areas. Two of the surveys were not completely consistent with EPA guidance but provided enough information to determine if critical habitat for a species was present. The EPA considered it had been provided with enough information to complete its assessment and has taken a conservative approach to conditioning of impacts where surveys were not consistent with EPA guidance. The large number of vegetation surveys provided good information on habitat types and extents.

2.2.3 Assessment context – existing environment

As discussed in Section 1 and Section 2.1.3, the proposal is located within the Great Western Woodlands (Figure 1).

As discussed in Section 2.1.3, most of the vegetation within the Mine Study Area is in a state of regeneration after being burnt during a series of major fires in 2009/2010. Fire scars cover approximately 78% of the Haul Road Survey Area (64% in 2010 fire and 13% in 1998 fire) (Botanica 2021).

Fauna habitat

Five fauna habitat types were mapped during the surveys, with three mapped in the Mine Study Area and five in the Haul Road Study Area. None of the habitat types are restricted to the proposal development envelopes. The Clay-Loam Plains (Eucalypt woodlands or Mallee woodlands over shrublands) is the most common habitat type, covering 78% the development envelopes and is likely to be the most viable habitat for fauna (Preston 2021a). Approximately 93% of the 14,694 ha Clay-Loam Plain habitat mapped in the study area is outside the Mine Development Envelope (Preston 2021a).

Significant fauna

Vertebrate fauna

Of the nine conservation significant vertebrate species that may occur within the study areas, three were recorded:

- malleefowl (*Leipoa ocellata*): Threatened (Vulnerable)–- EPBC Act and BC Act
- central long-eared bat (*Nyctophilus major tor)*: DBCA P3
- western rosella (Inland ssp.) (*Platycercus icterotis xanthogenys*) – DBCA P4.

Malleefowl

Malleefowl is the only species listed as Threatened that was recorded during surveys. Evidence of malleefowl (one malleefowl and extinct old mounds) was recorded in an area within the Clay-Loam Plain habitat type in the Haul Road Development Envelope, however, no active mounds or recently active mounds were detected. There was no evidence of malleefowl in the Mine Study Area and no evidence of breeding (i.e. nest mounds recent or old) was observed (Preston 2021a). Further information on the mitigation of impacts to malleefowl due to its listing are outlined below.

Central long-eared bat

The central long-eared bat (P3) was recorded (calls) in two locations in the Mine Development Envelope and one location in the Haul Road Development Envelope. The records were located within the Clay-Loam Plain habitat type, which is potential habitat for the species. The species was also recorded in Clay-Loam Plain habitat outside the Mine Development Envelope. This species is currently known from several localities in Western Australia and in South Australia, and is locally common in the Coolgardie, Hampton, Gawler and western Eyre-York Block Bioregions (Duncan et al (ed) 1999; Preston 2021a). Considering the habitat is extensive

outside the Mine Development Envelope, the proposal is not expected to have a significant impact on the central long-eared bat. Therefore, no further assessment has been undertaken.

Western rosella

The western rosella (P4) was recorded in one location in the Mine Development Envelope in the Clay-Loam Plain habitat type, which is potential habitat for the species. The species was also recorded in the Clay-Loam Plain and Hillslope habitat types outside the Mine Development Envelope. The species is mobile and occupies a large home range and its population is considered to be stable in the western woodland and forest (Harewood 2020a). Approximately 93% of the 14,694 ha Clay-Loam Plain and 76% of the 1,026 ha Hillslope habitat types mapped are outside the Mine Development Envelope, and less than 4% of the Clay-Loam Plain and 8% of the Hillslope habitat types are within the indicative disturbance footprint (Preston 2021a). Considering the habitat is extensive outside the Mine Development Envelope and the species is mobile, the proposal is not expected to have a significant impact on the western rosella. Therefore, no further assessment has been undertaken.

SRE Invertebrate fauna

The SRE field survey recorded 36 species of which 16 are considered potential SREs (Preston 2022a). Of these potential SREs, 8 were recorded in the Mine Development Envelope and 10 were recorded in the Haul Road Development Envelope. The mitigation of impacts to SRE's is outlined below.

2.2.4 Consultation

Matters raised during stakeholder consultation and the proponent's responses are provided in ERD (Preston 2021a) and the RtS document (Preston 2022a). During the public review, issues were raised by DWER and DBCA regarding:

- potential impacts to malleefowl habitat
- potential impacts to SRE species
- impacts of fires on understanding of habitat that may support conservation significant fauna
- fragmentation and rehabilitation of fauna habitat in the Great Western Woodlands.

The key issues raised during the public consultation on the proposal and how they have been considered in the assessment are described in sections 2.2.7, 2.2.8 and 2.2.9.

2.2.5 Potential impacts from the proposal

The implementation of the proposal including the clearing of up to 650 ha of native vegetation, has the potential to significantly impact on terrestrial fauna, from:

- potential impacts to SRE invertebrate fauna habitat in the Great Western Woodlands
- habitat degradation in the Great Western Woodlands due to the indirect impact of fire, weeds and fragmentation
- injury / mortality to significant fauna from light pollution, vehicle strike, fire and introduced fauna (feral animals).

2.2.6 Avoidance measures

The proponent has designed the proposal to avoid impacts to terrestrial fauna by:

- redesigning the borrow pit for the Haul Road to avoid the location of the record of the potential SRE species Garypidae `BPS333`.

2.2.7 Minimisation measures

The proponent proposed measures to minimise impacts to terrestrial fauna with details outlined in Section 6.6.2 of the ERD (Preston 2021a). In response to issues raised during the public consultation, the proponent prepared a Fauna Management Plan (Audalia Resources 2022) to include monitoring, management actions and targets relating to significant fauna (particularly malleefowl) and introduced fauna.

The proponent has proposed the following key minimisation measures:

- implement industry leading practice management measures for terrestrial fauna
- implement the Dust Control Management Strategy (see Section 2.1.7)
- conduct pre-clearance surveys
- establish a 50 m exclusion zone for any active or potentially active breeding sites identified prior to and during operations
- if clearing is required within 50 m of a breeding site, undertake suitable measures in consultation with DBCA including delaying clearing, clearing outside the breeding season, removal of eggs and release of chicks, monitoring of the malleefowl population
- minimise clearing which will result in the loss and fragmentation of significant fauna habitat
- implement measures to reduce injury / death to fauna including vehicle speed limits, design and management of open trenches
- minimise activities (light, dust, traffic) that may disturb conservation significant fauna
- implement a feral animal management program (targeting feral cats and foxes).

2.2.8 Rehabilitation measures

As discussed in Section 2.1.8, the proponent prepared an interim Mine Closure Plan as part of the supporting documentation for the ERD (Preston 2020a) (appendix 4 of the ERD, Preston 2021a). In response to issues related to the suitability of proposed rehabilitation measures raised during the public consultation, the proponent:

- prepared a Rehabilitation Plan (Botanica 2022c), that outlines rehabilitation measures specific to re-establishing fauna habitat and monitoring of fauna presence in rehabilitated areas
- revised the Interim Mine Closure Plan (Preston 2022b), to update the native fauna completion criteria.

The proponent proposed key rehabilitation measures for terrestrial fauna in the ERD, which are the same as the rehabilitation measures identified for flora and vegetation (see Section 2.1.8). In addition, the proponent has proposed the following specific rehabilitation measures for terrestrial fauna in the Rehabilitation Plan and Interim Mine Closure Plan:

- conduct a fauna habitat assessment after the completion of rehabilitation, including landscape function/ habitat complexity of rehabilitated landforms
- apply mulch and tree logs recovered during clearing, to provide fauna habitat diversity/ fauna refuge
- undertake fauna monitoring of rehabilitated landforms
- maintain records of fauna observed utilising rehabilitated sites during landscape / vegetation monitoring.

2.2.9 Assessment of impacts to environmental values

The EPA considers that the key environmental values for terrestrial fauna likely to be impacted by the proposal are significant fauna and their habitats.

Significant fauna

Vertebrate fauna

There is the potential for direct impacts to significant vertebrate fauna from death or injury, during clearing and construction and due to vehicle strike, particularly along the haul road. There is also the potential for indirect impacts from increased predation or competition from introduced fauna, altered movements and behaviour of fauna due to the haul road, and from dust, noise and light emissions.

While the survey results yielded limited conservation significant vertebrate fauna records, DBCA advised during the public consultation that these results may be due to the impacts of bushfires a few years prior to the surveys being conducted, and fauna recovery was possible in conjunction with vegetation recovery. The proponent advised in the RtS that that survey results for most species would likely be unaffected as unburnt habitat was still present (Preston 2022a). The EPA has taken a cautionary approach and has considered the possible impact of the fires in its assessment of significant fauna, conservatively assuming that further significant fauna species may utilise the proposal area than were recorded in the surveys.

The EPA notes evidence of malleefowl was located within the Haul Road Development Envelope, however no active or recently active mounds were detected. There was no evidence of malleefowl in the mine study area and no evidence of breeding (i.e. nest mounds recent or old). The EPA has assessed that the vegetation

in the mine study area is likely to be lower value habitat and that rocky areas in the proposed open pit locations appear unsuitable for malleefowl habitat. The EPA considers that any malleefowl that occur in the area are more likely to use the areas around the haul road but not likely for breeding as evidence of used mounds that were present prior to the fire were not located in high numbers.

The EPA considers that conservation significant fauna might be found during pre-clearance surveys or during operations opportunistically and has conditioned the proposal for this possibility. During construction and operation of the haul road, there is a risk of threatened fauna being struck by vehicles or fauna may be impacted through trenching activities. The EPA considers setting standard conditions on these risks will minimise the potential impact of vehicle strike, and minimise the risk of injury and mortality of individuals. The EPA considers that standard vehicle speed limit conditions are appropriate and consistent with other recent decisions and proposal conditions and given evidence of malleefowl was located within the Haul Road Development Envelope (noting that no active or recently active mounds were detected). The EPA therefore considers that the risk of fauna mortality or injury from vehicle strike can be minimised and managed through reasonable conditions to be consistent with the EPA objective for terrestrial fauna.

The EPA notes the proponent's general operational controls for fire management and proposed Construction and Operations Fire Management Plan. The EPA notes the proponent has committed to provide funding for land management costs within the proposed 427 ha exclusion zone offset area for a period of 20 years as an environmental enhancement (Preston 2024). The additional fire management would further protect fauna habitat and species in the local area.

The EPA advises that the residual impact is likely to be able to be regulated through implementation conditions to require mitigation measures (recommended condition A1 and B2), including limiting the proposal clearing extent, pre-clearance fauna surveys, speed limits, trench inspections, and the installation and maintenance of fauna crossings. The EPA recommended conditions on the rehabilitation of fauna habitat (conditions B3 and C4). These conditions would ensure the environmental outcome is likely to be consistent with the EPA objective for terrestrial fauna.

SRE Invertebrate fauna

The EPA has assessed the potential impacts of the proposal on SRE invertebrate fauna. Of the eight potential SREs recorded in the Mine Development Envelope, three were recorded only within the indicative disturbance footprint, including pseudoscorpions Chernetidae `BPS335` and Garypidae 'BPS400', and scorpion *Urodacus* 'BSCO060' (Preston 2022a).

Urodacus 'BSCO060' and Chernetidae `BPS335` were collected from the same survey location on the northern boundary of the proposed TSF in the Clay-Loam Plain habitat type (Preston 2022a). This habitat type is extensive beyond the indicative disturbance footprint and outside the Mine Development Envelope. Both species are expected to occur outside the disturbance footprint given contiguous habitat extends from the TSF to the north and the species range (Preston 2022a).

Garypidae 'BPS400' was recorded from the centre of the Vesuvius pit within the hillslope woodlands/shrubs vegetation habitat. This vegetation habitat and finer SRE habitats in the vegetation unit extend widely in all directions from the pit (Bennelongia 2022). Undisturbed, unfragmented habitat for the species occurs 200 m north, south and east, and the species would be considered to be restricted to the pit if it had a range less than 0.25 km^2 (Bennelongia 2022). There are very few, if any, SRE species known to have ranges this small without the range being defined by a topographic feature (Preston 2022a).

The EPA advises that given the extent of contiguous SRE habitat outside the pits, disturbance footprints and development envelopes, and the likely species range extents, the proposal is not likely to significantly impact SRE invertebrate fauna and the environmental outcome is likely to be consistent with the EPA objective for terrestrial fauna.

Cumulative impacts

The EPA has considered cumulative impacts from the proposal to terrestrial fauna and values, noting that key proposals that have impacted similar fauna values in the Great Western Woodlands include the Earl Grey Project, Parker Range Project, and Lake Johnston nickel project (Emily Ann and Maggie Hays mines).

The EPA notes evidence of malleefowl was located within the proposal Haul Road Development Envelope, however no active or recently active mounds were detected. There was no evidence of malleefowl in the mine study area and no evidence of breeding (i.e. nest mounds recent or old). The Western Rosella was recorded in the proposal Mine Development Envelope and suitable habitat types are considered to be extensive outside the development envelope. The proposal area is considered to contain lower fauna values, particularly in comparison to the Earl Grey Lithium and Parker Range projects. Given consideration to the above factors and the low level of impact to fauna from this proposal, the EPA considers that the impacts from the proposal are not likely to significantly increase the impacts to these or other fauna species.

2.2.10 Summary of key factor assessment and recommended regulation

The EPA has considered the likely residual impacts of the proposal on terrestrial fauna environmental values. In doing so, the EPA has considered whether reasonable conditions could be imposed, or other decision-making processes can mitigate the potential impacts on the environment, to ensure consistency with the EPA factor objective. The EPA assessment findings are summarised in Table 6.

The EPA has also considered the principles of the *Environmental Protection Act 1986* (see Appendix D) in assessing whether the residual impacts will be consistent with its environmental factor objective and whether reasonable conditions can be imposed (see Appendix A).

The EPA has also had regard to its conclusions in other recent assessments, including Earl Grey Lithium Project (Revised Proposal) (EPA Report 1720) and St Ives Gold Mine: The Beyond 2018 Project (EPA Report 1645).

Table 6: Summary of assessment for terrestrial fauna

Residual impact or risk to environmental value	Assessment finding	Recommended conditions and DMA regulation
1. Loss of native vegetation that supports significant fauna in the Great Western Woodlands from the direct impact of clearing. 2. Habitat degradation due to the indirect impact of fire, weeds and fragmentation.	The proposal will result in the loss of native vegetation that supports significant fauna and potential habitat degradation in the Great Western Woodlands. The EPA advises that subject to the recommended conditions to limit the proposal's clearing extent and to require mitigation and rehabilitation, the residual impact can be managed so that the environmental outcome is likely to be consistent with the EPA objective for terrestrial fauna.	Regulated through recommended conditions: **Condition A1 (Limitations and extent of proposal):** • limit extent of loss of native vegetation which may also provide habitat for significant terrestrial fauna species. **Condition B2 Terrestrial Fauna** • outcomes based conditions for the management of impacts. **Condition B3 Rehabilitation** Revision of Rehabilitation Plan. **DMA regulation** Regulate mine closure under the Mining Act, including revision of Mine Closure Plan.
3. Potential injury / mortality to significant vertebrate fauna from light pollution, vehicle strike, fire and introduced fauna.	Residual impacts are likely to be regulated through reasonable conditions, so the environmental outcome is likely to be consistent with the EPA objective for terrestrial fauna.	**Condition A1 'Limitations and extent of proposal'.** Limit on the extent of the proposal including the development envelope and clearing extent. **Condition B2 Terrestrial Fauna** • pre-clearance significant vertebrate fauna survey/s and other suitable actions such as avoidance of direct disturbance within 50m of active malleefowl mounds • haul road speed limits during construction and operations • trench inspections and suitable actions • implementation and maintenance of fauna crossings.

3 Holistic assessment

While the EPA assessed the impacts of the proposal against the key environmental factors and environmental values individually in the key factor assessments above, given the link between Flora and vegetation and Terrestrial fauna, the EPA also considered connections and interactions between them to inform a holistic view of impacts to the whole environment.

Flora and vegetation, Terrestrial fauna, and Terrestrial environmental quality and Inland waters

There is a high level of interconnectivity between the environmental factors of Flora and vegetation, and Terrestrial fauna. Minimising the direct and indirect impacts to flora and vegetation will also minimise impacts to significant fauna habitat. In turn significant fauna aid ecosystem functioning and structure for Flora and vegetation.

The EPA considers that the proposed mitigation and management measures, recommended conditions and regulation by other DMAs for residual impacts, and provision of offsets to counterbalance the significant residual impacts to Flora and vegetation, will also mean the inter-related impacts to Terrestrial fauna, are likely to be consistent with the EPA environmental factor objectives.

Summary of holistic assessment

When the separate environmental factors and values affected by the proposal were considered together in a holistic assessment, the EPA formed the view that the impacts from the proposal would not alter the EPA's views about consistency with the EPA's factor objectives as assessed in section 2.

Considering the high biodiversity value of the proposal area, the EPA recommends that a three yearly environmental performance report (condition B5) should be required, given the interconnected environmental values in the area likely to be affected by the proposal. This environmental performance reporting will provide the proponent and the Minister with renewed and current information about the performance of the proposal with respect to environmental values over the life on the project.

4 Offsets

Environmental offsets are actions that provide environmental benefits which counterbalance the significant residual impacts of a proposal.

Consistent with the *WA Environmental Offsets Guidelines* (Government of Western Australia 2014), the EPA may consider the application of environmental offsets to a proposal where it determines that the residual impacts of a proposal are significant, after avoidance, minimisation and rehabilitation have been pursued.

In the case of this proposal, likely (and potential) significant residual impacts are to significant flora (threatened flora (*Marianthus aquilonaris*) and priority flora that may be listed as threatened (*Eucalyptus rhomboidei, Stenanthemum bremerense* and *Hakea pendens*) and significant vegetation (the Bremer Range PEC):

- *Marianthus aquilonaris* (Threatened): direct loss of 1.51 ha of sub optimal habitat
- *Eucalyptus rhomboidea* (Priority 4): direct loss of 768 individuals
- *Stenanthemum bremerense* (Priority 4): direct loss of 2,049 individuals
- *Hakea pendens* (Priority 3): direct loss of 876 individuals
- direct loss of 285 ha of the Bremer Range PEC.

Environmental offsets are not appropriate in all cases. In this case, the EPA considers offsets are appropriate given the scale of the environmental impacts (principle 2 of the WA Environmental Offsets Policy) and, in accordance with principle 1 of the WA Environmental Offsets Policy, the proponent has applied avoidance and mitigation measures by amending the proposal during the assessment to avoid or minimise impacts to environmental value.

The proponent proposed offsets as part of the December 2020 Offset Strategy (Preston 2020b) (appendix 12 of the ERD). The proponent refined the offsets and revised the Offset Strategy (October 2021) in response to submissions on the ERD (Preston 2021b) (appendix 13 of the RtS). The proponent was advised on 28 April 2023 by the EPA that a revision of the Offset Strategy would be required that included additional detail on how the offset will provide long term outcomes for the environmental values that are impacted. The proponent revised the draft Offset Strategy during 2023 to address the above requirement and to incorporate informal comments from regulators, including the DWER, DEMIRS and the DBCA (Preston 2024).

The EPA recognises the efforts the proponent undertook during 2023 to work with the DWER, DEMIRS and DBCA to revise its Offset Strategy.

Proposed offsets

The proponent has proposed four offsets to counterbalance the significant residual impacts of the proposal, detailed in the Offset Strategy (Preston 2024):

1. provision of a 427 ha exclusion zone offset for areas within Audalia's Mining Act tenure, (Figure 7), including land management costs

2. provision of a 6,940 ha off-tenement offset site (Figure 8) to protect significant flora values, including *Eucalyptus rhomboidea*, including land management costs
2. provision of funding ($500,000) for ongoing conservation management within the Bremer Range PEC, including significant flora populations
3. ongoing *Marianthus aquilonaris*, *Eucalyptus rhomboidea* and *Stenanthemum bremerense* research
4. attempted establishment in rehabilitation areas of *Eucalyptus rhomboidea* and *Stenanthemum bremerense* individuals impacted by the proposal.

The proponent has not proposed offsets for the HS-MWS1 floristic community in the revised Offset Strategy, as there is overlap with the other identified significant residual impacts and associated offsets, in particular those associated with the Bremer Range PEC (Preston 2022a).

The proponent has not specifically proposed offsets for *Hakea pendens*, however, it is noted that the offsets proposed for the Bremer Range PEC will also cover and provide benefits and enhancements for this species. The EPA has recommended additional offsets for *Hakea pendens* in alignment with the offsets proposed for *Eucalyptus rhomboidea* and *Stenanthemum bremerense*. The EPA considers that the research required for *Hakea pendens* may be lower than that required for *Eucalyptus rhomboidea* and *Stenanthemum bremerense* but providing clarity on its likely range may be required.

Specific advice on each of the proposed offsets is discussed under Assessment of proposed offsets, where provided.

Assessment of proponent offsets

Off-tenement exclusion zone – Direct offset

In response to feedback from the EPA and government stakeholders, the proponent has proposed a direct offset of a 6,940 ha off-tenement exclusion zone (Figure 8) to protect significant flora values, including *Eucalyptus rhomboidea*.

The EPA notes that the proposed offset site is comprised almost entirely of native vegetation in excellent condition. The offset site represents habitat for up to 14 significant flora species, of which six priority flora species (such as *Eucalyptus rhomboidea*) and two species of interest were identified during field surveys in 2023 (Western Botanical 2024), and it is likely that an additional six species (five priority species including *Teucrium diabolicum R.W.Davis & Wege* and one species of interest) are present (Western Botanical 2024).

The EPA also notes that the proposed offset is on land that is currently zoned Unallocated Crown land, within an area that is significantly mineralised and comprises extensive Mining Act tenements (Figure 4). The offset site would also preserve a connection between the Frank Hann National Park and the proposed Bremer Range Nature Reserve (Figure 8). The proponent has committed to protect

the site and provide funding for land management costs for a period of 20 years (Preston 2024).

Whilst not a specific offset requirement, the EPA has also considered whether the offset site represents some of the values of the proposed Bremer Range Nature Reserve and provides broader benefits. The EPA advises that close of half of the offset site occurs within the proposed Bremer Range Nature Reserve and connects this area to Frank Hann National Park which was identified in DBCA's plan for our parks for expansion. The offset thus does provide broader benefits as further outlined below. The proposed off-tenement offset comprises high biodiversity values, including *Eucalyptus rhomboidei*, which was a primary value the proposal area was considered for inclusion as a nature reserve (Henry-Hall 1990). Other key environmental values considered important for the proposed Bremer Range Nature Reserve included low lying land and areas of eucalypt woodland (Henry-Hall 1990). The proposed offset area also contains these values.

The EPA has considered whether the offsets are likely to counterbalance the significant residual impacts to significant flora and vegetation. The EPA's view is that the values of the off-tenement offset site are relevant to the environmental values being impacted. The EPA's preference is that the area is converted to conservation estate to achieve security of tenure and managed by DBCA or the Prescribed Body Corporate who holds native title over the land in conjunction with DBCA (see Section 6 Other Advice). It is EPA's view that the offset meets the values requirements as a direct offset, as the exclusion zone is a presumption against development in this area, with the exception of conservation activities and traditional owner access and activities. The exclusion zones will prevent native vegetation clearing and mining activities.

Establishment of on-tenement exclusion zone

The proponent has proposed a 427 ha on-tenement exclusion zone offset within their Mining Act tenure (Figure 7) and primarily situated within the original Mine Development Envelope referred (Figure 6; Preston 2024). The offset will prohibit the clearing of native vegetation and all mining activities for a period of 20 years.

The exclusion zone would protect 3.37 ha of *Marianthus aquilonaris* sub-population extent (74.7% of total extent), 38.7 ha of critical habitat (60.0%) and sub-populations 1a and 1d, representing 71.9% of all known individuals. The offset would also protect *Eucalyptus rhomboidea* and *Stenanthemum bremerense* population extent (61.7% and 19.6% respectively), 30.4% of known *Stenanthemum bremerense* individuals, 12.7% of known *hakea pendens* individuals and 427 ha of the Bremer Range PEC. The revised Offset Strategy commits to provide funding for land management costs for a period of 20 years (Preston 2024).

The exclusion zone provides an indirect offset for significant residual impacts to flora through conservation, preservation and research for significant flora and vegetation, and funding for land management costs within the exclusion zone. The EPA notes that the area is highly mineralised, and a significant number of mining tenements occur in the local and wider area. The exclusion zone, however, has the potential to

provide a direct offset given it is land that the proponent has set aside the purpose of research, conservation and the preservation of significant flora.

E. rhomboidea. S. bremerense and *Hakea pendens* establishment in rehabilitation areas

The proponent has proposed an indirect offset of attempted establishment of *Eucalyptus rhomboidea* and *Stenanthemum bremerense* individuals impacted by the proposal. The EPA notes that germination trials for *Eucalyptus rhomboidea* and *Stenanthemum bremerense* have been undertaken by DBCA and that these germination trials will continue to inform the target regrowth and establishment of individuals of both species (Preston 2024).

The EPA has considered whether the offsets are likely to counterbalance the significant residual impacts to *Eucalyptus rhomboidea* and *Stenanthemum bremerense* population extent. The EPA's view is that if successful this offset would offset impacts to *Eucalyptus rhomboidea* and *Stenanthemum bremerense*. The EPA has also recommended attempted establishment of *Hakea pendens* individuals impacted by the proposal in line with the offset requirements for *Eucalyptus rhomboidea* and *Stenanthemum bremerense.*

The EPA considers that there is some uncertainty with this offset but it will provide knowledge that can be used in rehabilitation and potential future restoration. The EPA notes that successful translocation of species has occurred such as at Mt Gibson for *Darwinia masonii.*

M. aquilonaris, E. rhomboidea, S. bremerense and *H. pendens* research

The proponent has proposed an indirect offset of ongoing research of *Marianthus aquilonaris*, *Eucalyptus rhomboidea* and *Stenanthemum bremerense*. This will continue the longer-term research that the proponent commissioned for the environmental review, including germination, plant numbers and health and rehabilitation trials. Information obtained from the research will inform the recovery and preservation planning for these species (Preston 2024). DBCA has advised that it supports investigations to advance the scientific understanding of the ecological requirements of conservation significant flora. The EPA considers that this research can be expanded with further work with DBCA and considers that the proponent should develop this research option further.

The EPA has considered whether the offsets are likely to counterbalance the significant residual impacts to *Marianthus. aquilonaris*, *Eucalyptus rhomboidea* and *Stenanthemum bremerense*. The EPA has also recommended ongoing research for *Hakea pendens*. The EPA's view is that the proposed offset will counterbalance the significant residual impacts and provide on ground benefits as well as future benefits for the species impacted. These benefits are in addition to the work that would be undertaken on the Bremer Range PEC, below.

Funding for management in the Bremer Range PEC

The proponent has proposed an indirect offset of the provision of funding of $500,000 for ongoing conservation management within the Bremer Range PEC, including of significant flora populations. The proponent proposes to contribute $100,000 per year for five years. The funding would be paid to an independent and transparent management authority which would be developed in consultation with EPA, DBCA and local landcare groups (Preston 2024). The EPA notes that the proponent has based the offset amount on similar offset requirements for impacts to other PECs in WA. The EPA notes that there are opportunities to rehabilitate and better manage areas within the Bremer Range PEC that have been impacted by historical exploration and clearing activities.

The EPA has considered whether the offsets are likely to counterbalance the significant residual impacts to the Bremer Range PEC. The EPA's view is that the proposed offset will counterbalance the significant residual impacts and provide benefits to the PEC across the Bremer Range.

Analysis of offsets against EPA public advice (EPA 2024)

The EPA has reviewed and considered proposal offsets against the guiding values in its *Public Advice for Considering Environmental Offsets at a Regional Scale* (EPA 2024):

1. **Restoration**: The proponent has proposed two exclusion zones in the Great Western Woodlands, comprising a 427 ha on-tenement and 6,940 ha off tenement exclusion zone. The exclusion zones will prevent native vegetation clearing and mining activities. The proponent has committed to protect the sites and provide funding for land management costs within these exclusion zones for a period of 20 years. The purpose of the exclusion zones is for conservation and to protect significant flora and vegetation values, including *Marianthus aquilonaris, Stenanthemum bremerense, Eucalyptus rhomboidea, Hakea pendens* and the PEC. This includes maintenance and improving the quality of flora habitat within the exclusion zones. The EPA has recommended conditions that require the proponent to develop techniques for restoration and establishment in historically cleared areas for *Eucalyptus rhomboidea* and *Stenanthemum bremerense*. In addition to the reestablishment of the Bremer Range PEC and HS-MWS1 floristic community

   The EPA considers revegetation and restoration is critical to achieve the outcome of maintaining significant flora habitat and the Bremer Range PEC. On ground management of the exclusion zones includes revegetation (re-establishment of native vegetation in degraded areas) and rehabilitation (repair of ecosystem processes and management of weeds, disease or feral animals) with the objective to achieve a tangible improvement to the environmental values in the offset area. The EPA has recommended conditions that include on-ground management requirements such as targets for environmental values to be achieved, including completion criteria that results in tangible improvement to environmental values being offset. The

proposed off-tenement offset is also situated within the proposed Bremer Range Nature Reserve.

2. **Regional scale management**: The proposed 6,940 ha off-tenement exclusion zone offset provides connection and ecological linkage to the Frank Hann National Park and Bremer Range, within the Great Western Woodlands. The proposed offset comprises up to six priority flora species, including *Eucalyptus rhomboidea*, a species that was the primary reason the Bremer Range Nature Reserve was proposed (Henry-Hall, 1990). The 427 ha on tenement exclusion zone provides protection for the Bremer Range PEC and other significant flora values. The proponent has proposed an indirect offset of ongoing research of *Marianthus aquilonaris*, *Eucalyptus rhomboidea* and *Stenanthemum bremerense*. This will continue the longer-term research that the proponent commissioned for the environmental review, including germination, plant numbers and health and rehabilitation trials. Information obtained from the research will inform the recovery and preservation planning for these species (Preston 2024). The offset will also apply to *Hakea pendens*.

   The EPA noted that extensive fires have previously occurred within the proposal area and considers that fire is likely to occur more in these regions from climate change. Climate change presents a high risk to *Marianthus aquilonaris, Eucalyptus rhomboidea* and *Stenanthemum.* The proponent has committed to undertaking fire management to protect the values within the exclusion zones. The proposed ongoing research within the exclusion zones will assist in managing impacts and enhance viability of these species (e.g. long-term fire management, preservation of genetic flows, pollination, preservation of genetic material) should the species be impacted by successive fire events that impact on seed banks and genetics in the future.

3. **Resilient systems**. The proposed offsets provide connectivity linkage to the Frank Hann National Park and the proposed Bremer Range Nature Reserve. The ongoing research trials for significant flora species will help inform recovery strategies for the species, with consideration to fire management and susceptibility to climate change and successive fire events.

   Expanding scientific knowledge: The on-tenement and off-tenement exclusion zones are intended to provide protection to significant flora and vegetation values. The proponent has committed to ongoing research as in indirect offset to improve scientific knowledge for *Marianthus aquilonaris*, *Eucalyptus rhomboidea* and *Stenanthemum bremerense.* The research includes germination trials, regional searches after fire events, sub-population health monitoring, rehabilitation trials and genetic studies for these species. In addition to annual plant count for *Marianthus aquilonaris.* The results of the research can be used to inform the recovery strategies and planning for these species.

   An indirect offset is proposed for the attempted establishment of *Eucalyptus rhomboidea* and *Stenanthemum bremerense* individuals impacted by the proposal. The offset will also apply to *Hakea pendens*. The offset will provide knowledge that can be used in rehabilitation and potential future restoration.

The EPA has recommended conditions for the research offset that require the proponent to identify how the ongoing performance of the offset measures and whether they are achieving the required outcomes and objectives will be made periodically publicly available.

4. **Like for like, and similar values:** The exclusion zones are situated within the Great Western Woodlands. The on-tenement exclusion zones provide protection to significant flora (*Marianthus aquilonaris*) and priority flora (*Eucalyptus rhomboidea*, *Stenanthemum bremerense* and *Hakea pendens*), and the Bremer Range PEC. The on-tenement exclusion zones will protect the area from native vegetation clearing and mining activities for a period of 20 years. The offset package comprises research for significant flora species impacted by the proposal, in addition to restoration of the Bremer Range PEC and significant flora species within historically disturbed areas.

5. ***Connectedness***: The proposal is located within the Great Western Woodlands. The offsets for the proposal include 7,367 ha, comprising a 427 ha on-tenement exclusion zone and 6,940 ha off-tenement exclusion zone within the Great Western Woodlands region. The off-tenement offset will preserve connectivity with the Frank Hann National Park and the proposed Bremer Range Nature Reserve (Figure 8).

6. **Co-benefits for social surroundings**: The exclusion zone offset areas are intended for the protection and conservation of significant flora and vegetation values, including research and land management. Other permitted activities within these areas include Traditional Owner access and cultural activities. The off-tenement offset site intersects the proposed Bremer Range Nature reserve, and comprises high biodiversity values, including *Eucalyptus rhomboidei* was a primary reason the area of the proposal was considered for inclusion as a nature reserve (Henry-Hall, 1990). The proposed offset packages include funding for land management in both exclusion zones, including research, revegetation and enhancements.

Conclusion

The EPA has considered whether the offset package is likely to counterbalance the likely significant residual impacts to significant flora and vegetation. The EPA acknowledges that the proponent has applied the mitigation hierarchy, including additional measures to further reduce potential impacts (principle 1 of the *WA Environmental Offsets Policy*; Government of Western Australia 2011). The proponent also concluded that the residual impact to significant flora (threatened flora (*Marianthus aquilonaris*) and priority flora that may be listed as threatened (*Eucalyptus rhomboidea, Stenanthemum Bremerense* and *Hakea pendens*) and significant vegetation (Bremer Range PEC) would be significant and proposed offsets to counterbalance the significant residual impact to these values. The EPA also recognises that the proponent revised its Offset Strategy in 2021 in response to submissions on the ERD and again in 2023 in response to advice from the EPA, DBCA and other government stakeholders.

The EPA's view is that the offset package is adequate to counterbalance the significant residual impacts to significant flora and vegetation values. The EPA recommends condition B4 be implemented to ensure that the offsets can counterbalance the likely significant residual impacts. The EPA notes that the additional details are required to finalise the Offset Strategy. Therefore, the EPA has recommended in Condition B4-4 that the proponent review and revise the Offset Strategy.

5 Recommendations

The EPA has taken the following into account in its assessment of the proposal:

- environmental values which may be significantly affected by the proposal
- assessment of key environmental factors, separately and holistically (this has included considering cumulative impacts of the proposal where relevant)
- likely environmental outcomes which can be achieved with the imposition of conditions
- consistency of environmental outcomes with the EPA's objectives for the key environmental factors
- EPA's confidence in the proponent's proposed mitigation measures
- whether other statutory decision-making processes can mitigate the potential impacts of the proposal on the environment and
- principles of the EP Act.

The EPA recommends that the proposal may be implemented subject to the conditions recommended in Appendix A.

6 Other advice

The EPA may, if it sees fit, include other information, advice or recommendations relevant to the environment in its assessment reports, even if that information has not been taken into account by the EPA in its assessment of a proposal. Regulation of the proposal by other DMAs is summarised in Appendix C.

The EPA provides the following information for consideration by the Minister.

Proponent's application of the mitigation hierarchy

The EPA considers that the proponent has proposed appropriate mitigation and offset measures for the impacts and has gone to significant lengths to avoid impacts to Threatened, priority flora and a priority ecological community. The EPA notes that the proponent has undertaken extensive searches and identified a 6,940 ha site which includes high biodiversity values such as *Eucalyptus rhomboidei. Eucalyptus rhomboidei* was a primary reason the area of the proposal was considered for inclusion as a nature reserve (Henry-Hall, 1990).

The proposed offset site provides a linkage between Frank Hann National Park and Bremer Range, and was identified with the assistance of DEMIRS, who support the site becoming a nature reserve. Almost half of the proposed off-tenement offset site occurs within the proposed Bremer Range Nature Reserve (Figure 8). The site is not supported by the DBCA for inclusion as a nature reserve. DBCA consider that the site does not contain values it wants to include in the conservation estate.

The EPA notes that the proposed Bremer Range Nature Reserve has not been enacted by government and the proponent has gone to considerable lengths to identify and work with government, where possible, to find a site that can counterbalance the impacts from the proposal. In particular, the EPA notes that the proposed offset does contain *Eucalyptus rhomboidei* which was a primary reason for the proposed Bremer Range Nature Reserve. The EPA further notes that nearly half of the proposed offset site occurs within the proposed Bremer Range Nature Reserve and the spatial area within the proposed nature reserve is significantly higher than the area of proposed impacts from implementation of the proposal. The EPA advises the Minister that it is outside its scope to request government agencies to accept proposals for nature reserves but considers on a values basis that the proposed offset site, under the current offset guidelines, is an appropriate option to counterbalance the impacts to *Eucalyptus rhomboidei* and impacts to the proposed Bremer Range Nature Reserve.

Strategic approach to offsets

The EPA notes that the proponent has worked with DEMIRS and DWER for the provision of a 6,940 ha off-tenement exclusion zone offset to protect significant flora values, including *Eucalyptus Rhomboidei,* which was a key value for the proposed Bremer Range Nature Reserve in the area of the proposal (Henry-Hall, 1990). The off-tenement offset provides connectivity with the proposed Bremer Range Nature Reserve and Frank Hann National Park, and has the potential to extend the area protected by the Frank Hann National Park by approximately 7,000 ha.

The proponent has also provided a 427ha on-tenement exclusion zone that provides indirect and a potential direct offsets for significant flora and vegetation values.

The exclusion zones will prevent the clearing of native vegetation and all mining activities for a period of 20 years, and are a presumption against development, in an area of high ecological value and with the potential to become under pressure due to a large number of mining tenements and mineralisation in the area (Figure 4). The EPA's preference is that the 6,940 ha off-tenement direct offset area be converted to conservation estate to achieve security of tenure and managed by DBCA or the Prescribed Body Corporate who holds native title over the land in conjunction with DBCA. However, DBCA are not in a position to support the site for inclusion as a nature reserve at this time.

The EPA is of the view that there is a need for a coordinated and strategic approach to offsets across government. The EPA further advises that there is not always a clear linkage between land requested for the conservation estate at a landscape scale and the offsetting of specific values from a development.

The EPA considers that a whole-of-government approach is needed to enable prioritisation and use of lands for offsets in the Great Western Woodlands. The EPA considers that the government should use a similar approach to plan for our parks to develop advanced offsets in areas of higher biodiversity for future developments. The EPA advises that the program would reduce the need for detailed assessment and provide better environmental outcomes for future developments.

The EPA recognises the pressure within the Great Western Woodlands from the large number of mining tenements and significant mineralisation in the area (Figure 4). This highlights a need for a strategic approach for the management and offset of environmental values within the area. The EPA's Strategic Plan promotes the development of regional environmental protection frameworks for significant environmental assets and intended to identify regions for inclusion. The EPA considers there is a need for a regional environmental protection framework for the Great Western Woodlands given the significant environmental values and potential cumulative impacts from critical minerals in the area.

Appendix A: Recommended conditions

Section 44(2)(b) of *Environmental Protection Act 1986* specifies that the EPA's report must set out (if it recommends that implementation be allowed) the conditions and procedures, if any, to which implementation should be subject. This appendix contains the EPA's recommended conditions and procedures.

Appendix B: Regulation by other DMA processes

Table B1: Identified relevant decision-making authorities for the regulation of outcomes for the proposal

Statutory decision-making process	Environmental outcome
Mining Act 1978	1. Rehabilitated vegetation is self-sustaining 2. Rehabilitated areas are consistent with the species diversity and abundance of native vegetation within comparative analogue or reference sites 3. Rehabilitation includes the use of native seeds collected from native vegetation adjacent to the proposal 4. Rehabilitation includes research for the rehabilitation and re-establishment of significant flora species and other local provenance species 5. No impacts to soil, surface water and groundwater quality (from the tailings storage facility and evaporation pond) 6. Closure planning and rehabilitation are undertaken in a progressive manner consistent with achievement of the above outcomes during operations, where practicable, and as soon as practicable upon closure.
Environmental Protection Act 1986 *- part V works approval and licence*	Regulate emissions and discharges from construction and operations to achieve the following outcomes: 1. No adverse impacts to soil, surface water and groundwater quality (including from the TSF) 2. Maintain air quality and minimise emissions so that environmental values are protected 3. Protect sensitive receptors from dust.
Rights in Water and Irrigation Act 1914	1. No adverse impacts to groundwater or surface water.
Aboriginal Heritage Act 1972 *- section 18 consent to impact a registered* *Aboriginal heritage site)*	No disturbance to Aboriginal cultural heritage, unless consent is granted to disturb that site under the *Aboriginal Heritage Act 1972* and has involved reasonable steps to consult with relevant Traditional Owners.

Appendix C: Decision-making authorities

Table B1: Identified relevant decision-making authorities for the proposal

Decision-Making Authority	Legislation (and approval)
1. Minister for Aboriginal Affairs	*Aboriginal Heritage Act 1972* - section 18 consent to impact a registered Aboriginal heritage site OR *Aboriginal Cultural Heritage Act 2021* - Part 6 permit for consent to impact a registered Aboriginal heritage site
2. Minister for Environment	*Biodiversity Conservation Act 2016* - section 40 authority to take or disturb threatened species
3. Minister for Water	*Rights in Water and Irrigation Act 1914* - permit to interfere with beds and banks - permit to take water - groundwater abstraction licence - licence to construct bores - dewatering licence
4. Minister for Mines and Petroleum	*Mining Act 1978* - granting of a new mining lease
5. Minister for Transport	*Main Roads Act 1930* - *approval for Commissioner to construct roads*
6. Chief Executive Officer, Department of Biodiversity, Conservation and Attractions	*Biodiversity Conservation Act 2016* - authority to take flora and fauna (other than threatened species)
7. Chief Executive Officer, Department of Water and Environmental Regulation	*Environmental Protection Act 1986* - part V works approval and licence
8. Chief Dangerous Goods Officer, Department of Energy, Mines, Industry Regulation and Safety	*Dangerous Goods Safety Act 2004* storage and handling of dangerous goods
9. Chief Executive Officer, Shire of Dundas	*Building Act 2011* - permit for worker accommodation
10. Chief Health Officer, Department of Health	*Health Act 1911* Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulation 1974
11. Commissioner for Main Roads Western Australia	*Main Roads Act 1930* Application to undertake works within road reserve

Decision-Making Authority	Legislation (and approval)
12. Executive Director Resource and Environmental Compliance, Department of Mines, Industry Regulation and Safety	*Mining Act 1978* - mining proposal
13. State Mining Engineer, Department of Energy, Mines, Industry Regulation and Safety	*Mines Safety and Inspection Act 1994* - mine safety - approval to commence mining operations

Appendix D: Environmental Protection Act principles

Table C1: Consideration of principles of the *Environmental Protection Act 1986*

EP Act principle	Consideration
1. The precautionary principle *Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In application of this precautionary principle, decisions should be guided by –* *(a) careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and* *(b) an assessment of the risk-weighted consequences of various options.*	The EPA has considered the precautionary principle in its assessment and has had particular regard to this principle in its assessment of flora and vegetation and terrestrial fauna. The proponent has undertaken biodiversity studies and investigations to provide scientific information to identify environmental values of the proposal area and assess the risks and potential impacts on the environment from the proposal. The EPA notes that the proponent has considered different options in designing the proposal and proposed avoidance measures to avoid impacts on the environment by: • redesigning the mine to avoid all Threatened Flora (*Marianthus aquilonaris*) populations • relocation of infrastructure away from known Threatened and Priority flora records, reducing impacts on areas with greater biodiversity • selecting the haul road alignment that avoids significant surface water flow crossings and landforms of ecological and Aboriginal heritage importance such as granite outcrops and salt lakes • designing the project to avoid direct impacts to 5 of the 10 priority flora species recorded during surveys, including two Priority 1 species • redesigning the borrow pit in the Haul Road Development Envelope to avoid the location of the record of the potential SRE species Garypidae `BPS333`. The proponent has also proposed limits on impacts and mitigation measures to reduce impacts on the environment. Given the biodiversity values of the Bremer Range, the EPA has recommended conditions to impose limits on the disturbance of other Priority flora and locally important vegetation. The EPA has applied conditions where there is uncertainty to prevent and avoid environmental impacts from occurring, and imposed conditions to counterbalance significant residual impacts where they may occur. The EPA has concluded that subject to the implementation of the recommended conditions, the proposal is unlikely to pose a threat of serious or irreversible harm.
2. The principle of intergenerational equity *The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.*	The EPA has considered the principle of intergenerational equity in its assessment and has had particular regard to this principle in its assessment of flora and vegetation. The EPA notes that the proponent has identified measures to avoid and minimise impacts to the key environmental factors for flora and vegetation, terrestrial fauna, and terrestrial environmental quality and inland waters. The EPA has considered these measures during its assessment and has recommended conditions to ensure that appropriate measures are implemented.

EP Act principle	Consideration
	The EPA considers that rehabilitation, particularly revegetation, is important and recommends rehabilitation of the disturbance footprint is undertaken. The EPA notes that successful rehabilitation of some Priority flora species may be difficult to achieve in all scenarios and preferred avoidance and minimisation of impacts as its mitigation to reduce impacts. The EPA has also recommended that offsets are imposed to ensure that the significant residual impacts for flora and vegetation values are counterbalanced. This includes direct and indirect offsets that provide for the protection of areas containing significant vegetation including the Bremer Range PEC and locally important vegetation, and Threatened and Priority flora, which will maintain the environment. The offsets also include funding towards research and return of species with a significant residual impact. The EPA has concluded that the environmental values are likely to be protected and that the health, diversity and productivity of the environment is likely to be maintained and enhanced for the benefit of future generations.
3. The principles of the conservation of biological diversity and ecological integrity *Conservation of biological diversity and ecological integrity should be a fundamental consideration.*	The EPA has considered the principle of conservation of biological diversity and ecological integrity in its assessment and has had particular regard to this principle in its assessment of flora and vegetation. The EPA has considered to what extent the potential impacts from the proposal to flora and vegetation can be ameliorated to ensure consistency with the principle of conservation of biological diversity and ecological integrity, including by provision of offsets. As discussed for Principle 1, the EPA has recommended limits of disturbance to Priority flora and locally important vegetation implementation of mitigation measures, which will contribute to the conservation of biodiversity diversity and ecological integrity of these values. The EPA has required the proponent to avoid and minimise impacts to a low level and propose direct and indirect offsets to contribute to the conservation of biological diversity and ecological integrity of the area.
4. Principles relating to improved valuation, pricing and incentive mechanisms *(1) Environmental factors should be included in the valuation of assets and services.* *(2) The polluter pays principle — those who generate pollution and waste should bear the cost of containment, avoidance or abatement.* *(3) The users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any wastes.*	In considering this principle, the EPA notes that the proponent will bear the costs relating to implementing the proposal to achieve environmental outcomes, and management and monitoring of environmental impacts during construction, operation and decommissioning of the proposal. The EPA has had particular regard to this principle in considering flora and vegetation, terrestrial fauna, terrestrial environmental quality and inland waters. The EPA notes that the proponent will be responsible for bearing the cost of rehabilitation and acquisition and management.

EP Act principle	Consideration
(4) Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solutions and responses to environmental problems.	
5. The principle of waste minimisation *All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.*	The EPA has considered the principle of waste minimisation in its assessment and has had particular regard to this principle in its assessment of terrestrial environmental quality and inland waters. In considering this principle, the EPA notes that the proponent states waste would be minimised by adopting the hierarchy of waste controls; avoid, minimise, reuse, recycle and safe disposal. The EPA notes that the proponent has designed the proposal and proposed the following measures to minimise the generation of waste and minimise the discharge of waste into the environment, including the following: • amending the proposal to remove a waste rock landform and utilise the mined waste rock materials in the construction of embankments for the TSF • constructing a causeway at crossing across a tributary of Lake Medcalf (Crossing 1) to avoid the excavation of potential acid sulphate soils • designing, constructing and operating the TSF and evaporation ponds to minimise overtopping and seepage, and brine spills from the reverse osmosis plant • using brackish groundwater in processing, which avoids the production of brine from reverse osmosis processes.

Appendix E: Other environmental factors

Table D1: Evaluation of other environmental factors

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
Land			
Subterranean fauna	Direct disturbance of troglofaunal habitat from pit excavation	Public comments • Submitter requested that the EPA apply the Precautionary Principle in the absence of the results from the third troglofauna survey round • Submitter raised that population size and range estimates are needed. Agency comments DWER Requested the results of the third troglofauna sampling round.	The EPA did not identify Subterranean fauna as a preliminary key environmental factor when the EPA decided to assess the proposal. Stygofauna None of the bores in the water supply borefield areas targeted for stygofauna sampling yielded any stygofauna. All except one of the bores sampled had hypersaline groundwater at the top of the water table, which is consistent with a depauperate community (Bennelongia 2020, Appendix 6 of the ERD). Troglofauna Appendix 7 of the Proponent's RtS provides an update of the assessment of the subterranean fauna values provided with the ERD (Bennelongia 2020), to include the results of a third round of troglofauna sampling. As committed to in the RtS, the proponent also provided an additional geological assessment (of troglofaunal habitat) to the EPA (Audalia Resources 2022b) prior to the completion of its assessment. The proponent revised the subterranean fauna assessment to include the results of the geological assessment (Bennelongia 2021). The findings of the updated subterranean fauna (troglofauna) assessment are summarised below: • The area contains a low diversity of troglofauna • Of the nine troglofauna species recorded within and outside pit areas, three species were recorded only in pit areas • The occurrence of pit-collected species in both impact and reference holes suggests it is likely that the three species collected in the proposed mine pit areas only have more extensive distributions • Mapped geologies provide support for the notion that species are likely to have wider ranges. It is therefore considered unlikely that any of the troglofauna

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
			species recorded will have distributions entirely confined to the small proposed mine pits. Having regard to: • the significance of considerations in the *Statement of environmental principles, factors, objectives and aims of EIA* (EPA 2021a), the *Environmental factor guideline – Subterranean fauna* (EPA 2016f) and *Technical guidance – Subterranean fauna surveys for environmental impact assessment* (EPA 2021c) • the surveys undertaken by the proponent, that are adequate to inform the assessment • no stygofauna were recorded in the bores in the water supply borefield areas • advice from the DWER that it is unlikely that the three troglofauna species recorded only in pit areas would be restricted to the proposed mine pits, which is supported by the updated geological assessment the EPA considers it is unlikely that the proposal would have a significant impact on subterranean fauna. Accordingly, the EPA did not consider subterranean fauna to be a key environmental factor at the conclusion of its assessment.
Terrestrial environmental quality and inland waters	Potential contamination of soils, surface water and groundwater from the indirect impacts of seepage from the TSF Minor changes to surface water flow regimes from the direct impact of catchment reduction and interruption of surface water flows	<u>Public comments</u> • Submitters raised concerns with the use of saline water for dust suppression, maintenance of surface water flows and rehabilitation of pits and landforms. <u>Agency comments</u>	The EPA considered inland waters and terrestrial environmental quality as preliminary key environmental factors when the EPA decided to assess the proposal. In considering the potential impacts to terrestrial environmental quality, the EPA had regard to the following: • Seepage from the TSF presents a low risk to the environment as the tailings have lower toxicity and groundwater is 30-40 below ground level and hypersaline • The proponent has committed to manage mine wastes through assessment during the life of mine and clean up of any potential leachate • Groundwater drawdown is expected to be 1 – 2 m within 2 km of each bore, which is unlikely to affect any other users or the environment • The proponent has committed to design infrastructure to minimise erosion and surface water flows and the impacts are likely to be minor.

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
	Drawdown of up to 1-2 m from the direct impact of groundwater abstraction	DWER advised that there was the potential for the release of vanadium from mine waste	Emissions to soil and water quality from prescribed premises (including the TSF) can be adequately assessed, managed and regulated under Part V of the EP Act. In addition, DEMIRS can manage the design of mine waste storage facilities to ensure there is limited leaching potential for minerals and they are encapsulated in waste rock landforms. Finally, DWER can place limitation on groundwater abstraction to ensure impacts are as predicted in this assessment. Considering the above, the EPA notes that the likely impacts to terrestrial environmental quality and inland waters can be regulated by other decision-making authorities including: • the Mining Act will mitigate impacts to soil and water quality from the TSF and evaporation pond • Part V of the EP Act will mitigate emissions to land and water quality • the RIWI Act will mitigate impacts to groundwater, in a manner that will meet the EPA objectives for Inland waters and Terrestrial environmental quality and that these factors do not require further assessment under Part IV of the EP Act. Accordingly, the EPA did not consider inland waters to be a key environmental factor at the conclusion of its assessment.
Landforms	There is a potential change to the landform of the Bremer Range	<u>Public comments</u> • No comments received. <u>Agency comments</u> • No comments received.	The EPA did not identify Landforms as a preliminary key environmental factor when the EPA decided to assess the proposal. The Bremer Range is considered to be a large landform that comprises the Bremer Range priority ecological community (PEC) along its length. The proposed impacts to this section of the landform are not considered to represent impacts to areas of high geoheritage or cultural heritage. The proposal will impact up to 285 ha or 0.39% of the 72,845 ha Bremer Range PEC and 0.61% of the 50,908 ha proposed Bremer Range Nature Reserve (that has not yet been enacted by government). The main values that have the potential to be associated with landform have been assessed under flora and vegetation, and terrestrial fauna, and these are likely to meet the EPA's objectives. At the end of the assessment, the EPA did not consider landforms to represent significant additional or different the impacts to Flora and Vegetation and Terrestrial Fauna. Noting the EPA's view on flora and vegetation, and terrestrial fauna, it did

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
			not consider landforms to be a key environmental factor at the conclusion of its assessment.
Air			
Greenhouse gas (GHG) emissions	GHG emissions contribute to climate change, which impacts on WA's environment	<u>Public comments</u> • Submitter raised that broader-scale impacts of the carbon emissions (contribution to global warming) are not accounted for. Suggests use of renewable energy sources and carbon offsets. <u>Agency comments</u> DWER Raised that the land disturbance assumption used for the GHG emissions calculations in Section 4.1 of Appendix 9 is 400 ha, which is inconsistent with the disturbance of 650 ha in the ERD.	The EPA did not identify GHG emissions as a preliminary key environmental factor when the EPA decided to assess the proposal. The approved Environmental Scoping Document (ESD) for the proposal (Preston 2019) required that the following to be discussed in the ERD: • provide an estimate of the expected annual Scope 1 (direct) GHG emissions from the proposal • provide details of any mitigation measures designed to avoid or minimise GHG emissions during the implementation of the proposal. No Scope 2 (energy indirect) emissions were considered given that there is no purchase of off-site power (Preston 2022a). The estimated scope 1 emissions for the proposal are (Preston 2022a): • construction (including land clearing): 58,146 t CO_2-e/yr for 1 year • operations: 50,288 t CO_2-e/yr for 13 years • decommissioning: 9,036 t CO_2-e/yr for 1 year. The total scope 1 GHG emissions for the proposal are an average of 48,062 t CO_2-e/yr over the 15 year project life. The proponent confirmed in its RtS document (Preston 2022a) that the GHG estimate in Table 74 of the ERD for land disturbance (Land use change) was updated based on 650 ha of land clearing (35,555 t CO_2-e) from the estimate in Appendix 9 which was based on 400 ha of land clearing (21,880 t CO_2-e). Regarding the submission on renewable energy, the proponent notes in its RtS document (Preston 2022a) that the implementation of a solar farm is dependent on open areas of suitable land being available at the end of the construction phase. A portion of the borrow pit may be repurposed as a solar farm with associated vanadium batteries after it has been backfilled with overburden.

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
			Consistent with the requirements of the ESD to provide mitigation measures designed to avoid or minimise GHG emissions (Preston 2019), the proponent has outlined measures to minimise GHG emissions in the ERD (Preston 2021a). Having regard to: • the significance of considerations in the *Statement of environmental principles, factors, objectives and aims of EIA* (EPA 2021a) • the *Environmental factor guideline – Greenhouse gas emissions* (GHG guideline) (EPA 2023a) which states that generally, GHG emissions from a proposal will be considered where the scope 1 emissions or Scope 2 emissions exceed 100,000 t CO_2-e in any year • the highest annual scope 1 GHG emissions of 58,146 t CO_2-e during construction and annual scope 1 emissions of 50,288 t CO_2-e/yr during operations is well below the GHG guideline threshold of 100,000 t CO_2-e scope 1 emissions • there are negligible Scope 2 emissions, the EPA considers that the proposal is consistent with the EPA's GHG guideline. Accordingly, the EPA did not consider GHG emissions to be a key environmental factor at the conclusion of its assessment.
People			
Social surroundings	Potential disturbance to Aboriginal heritage sites and areas or artefacts of Aboriginal cultural value	Public comments None received. Agency comments None received.	The EPA did not identify social surroundings as a preliminary key environmental factor when the EPA decided to assess the proposal. The approved ESD for the proposal (Preston 2019) did not consider social surroundings to be an 'other environmental factor or matter' relevant to the proposal. The proposal is within the Ngadju native title claim area. The Ngadju people are the sole native title holders and are represented by the Ngadju Native Title Aboriginal Corporation (NNTAC). The ERD (Preston 2021) summarises the Aboriginal cultural heritage surveys and consultation with the Ngadju people undertaken for the proposal: • Surveys were undertaken with the assistance of nominated Ngadju Native Title Holders.

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
			• Archaeological and ethnographic heritage surveys undertaken within the mining tenement confirmed that rock shelters were not significant pursuant to Section 5 of the *Aboriginal Heritage Act 1978*. • Anthropological heritage surveys undertaken within the proposed haul road corridor did not identify any sites. No specific areas of bush tucker or bush medicine were identified during consultation (Preston 2021). During the assessment of the proposal, the proponent confirmed that they had consulted with the NNTAC since the preparation of the ERD. In May 2021 the proponent met with the NNTAC to provide a project update and the ERD for their review. The proponent also confirmed that all recorded heritage sites would be avoided. NNATC notified the proponent that they had no comments on the ERD however wished to reiterate that the proponent would need to comply with the Land Access Deed between the Ngadju People and the proponent. The proponent states in the RtS document that given the small scale and relative flexibility of the proposal that the disturbance of heritage sites is unlikely to be required and the disturbance of areas or artefacts of significant Aboriginal cultural value are expected to be able to be avoided (Preston 2022a). There are no sensitive receptors within the vicinity of the proposal and the nearest town is Norseman, located approximately 100 km east from the proposal. The area adjacent to and surrounding the proposal does not comprise any tourism, public access roads or social amenity. The EPA notes that the proposed on-tenement and off-tenement exclusion zones allow for Traditional Owner access and cultural activities. Having regard to: • the significance of considerations in the *Statement of environmental principles, factors, objectives and aims of EIA* (EPA 2021a), *Environmental factor guideline – Social surroundings* (EPA 2023b) and *Technical Guidance Environmental impact assessment of Social Surroundings – Aboriginal cultural heritage* (EPA 2023c) • the surveys and consultation undertaken by the proponent • heritage sites and areas or artefacts of significant Aboriginal cultural value are likely to be avoided

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
			• disturbance of heritage sites and areas or artefacts of significant Aboriginal cultural value (if required) can be regulated under the *Aboriginal Heritage Act 1972* • the absence of sensitive receptors, public access roads or social amenity in the area, the EPA considers that potential impacts from the proposal on social surroundings can be managed and regulated (if required) to be consistent with the EPA's objective for social surroundings. Accordingly, the EPA did not consider social surroundings to be a key environmental factor at the conclusion of its assessment.
Human health	Potential concentrations of low levels of radioactive materials	<u>Agency comments</u> DWER Raised that the reject brine is likely to contain concentrations of radium and should be treated as technologically enhanced naturally occurring radioactive materials (TENORM) and managed as such	The EPA did not identify human health as a preliminary key environmental factor when the EPA decided to assess the proposal. The approved ESD for the proposal (Preston 2019) did not consider human health to be an 'other environmental factor or matter' relevant to the proposal. The proponent responded to DWER's comments in the RtS (Preston 2022a). Material characterisation reports (Appendix 7.1 and 7.2 of the ERD) indicate concentrations of Uranium and Thorium in the waste rock and tailings are in very low concentrations below the criteria that would trigger specific radiation management. Having regard to: • the significance of considerations in the *Statement of environmental principles, factors, objectives and aims of EIA* (EPA 2021a) and the *Environmental factor guideline – Human health* (EPA 2016g) • material characterisation reports indicate concentrations of radionuclides are in very low concentrations below the criteria that would trigger specific radiation management • radiation can be regulated by the DEMIRS and Radiological Council, the EPA considers that potential impacts from the proposal on human health can be managed and regulated (if required) to be consistent with the EPA's objective for human health and did not consider human health to be a key environmental factor at the conclusion of its assessment

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
			Accordingly, the EPA did not consider human health to be a key environmental factor at the conclusion of its assessment.

Appendix F: Relevant policy, guidance and procedures

The EPA had particular regard to the policies, guidelines and procedures listed below in the assessment of the proposal.

- *Environmental factor guideline – Flora and vegetation* (EPA 2016)
- *Environmental factor guideline – Terrestrial fauna* (EPA 2016)
- *Environmental factor guideline – Terrestrial environmental quality* (EPA 2016)
- *Environmental factor guideline – Inland waters* (EPA 2018)
- *Environmental factor guideline – Subterranean fauna* (EPA 2016)
- *Environmental factor guideline – Greenhouse gas emissions* (EPA 2023).
- *Environmental factor guideline – Social surroundings* (EPA 2023)
- *Environmental factor guideline – Human health* (EPA 2016)
- *Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual* (EPA 2021b)
- *Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2021* (State of Western Australia 2021)
- *Statement of environmental principles, factors, objectives and aims of EIA* (EPA 2021a)
- *Technical guidance – Flora and vegetation surveys for environmental impact assessment* (EPA 2016)
- *Technical guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA 2020).
- *Technical guidance – Sampling of short-range endemic invertebrate fauna* (EPA 2016)
- *Technical guidance – Subterranean fauna surveys for environmental impact assessment* (EPA 2021)
- *Technical Guidance Environmental impact assessment of Social Surroundings – Aboriginal cultural heritage* (EPA 2023)
- *WA Environmental Offsets Policy* (Government of Western Australia 2011)
- *WA Environmental Offsets Guidelines* (Government of Western Australia 2014)

Appendix G: List of submitters

7-day comment on referral

Organisations and public

- 14 submissions were received from the public during the 7-day public comment period.

Public review of proponent information

Organisations and public

- Public submission 1

Government agencies

- Department of Biodiversity, Conservation and Attractions
- Department of Energy, Mines, Industry Regulation and Safety
- Department of Water and Environmental Regulation
- Main Roads Western Australia

Appendix H: Assessment timeline

Date	Progress stages	Time (weeks)
13 March 2018	EPA decided to assess – level of assessment set	
01 April 2019	EPA approved Environmental Scoping Document	55
02 March 2021	EPA accepted Environmental Review Document	100
08 March 2021	Environmental Review Document released for public review	6 days
03 May 2021	Public review period for Environmental Review Document closed	8
01 July 2022	EPA accepted proponent's Response to Submissions	61
18 August 2022	EPA considered proposal and provided advice on offsets	7
25 January 2024	EPA received updated offsets strategy	75
21 March 2024	EPA completed its assessment	8
28 March	EPA received additional information for assessment	1
24 April 2024	EPA provided report to the Minister for Environment	27 days
1 May 2024	EPA report published	3 days
22 May 2024	Appeals period closed	3 weeks

Timelines for an assessment may vary according to the complexity of the proposal and are usually agreed with the proponent soon after the EPA decides to assess the proposal and records the level of assessment.

In this case, the EPA met its timeline objective to complete its assessment and provide a report to the Minister.

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